Computer algebra independent integration tests

8-Special-functions/8.1-Error-functions

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Contents

Chapter 1

Introduction

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

The number of integrals in this report is [311]. This is test number [204].

1.1 Listing of CAS systems tested

The following systems were tested at this time.

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

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

Sympy was called directly using Python.

1.2 Results

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

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

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

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

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

System	solved	Failed
Rubi	% 100.00 (311)	% 0.00 (0)
Mathematica	% 96.46 (300)	% 3.54 (11)
Maple	% 57.56 (179)	% 42.44 (132)
Maxima	% 45.02 (140)	% 54.98 (171)
Fricas	% 82.96 (258)	% 17.04 (53)
Sympy	% 54.02 (168)	% 45.98 (143)
Giac	% 42.77 (133)	% 57.23 (178)
Mupad	% 65.27 (203)	% 34.73 (108)

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.

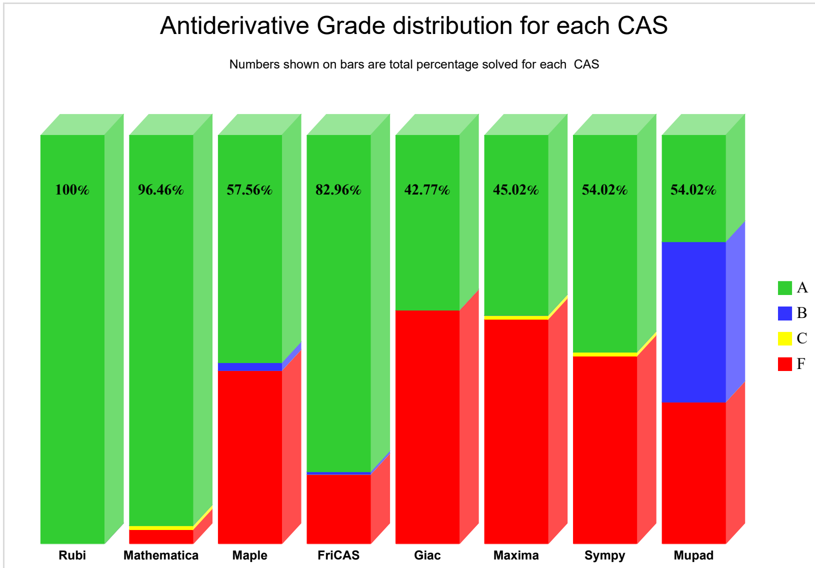
Table 1.2: Description of grading applied to integration result

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

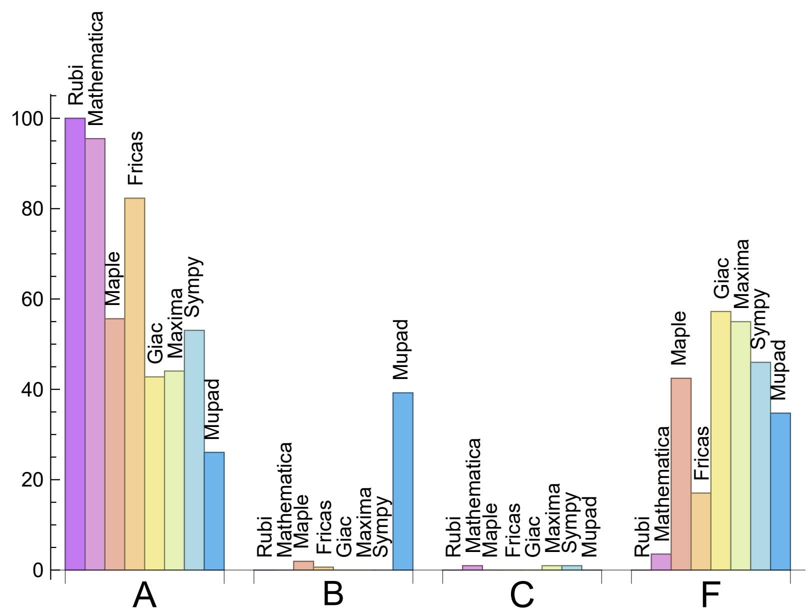
System	% A grade	% B grade	% C grade	% F grade
Rubi	100.00	0.00	0.00	0.00
Mathematica	95.50	0.00	0.96	3.54
Maple	55.63	1.93	0.00	42.44
Maxima	44.05	0.00	0.96	54.98
Fricas	82.32	0.64	0.00	17.04
Sympy	53.05	0.00	0.96	45.98
Giac	42.77	0.00	0.00	57.23
Mupad	26.05	39.23	0.00	34.73

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	11	100.00 %	0.00 %	0.00 %
Maple	132	99.24 %	0.00 %	0.76 %
Maxima	171	98.83 %	1.17 %	0.00 %
Fricas	53	100.00 %	0.00 %	0.00 %
Sympy	143	67.13 %	18.88 %	13.99 %
Giac	178	100.00 %	0.00 %	0.00 %
Mupad	108	100.00 %	0.00 %	0.00 %

Table 1.4: Time and leaf size performance for each CAS

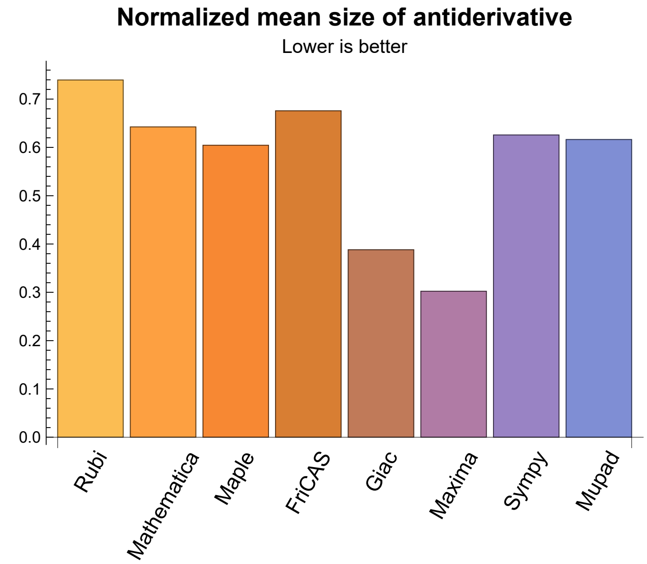
1.3 Performance

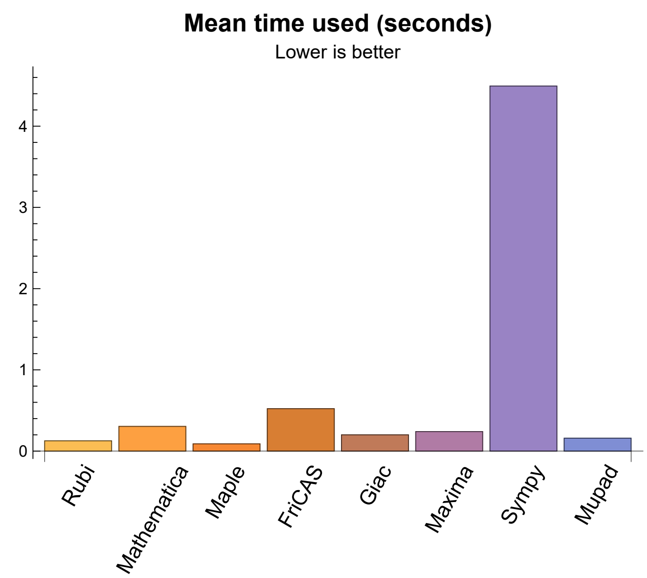
The table below summarizes the performance of each CAS system in terms of CPU time and leaf size of results.

System	Mean time (sec)	Mean size	Normalized mean	Median size	Normalized median
Rubi	0.13	68.68	0.74	59.00	1.00
Mathematica	0.30	56.06	0.64	51.00	0.77
Maple	0.09	56.31	0.60	26.00	0.81
Maxima	0.24	16.39	0.30	0.00	0.00
Fricas	0.52	64.48	0.68	51.00	0.76
Sympy	4.49	53.59	0.63	19.50	0.85
Giac	0.20	42.61	0.39	0.00	0.00
Mupad	0.16	52.44	0.62	24.00	0.77

Table 1.5: Time and leaf size performance for each CAS

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





1.4 list of integrals that has no closed form antiderivative

{19, 20, 21, 25, 32, 33, 34, 38, 39, 56, 57, 58, 59, 60, 61, 62, 63, 78, 79, 80, 88, 89, 90, 91, 92, 93, 94, 122, 123, 124, 128, 135, 136, 137, 141, 142, 159, 160, 161, 162, 163, 164, 165, 166, 181, 182, 183, 191, 192, 193, 194, 195, 196, 197, 225, 226, 227, 231, 238, 239, 240, 244, 245, 262, 263, 264, 265, 266, 267, 268, 269, 286, 287, 288, 296, 297, 298, 299, 300, 301, 302}

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 {125, 126, 127, 138, 139, 171, 172, 173, 174, 176, 177, 184, 185, 189, 199, 200, 203, 204, 205, 206, 276, 277, 278, 280, 281, 282}

Maple Verification phase not implemented yet.

Maxima Verification phase not implemented yet.

Fricas Verification phase not implemented yet.

Sympy Verification phase not implemented yet.

Giac Verification phase not implemented yet.

Mupad Verification phase not implemented yet.

1.7 Timing

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

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

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

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

1.8 Verification

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

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

1.9 Important notes about some of the results

1.9.1 Important note about Maxima results

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

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

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

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

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

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

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

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

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

1.9.2 Important note about FriCAS and Giac/XCAS results

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

These will fail With error `Exception raised: NotImplementedError`

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

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

1.9.3 Important note about finding leaf size of antiderivative

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

The other CAS systems (SageMath and Sympy) do not have special buildin function for this purpose at this time. Therefore the leaf size for Fricas and Sympy and Giac antiderivatives is determined using the following function, thanks to user `slelievre` at `https://`

ask.sagemath.org/question/57123/could-we-have-a-leaf_count-function-in-base-sagemath/

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

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

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

  except Exception as ee:
         leafCount =1
```

1.9.4 Important note about Mupad results

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

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

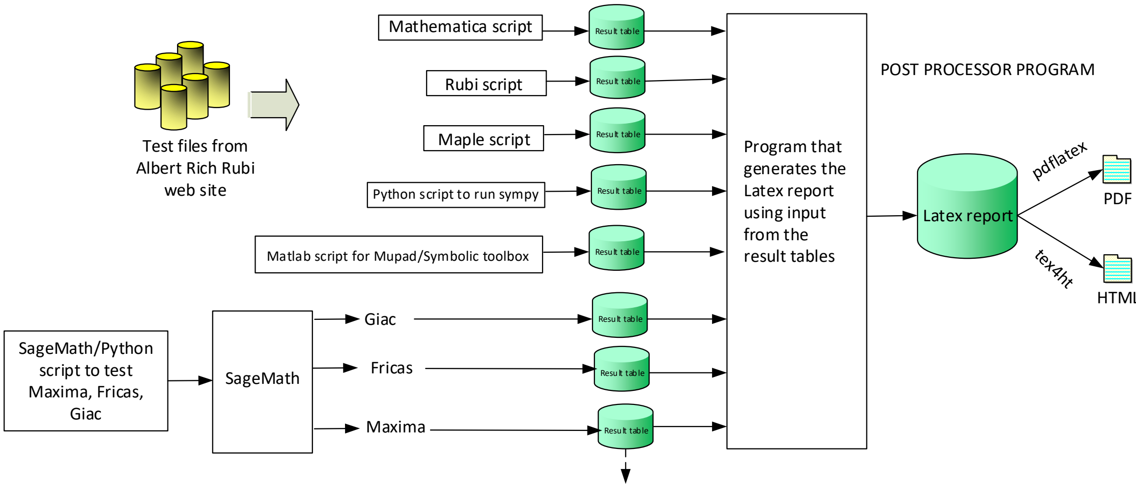
The following is an example of using Matlab's symbolic toolbox (Mupad) to solve an integral

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

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

1.10 Design of the test system

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



One record (line) per one integral result. The line is CSV comma separated. This is description of each record

1. integer, the problem number.
2. integer. 0 for failed, 1 for passed, -1 for timeout, -2 for CAS specific exception. (this is not the grade field)
3. integer. Leaf size of result.
4. integer. Leaf size of the optimal antiderivative.
5. number. CPU time used to solve this integral. 0 if failed.
6. string. The integral in Latex format
7. string. The input used in CAS own syntax.
8. string. The result (antiderivative) produced by CAS in Latex format
9. string. The optimal antiderivative in Latex format.
10. integer. 0 or 1. Indicates if problem has known antiderivative or not
11. String. The result (antiderivative) in CAS own syntax.
12. String. The grade of the antiderivative. Can be “A”, “B”, “C”, or “F”

    The following field present only in Rubi and Mathematica Tables

13. integer. 1 if result was verified or 0 if not verified.

    The following fields present only in Rubi Tables

14. integer. Number of rules used.
15. integer. Integrand leaf size.
16. real number. Ratio of field 14 over field 15
17. integer. 1 if result was verified or 0 if not verified.
18. String of form “{n,n,..}” which is list of the rules used by Rubi

High level overview of the CAS independent integration test build system

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May 11, 2021

Chapter 2

detailed summary tables of results

2.1 List of integrals sorted by grade for each CAS

2.1.1 Rubi

A grade: { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311 }

B grade: { }

C grade: { }

F grade: { }

2.1.2 Mathematica

A grade: { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 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, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 308, 309, 310, 311 }

B grade: { }

C grade: { 280, 281, 282 }

F grade: { 72, 98, 99, 175, 201, 202, 241, 304, 305, 306, 307 }

2.1.3 Maple

A grade: { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 25, 29, 30, 31, 32, 33, 34, 37, 38, 39, 43, 47, 48, 50, 51, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 75, 76, 77, 78, 79, 80, 83, 87, 88, 89, 90, 91, 92, 93, 94, 95, 104, 105, 106, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 120, 121, 122, 123, 124, 128, 132, 133, 134, 135, 136, 137, 140, 141, 142, 146, 151, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 178, 179, 180, 181, 182, 183, 186, 191, 192, 193, 194, 195, 196, 197, 198, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 223, 224, 225, 226, 227, 231, 238, 239, 240, 244, 245, 249, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 286, 287, 288, 296, 297, 298, 299, 300, 301, 302, 303 }

B grade: { 118, 119, 150, 190, 221, 222 }

C grade: { }

F grade: { 22, 23, 24, 26, 27, 28, 35, 36, 40, 41, 42, 44, 45, 46, 49, 52, 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 84, 85, 86, 96, 97, 98, 99, 100, 101, 102, 103, 107, 125, 126, 127, 129, 130, 131, 138, 139, 143, 144, 145, 147, 148, 149, 152, 153, 154, 155, 170, 171, 172, 173, 174, 175, 176, 177, 184, 185, 187, 188, 189, 199, 200, 201, 202, 203, 204, 205, 206, 228, 229, 230, 232, 233, 234, 235, 236, 237, 241, 242, 243, 246, 247, 248, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 289, 290, 291, 292, 293, 294, 295, 304, 305, 306, 307, 308, 309, 310, 311 }

2.1.4 Maxima

A grade: { 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 19, 20, 21, 25, 31, 32, 33, 34, 38, 39, 43, 47, 48, 49, 50, 51, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 77, 78, 79, 80, 83, 87, 88, 89, 90, 91, 92, 93, 94, 104, 105, 106, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 121, 122, 123, 124, 128, 135, 136, 137, 141, 142, 146, 159, 160, 161, 162, 163, 164, 165, 166, 181, 182, 183, 186, 191, 192, 193, 194, 195, 196, 197, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 224, 225, 226, 227, 231, 238, 239, 240, 244, 245, 249, 262, 263, 264, 265, 266, 267, 268, 269, 286, 287, 288, 296, 297, 298, 299, 300, 301, 302 }

B grade: { }

C grade: { 207, 208, 209 }

F grade: { 4, 15, 16, 17, 22, 23, 24, 26, 27, 28, 29, 30, 35, 36, 37, 40, 41, 42, 44, 45, 46, 52, 53, 54, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 81, 82, 84, 85, 86, 95, 96, 97, 98, 99, 100, 101, 102, 103, 107, 118, 119, 120, 125, 126, 127, 129, 130, 131, 132, 133, 134, 138, 139, 140, 143, 144, 145, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 184, 185, 187, 188, 189, 190, 198, 199, 200, 201, 202, 203, 204, 205, 206, 210, 221, 222, 223, 228, 229, 230, 232, 233, 234, 235, 236, 237, 241, 242, 243, 246, 247, 248, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 289, 290, 291, 292, 293, 294, 295, 303, 304, 305, 306, 307, 308, 309, 310, 311 }

2.1.5 FriCAS

A grade: { 1, 2, 3, 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, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 104, 105, 106, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 141, 142, 143, 144, 145, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 207, 208, 209, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303 }

B grade: { 140, 146 }

C grade: { }

F grade: { 4, 67, 68, 69, 70, 71, 72, 73, 74, 96, 97, 98, 99, 100, 101, 102, 103, 107, 170, 171, 172, 173, 174, 175, 176, 177, 199, 200, 201, 202, 203, 204, 205, 206, 210, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 304, 305, 306, 307, 308, 309, 310, 311 }

2.1.6 Sympy

A grade: { 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 32, 33, 34, 38, 39, 47, 48, 49, 50, 51, 52, 56, 57, 58, 59, 60, 61, 62, 63, 65, 66, 78, 79, 80, 81, 82, 83, 88, 89, 92, 93, 104, 105, 106, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 135, 136, 137, 141, 142, 150, 151, 152, 153, 154, 155, 159, 160, 161, 162, 163, 164, 165, 166, 168, 169, 181, 182, 183, 184, 185, 186, 191, 192, 195, 196, 207, 208, 209, 211, 212, 213, 214, 215, 216, 217, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 238, 239, 240, 244, 245, 253, 254, 255, 256, 257, 258, 262, 263, 264, 265, 266, 267, 268, 269, 271, 272, 286, 287, 288, 289, 290, 291, 296, 297, 299, 300, 301, 302, 303 }

B grade: { }

C grade: { 218, 219, 220 }

F grade: { 4, 26, 27, 28, 29, 30, 31, 35, 36, 37, 40, 41, 42, 43, 44, 45, 46, 53, 54, 55, 64, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 84, 85, 86, 87, 90, 91, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 107, 129, 130, 131, 132, 133, 134, 138, 139, 140, 143, 144, 145, 146, 147, 148, 149, 156, 157, 158, 167, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 187, 188, 189, 190, 193, 194, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 210, 232, 233, 234, 235, 236, 237, 241, 242, 243, 246, 247, 248, 249, 250, 251, 252, 259, 260, 261, 270, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 292, 293, 294, 295, 298, 304, 305, 306, 307, 308, 309, 310, 311 }

2.1.7 Giac

A grade: { 1, 2, 3, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 25, 29, 30, 31, 32, 33, 34, 38, 39, 40, 41, 42, 43, 46, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 75, 76, 77, 78, 79, 80, 86, 87, 88, 89, 90, 91, 92, 93, 94, 104, 105, 106, 111, 112, 113, 114, 118, 119, 120, 121, 122, 123, 124, 128, 132, 133, 134, 135, 136, 137, 141, 142, 143, 144, 145, 146, 149, 159, 160, 161, 162, 163, 164, 165, 166, 181, 182, 183, 191, 192, 193, 194, 195, 196, 197, 225, 226, 227, 231, 238, 239, 240, 244, 245, 262, 263, 264, 265, 266, 267, 268, 269, 286, 287, 288, 296, 297, 298, 299, 300, 301, 302 }

B grade: { }

C grade: { }

F grade: { 4, 5, 6, 7, 22, 23, 24, 26, 27, 28, 35, 36, 37, 44, 45, 47, 48, 49, 50, 51, 52, 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, 85, 95, 96, 97, 98, 99, 100, 101, 102, 103, 107, 108, 109, 110, 115, 116, 117, 125, 126, 127, 129, 130, 131, 138, 139, 140, 147, 148, 150, 151, 152, 153, 154, 155, 156, 157, 158, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 184, 185, 186, 187, 188, 189, 190, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 228, 229, 230, 232, 233, 234, 235, 236, 237, 241, 242, 243, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 289, 290, 291, 292, 293, 294, 295, 303, 304, 305, 306, 307, 308, 309, 310, 311 }

2.1.8 Mupad

A grade: { 19, 20, 21, 25, 32, 33, 34, 38, 39, 56, 57, 58, 59, 60, 61, 62, 63, 78, 79, 80, 88, 89, 90, 91, 92, 93, 94, 122, 123, 124, 128, 135, 136, 137, 141, 142, 159, 160, 161, 162, 163, 164, 165, 166, 181, 182, 183, 191, 192, 193, 194, 195, 196, 197, 225, 226, 227, 231, 238, 239, 240, 244, 245, 262, 263, 264, 265, 266, 267, 268, 269, 286, 287, 288, 296, 297, 298, 299, 300, 301, 302 }

B grade: { 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24, 29, 30, 31, 35, 36, 37, 43, 47, 48, 49, 50, 51, 52, 53, 54, 55, 64, 65, 66, 75, 76, 77, 81, 82, 83, 86, 87, 95, 104, 105, 106, 108, 109, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 125, 126, 127, 146, 150, 151, 152, 153, 154, 155, 167, 168, 169, 184, 185, 186, 207, 208, 209, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 228, 229, 230, 249, 253, 254, 255, 256, 257, 258, 259, 260, 261, 270, 271, 272, 283, 284, 285, 289, 290, 291, 294, 295, 303 }

C grade: { }

F grade: { 4, 26, 27, 28, 40, 41, 42, 44, 45, 46, 67, 68, 69, 70, 71, 72, 73, 74, 84, 85, 96, 97, 98, 99, 100, 101, 102, 103, 107, 110, 129, 130, 131, 132, 133, 134, 138, 139, 140, 143, 144, 145, 147, 148, 149, 156, 157, 158, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 187, 188, 189, 190, 198, 199, 200, 201, 202, 203, 204, 205, 206, 210, 232, 233, 234, 235, 236, 237, 241, 242, 243, 246, 247, 248, 250, 251, 252, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 292, 293, 304, 305, 306, 307, 308, 309, 310, 311 }

2.2 Detailed conclusion table per each integral for all CAS systems

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

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

Problem 1	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	96	96	72	83	63	63	88	64	108
normalized size	1	1.00	0.75	0.86	0.66	0.66	0.92	0.67	1.12
time (sec)	N/A	0.096	0.127	0.132	0.475	2.230	2.939	0.418	0.471

Problem 2	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	63	65	55	55	65	56	88
normalized size	1	1.00	0.89	0.92	0.77	0.77	0.92	0.79	1.24
time (sec)	N/A	0.062	0.026	0.018	0.624	0.411	0.981	0.480	0.099

Problem 3	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	46	46	42	47	44	42	39	44	48
normalized size	1	1.00	0.91	1.02	0.96	0.91	0.85	0.96	1.04
time (sec)	N/A	0.036	0.043	0.010	0.400	0.392	0.364	0.230	0.171

Problem 4	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	32	32	32	23	0	0	0	0	-1
normalized size	1	1.00	1.00	0.72	0.00	0.00	0.00	0.00	-0.03
time (sec)	N/A	0.014	0.084	0.207	0.000	0.416	0.000	0.000	0.000

Problem 5	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	42	42	42	50	35	41	36	0	67
normalized size	1	1.00	1.00	1.19	0.83	0.98	0.86	0.00	1.60
time (sec)	N/A	0.039	0.050	0.008	0.689	0.412	0.477	0.000	0.145

Problem 6	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	63	69	35	55	60	0	88
normalized size	1	1.00	0.89	0.97	0.49	0.77	0.85	0.00	1.24
time (sec)	N/A	0.065	0.019	0.007	0.458	0.412	1.148	0.000	0.111

Problem 7	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	96	96	73	87	35	62	87	0	113
normalized size	1	1.00	0.76	0.91	0.36	0.65	0.91	0.00	1.18
time (sec)	N/A	0.088	0.022	0.009	0.588	0.404	3.016	0.000	0.160

Problem 8	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	109	109	72	90	52	59	99	52	52
normalized size	1	1.00	0.66	0.83	0.48	0.54	0.91	0.48	0.48
time (sec)	N/A	0.099	0.022	0.007	0.416	0.381	5.157	0.187	0.145

Problem 9	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	84	84	66	72	44	51	75	44	44
normalized size	1	1.00	0.79	0.86	0.52	0.61	0.89	0.52	0.52
time (sec)	N/A	0.073	0.020	0.008	0.383	0.400	2.254	0.401	0.126

Problem 10	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	59	59	41	54	36	43	51	36	36
normalized size	1	1.00	0.69	0.92	0.61	0.73	0.86	0.61	0.61
time (sec)	N/A	0.049	0.025	0.010	0.512	0.389	0.646	0.187	0.089

Problem 11	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	26	26	26	26	25	29	24	23	23
normalized size	1	1.00	1.00	1.00	0.96	1.12	0.92	0.88	0.88
time (sec)	N/A	0.005	0.009	0.007	0.380	0.379	0.393	0.435	0.083

Problem 12	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	26	26	26	30	24	30	24	24	24
normalized size	1	1.00	1.00	1.15	0.92	1.15	0.92	0.92	0.92
time (sec)	N/A	0.031	0.015	0.008	0.414	0.407	1.470	0.186	0.153

Problem 13	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	56	56	47	53	27	48	54	51	45
normalized size	1	1.00	0.84	0.95	0.48	0.86	0.96	0.91	0.80
time (sec)	N/A	0.052	0.055	0.009	0.530	0.425	2.427	0.242	0.183

Problem 14	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	81	81	62	71	27	60	76	68	65
normalized size	1	1.00	0.77	0.88	0.33	0.74	0.94	0.84	0.80
time (sec)	N/A	0.075	0.051	0.007	0.611	0.648	3.394	0.159	0.205

Problem 15	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	289	289	248	466	0	265	746	400	337
normalized size	1	1.00	0.86	1.61	0.00	0.92	2.58	1.38	1.17
time (sec)	N/A	0.321	0.312	0.026	0.000	0.948	9.723	0.327	1.091

Problem 16	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	192	192	138	283	0	163	398	270	204
normalized size	1	1.00	0.72	1.47	0.00	0.85	2.07	1.41	1.06
time (sec)	N/A	0.200	0.233	0.013	0.000	0.801	3.935	0.429	0.716

Problem 17	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	118	118	88	111	0	91	178	149	126
normalized size	1	1.00	0.75	0.94	0.00	0.77	1.51	1.26	1.07
time (sec)	N/A	0.120	0.102	0.009	0.000	0.450	1.562	0.520	0.450

Problem 18	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	36	36	35	32	31	47	53	59	48
normalized size	1	1.00	0.97	0.89	0.86	1.31	1.47	1.64	1.33
time (sec)	N/A	0.007	0.051	0.003	0.333	0.443	0.617	0.188	0.221

Problem 19	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	17	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
time (sec)	N/A	0.015	1.371	0.095	0.000	0.467	0.000	0.000	0.000

Problem 20	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	52	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.041	0.341	0.227	0.000	0.521	0.000	0.000	0.000

Problem 21	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	107	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.084	0.576	0.093	0.000	0.459	0.000	0.000	0.000

Problem 22	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	178	178	106	0	0	98	168	0	142
normalized size	1	1.00	0.60	0.00	0.00	0.55	0.94	0.00	0.80
time (sec)	N/A	0.294	0.049	0.019	0.000	0.475	5.391	0.000	0.299

Problem 23	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	126	126	90	0	0	81	117	0	101
normalized size	1	1.00	0.71	0.00	0.00	0.64	0.93	0.00	0.80
time (sec)	N/A	0.181	0.042	0.013	0.000	0.405	1.974	0.000	0.205

Problem 24	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	64	0	0	59	65	0	67
normalized size	1	1.00	0.90	0.00	0.00	0.83	0.92	0.00	0.94
time (sec)	N/A	0.086	0.050	0.011	0.000	0.449	0.681	0.000	0.167

Problem 25	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.017	0.028	0.010	0.000	0.458	0.000	0.000	0.000

Problem 26	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	67	67	63	0	0	65	0	0	-1
normalized size	1	1.00	0.94	0.00	0.00	0.97	0.00	0.00	-0.01
time (sec)	N/A	0.100	0.028	0.017	0.000	0.445	0.000	0.000	0.000

Problem 27	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	125	125	97	0	0	94	0	0	-1
normalized size	1	1.00	0.78	0.00	0.00	0.75	0.00	0.00	-0.01
time (sec)	N/A	0.183	0.085	0.013	0.000	0.533	0.000	0.000	0.000

Problem 28	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	177	177	133	0	0	114	0	0	-1
normalized size	1	1.00	0.75	0.00	0.00	0.64	0.00	0.00	-0.01
time (sec)	N/A	0.292	0.049	0.015	0.000	0.641	0.000	0.000	0.000

Problem 29	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	165	165	106	131	0	111	0	170	131
normalized size	1	1.00	0.64	0.79	0.00	0.67	0.00	1.03	0.79
time (sec)	N/A	0.247	0.109	0.008	0.000	0.853	0.000	0.376	0.207

Problem 30	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	113	113	88	95	0	90	0	111	90
normalized size	1	1.00	0.78	0.84	0.00	0.80	0.00	0.98	0.80
time (sec)	N/A	0.136	0.074	0.005	0.000	1.106	0.000	0.226	0.172

Problem 31	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	56	56	56	48	62	63	0	48	44
normalized size	1	1.00	1.00	0.86	1.11	1.12	0.00	0.86	0.79
time (sec)	N/A	0.050	0.031	0.006	0.577	0.823	0.000	0.301	0.159

Problem 32	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.018	0.038	0.012	0.000	0.638	0.000	0.000	0.000

Problem 33	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.017	0.047	0.013	0.000	0.649	0.000	0.000	0.000

Problem 34	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.017	0.039	0.012	0.000	0.622	0.000	0.000	0.000

Problem 35	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	375	375	226	0	0	281	0	0	359
normalized size	1	1.00	0.60	0.00	0.00	0.75	0.00	0.00	0.96
time (sec)	N/A	0.422	1.101	0.083	0.000	0.860	0.000	0.000	0.443

Problem 36	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	188	188	132	0	0	171	0	0	186
normalized size	1	1.00	0.70	0.00	0.00	0.91	0.00	0.00	0.99
time (sec)	N/A	0.176	0.398	0.012	0.000	0.500	0.000	0.000	0.263

Problem 37	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	66	59	0	91	0	0	79
normalized size	1	1.00	0.93	0.83	0.00	1.28	0.00	0.00	1.11
time (sec)	N/A	0.180	0.012	0.003	0.000	0.471	0.000	0.000	0.130

Problem 38	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	19	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.024	0.059	0.073	0.000	0.499	0.000	0.000	0.000

Problem 39	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	19	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.022	0.115	0.090	0.000	0.519	0.000	0.000	0.000

Problem 40	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F(-1)	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	102	102	88	0	0	125	0	85	-1
normalized size	1	1.00	0.86	0.00	0.00	1.23	0.00	0.83	-0.01
time (sec)	N/A	0.232	0.353	0.208	0.000	0.649	0.000	0.712	0.000

Problem 41	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	94	94	84	0	0	121	0	83	-1
normalized size	1	1.00	0.89	0.00	0.00	1.29	0.00	0.88	-0.01
time (sec)	N/A	0.176	0.298	0.099	0.000	0.549	0.000	0.606	0.000

Problem 42	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	93	93	80	0	0	122	0	79	-1
normalized size	1	1.00	0.86	0.00	0.00	1.31	0.00	0.85	-0.01
time (sec)	N/A	0.129	0.263	0.023	0.000	0.476	0.000	0.619	0.000

Problem 43	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	65	65	79	79	58	119	0	67	121
normalized size	1	1.00	1.22	1.22	0.89	1.83	0.00	1.03	1.86
time (sec)	N/A	0.046	0.149	0.067	0.540	0.530	0.000	0.524	0.477

Problem 44	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	92	92	80	0	0	126	0	0	-1
normalized size	1	1.00	0.87	0.00	0.00	1.37	0.00	0.00	-0.01
time (sec)	N/A	0.213	0.288	0.203	0.000	0.498	0.000	0.000	0.000

Problem 45	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F(-1)	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	95	95	77	0	0	124	0	0	-1
normalized size	1	1.00	0.81	0.00	0.00	1.31	0.00	0.00	-0.01
time (sec)	N/A	0.215	0.261	0.194	0.000	0.564	0.000	0.000	0.000

Problem 46	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	125	125	127	0	0	180	0	156	-1
normalized size	1	1.00	1.02	0.00	0.00	1.44	0.00	1.25	-0.01
time (sec)	N/A	0.313	0.563	0.071	0.000	0.607	0.000	0.743	0.000

Problem 47	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	17	16	16	19	0	16
normalized size	1	1.00	1.00	0.81	0.76	0.76	0.90	0.00	0.76
time (sec)	N/A	0.030	0.009	0.007	0.324	0.602	1.744	0.000	0.111

Problem 48	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	17	16	16	19	0	93
normalized size	1	1.00	1.00	0.81	0.76	0.76	0.90	0.00	4.43
time (sec)	N/A	0.018	0.005	0.059	0.338	0.486	0.631	0.000	0.424

Problem 49	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F(-2)	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	20	20	20	0	15	15	17	0	15
normalized size	1	1.00	1.00	0.00	0.75	0.75	0.85	0.00	0.75
time (sec)	N/A	0.029	0.011	180.000	0.322	0.499	0.407	0.000	0.155

Problem 50	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	17	16	16	17	0	16
normalized size	1	1.00	1.00	0.81	0.76	0.76	0.81	0.00	0.76
time (sec)	N/A	0.028	0.006	0.003	0.530	0.573	0.688	0.000	0.135

Problem 51	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	17	16	16	19	0	16
normalized size	1	1.00	1.00	0.81	0.76	0.76	0.90	0.00	0.76
time (sec)	N/A	0.029	0.006	0.003	0.480	0.567	1.297	0.000	0.119

Problem 52	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	28	28	28	0	0	24	63	0	23
normalized size	1	1.00	1.00	0.00	0.00	0.86	2.25	0.00	0.82
time (sec)	N/A	0.037	0.014	0.027	0.000	0.675	5.603	0.000	0.164

Problem 53	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F(-1)	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	285	285	138	312	0	260	0	257	244
normalized size	1	1.00	0.48	1.09	0.00	0.91	0.00	0.90	0.86
time (sec)	N/A	0.436	0.467	0.096	0.000	0.555	0.000	0.301	0.771

Problem 54	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	155	155	99	168	0	149	0	124	131
normalized size	1	1.00	0.64	1.08	0.00	0.96	0.00	0.80	0.85
time (sec)	N/A	0.158	0.304	0.203	0.000	0.443	0.000	0.261	0.526

Problem 55	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	57	57	51	67	47	62	0	48	47
normalized size	1	1.00	0.89	1.18	0.82	1.09	0.00	0.84	0.82
time (sec)	N/A	0.039	0.046	0.191	0.337	0.646	0.000	0.250	0.198

Problem 56	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	20	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.040	0.155	0.054	0.000	0.630	0.000	0.000	0.000

Problem 57	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	101	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.154	0.208	0.233	0.000	0.570	0.000	0.000	0.000

Problem 58	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	231	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.342	0.290	0.259	0.000	0.560	0.000	0.000	0.000

Problem 59	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	186	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.244	0.320	0.066	0.000	0.622	0.000	0.000	0.000

Problem 60	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	84	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.095	0.228	0.216	0.000	0.533	0.000	0.000	0.000

Problem 61	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	17	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
time (sec)	N/A	0.015	0.025	0.073	0.000	0.566	0.000	0.000	0.000

Problem 62	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	62	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.117	0.229	0.094	0.000	0.520	0.000	0.000	0.000

Problem 63	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	155	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.285	0.341	0.257	0.000	0.513	0.000	0.000	0.000

Problem 64	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	118	118	73	88	82	74	0	118	91
normalized size	1	1.00	0.62	0.75	0.69	0.63	0.00	1.00	0.77
time (sec)	N/A	0.142	0.051	0.068	0.454	0.518	0.000	0.227	0.297

Problem 65	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	79	79	57	66	59	55	76	71	65
normalized size	1	1.00	0.72	0.84	0.75	0.70	0.96	0.90	0.82
time (sec)	N/A	0.080	0.044	0.169	0.344	0.511	131.386	0.270	0.204

Problem 66	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	37	37	34	51	34	35	34	31	31
normalized size	1	1.00	0.92	1.38	0.92	0.95	0.92	0.84	0.84
time (sec)	N/A	0.031	0.027	0.095	0.325	0.584	14.837	0.278	0.097

Problem 67	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	32	32	32	0	0	0	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	-0.03
time (sec)	N/A	0.043	0.138	0.046	0.000	0.484	0.000	0.000	0.000

Problem 68	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	34	0	0	0	0	0	-1
normalized size	1	1.00	0.48	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.089	0.127	0.205	0.000	0.515	0.000	0.000	0.000

Problem 69	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	115	115	36	0	0	0	0	0	-1
normalized size	1	1.00	0.31	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.135	0.157	0.227	0.000	0.711	0.000	0.000	0.000

Problem 70	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	119	119	100	0	0	0	0	0	-1
normalized size	1	1.00	0.84	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.113	0.331	0.065	0.000	0.487	0.000	0.000	0.000

Problem 71	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	76	76	80	0	0	0	0	0	-1
normalized size	1	1.00	1.05	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.064	0.224	0.162	0.000	0.605	0.000	0.000	0.000

Problem 72	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F(-2)	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	29	29	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
time (sec)	N/A	0.018	0.029	0.066	0.000	0.670	0.000	0.000	0.000

Problem 73	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	66	66	74	0	0	0	0	0	-1
normalized size	1	1.00	1.12	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.064	0.234	0.081	0.000	0.504	0.000	0.000	0.000

Problem 74	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	115	115	100	0	0	0	0	0	-1
normalized size	1	1.00	0.87	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.108	0.380	0.228	0.000	0.510	0.000	0.000	0.000

Problem 75	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F(-1)	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	135	135	86	119	0	97	0	153	192
normalized size	1	1.00	0.64	0.88	0.00	0.72	0.00	1.13	1.42
time (sec)	N/A	0.195	0.078	0.084	0.000	0.568	0.000	0.373	0.453

Problem 76	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	90	90	68	83	0	76	0	94	106
normalized size	1	1.00	0.76	0.92	0.00	0.84	0.00	1.04	1.18
time (sec)	N/A	0.101	0.059	0.191	0.000	0.546	0.000	0.303	0.451

Problem 77	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	43	43	39	39	34	43	0	35	43
normalized size	1	1.00	0.91	0.91	0.79	1.00	0.00	0.81	1.00
time (sec)	N/A	0.032	0.018	0.066	0.449	0.485	0.000	0.259	0.177

Problem 78	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	21	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.035	0.093	0.053	0.000	0.631	0.000	0.000	0.000

Problem 79	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	88	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.098	0.143	0.230	0.000	0.534	0.000	0.000	0.000

Problem 80	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	161	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.191	0.171	0.241	0.000	0.514	0.000	0.000	0.000

Problem 81	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	112	112	85	0	0	74	109	0	90
normalized size	1	1.00	0.76	0.00	0.00	0.66	0.97	0.00	0.80
time (sec)	N/A	0.146	0.042	0.187	0.000	0.408	37.091	0.000	0.749

Problem 82	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	63	63	56	0	0	52	60	0	80
normalized size	1	1.00	0.89	0.00	0.00	0.83	0.95	0.00	1.27
time (sec)	N/A	0.068	0.046	0.179	0.000	0.389	6.301	0.000	0.302

Problem 83	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	18	18	18	15	14	14	15	0	41
normalized size	1	1.00	1.00	0.83	0.78	0.78	0.83	0.00	2.28
time (sec)	N/A	0.017	0.004	0.036	0.313	0.392	0.993	0.000	0.197

Problem 84	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	52	52	52	0	0	53	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	1.02	0.00	0.00	-0.02
time (sec)	N/A	0.071	0.017	0.200	0.000	0.437	0.000	0.000	0.000

Problem 85	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	108	108	85	0	0	84	0	0	-1
normalized size	1	1.00	0.79	0.00	0.00	0.78	0.00	0.00	-0.01
time (sec)	N/A	0.148	0.073	0.242	0.000	0.488	0.000	0.000	0.000

Problem 86	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	342	342	240	0	0	267	0	271	386
normalized size	1	1.00	0.70	0.00	0.00	0.78	0.00	0.79	1.13
time (sec)	N/A	0.515	5.446	0.254	0.000	0.675	0.000	0.273	1.162

Problem 87	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	86	86	82	134	84	100	0	87	89
normalized size	1	1.00	0.95	1.56	0.98	1.16	0.00	1.01	1.03
time (sec)	N/A	0.057	0.114	0.214	0.331	0.480	0.000	0.475	0.181

Problem 88	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	22	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.037	0.239	0.047	0.000	0.599	0.000	0.000	0.000

Problem 89	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	185	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.417	0.424	0.275	0.000	0.734	0.000	0.000	0.000

Problem 90	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	527	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.969	0.565	0.091	0.000	0.564	0.000	0.000	0.000

Problem 91	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	164	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.190	0.465	0.187	0.000	0.424	0.000	0.000	0.000

Problem 92	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	19	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.015	0.051	0.069	0.000	0.406	0.000	0.000	0.000

Problem 93	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	83	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.215	0.462	0.109	0.000	0.469	0.000	0.000	0.000

Problem 94	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	355	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.912	0.630	0.288	0.000	0.456	0.000	0.000	0.000

Problem 95	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	62	62	62	67	0	66	0	0	52
normalized size	1	1.00	1.00	1.08	0.00	1.06	0.00	0.00	0.84
time (sec)	N/A	0.145	0.133	0.239	0.000	0.494	0.000	0.000	0.217

Problem 96	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	66	66	69	0	0	0	0	0	-1
normalized size	1	1.00	1.05	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.063	0.096	0.122	0.000	0.619	0.000	0.000	0.000

Problem 97	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	66	66	67	0	0	0	0	0	-1
normalized size	1	1.00	1.02	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.058	0.091	0.053	0.000	0.634	0.000	0.000	0.000

Problem 98	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	62	62	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.056	0.770	0.075	0.000	0.555	0.000	0.000	0.000

Problem 99	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	62	62	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.055	0.768	0.052	0.000	0.411	0.000	0.000	0.000

Problem 100	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	56	56	57	0	0	0	0	0	-1
normalized size	1	1.00	1.02	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.056	0.061	0.033	0.000	0.548	0.000	0.000	0.000

Problem 101	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	56	56	61	0	0	0	0	0	-1
normalized size	1	1.00	1.09	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.056	0.069	0.034	0.000	1.028	0.000	0.000	0.000

Problem 102	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	56	56	93	0	0	0	0	0	-1
normalized size	1	1.00	1.66	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.053	0.300	0.045	0.000	0.525	0.000	0.000	0.000

Problem 103	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	56	56	91	0	0	0	0	0	-1
normalized size	1	1.00	1.62	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.052	0.108	0.052	0.000	0.394	0.000	0.000	0.000

Problem 104	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	96	96	62	83	63	71	92	69	78
normalized size	1	1.00	0.65	0.86	0.66	0.74	0.96	0.72	0.81
time (sec)	N/A	0.090	0.078	0.008	0.401	0.403	2.903	0.646	0.267

Problem 105	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	54	65	55	63	68	61	58
normalized size	1	1.00	0.76	0.92	0.77	0.89	0.96	0.86	0.82
time (sec)	N/A	0.064	0.064	0.004	0.579	0.471	1.036	0.379	0.145

Problem 106	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	46	46	43	46	44	50	42	49	38
normalized size	1	1.00	0.93	1.00	0.96	1.09	0.91	1.07	0.83
time (sec)	N/A	0.035	0.057	0.004	0.309	0.403	0.367	0.491	0.116

Problem 107	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	35	35	45	0	0	0	0	0	-1
normalized size	1	1.00	1.29	0.00	0.00	0.00	0.00	0.00	-0.03
time (sec)	N/A	0.023	0.035	0.030	0.000	0.484	0.000	0.000	0.000

Problem 108	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	40	40	40	51	35	43	34	0	38
normalized size	1	1.00	1.00	1.28	0.88	1.08	0.85	0.00	0.95
time (sec)	N/A	0.038	0.048	0.006	0.654	0.585	0.473	0.000	0.130

Problem 109	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	53	69	35	58	60	0	71
normalized size	1	1.00	0.75	0.97	0.49	0.82	0.85	0.00	1.00
time (sec)	N/A	0.059	0.043	0.005	1.310	0.500	1.144	0.000	0.191

Problem 110	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	96	96	62	87	35	66	87	0	-1
normalized size	1	1.00	0.65	0.91	0.36	0.69	0.91	0.00	-0.01
time (sec)	N/A	0.083	0.063	0.008	0.613	0.472	2.849	0.000	0.000

Problem 111	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	109	109	73	90	52	68	102	57	90
normalized size	1	1.00	0.67	0.83	0.48	0.62	0.94	0.52	0.83
time (sec)	N/A	0.094	0.024	0.004	0.328	0.554	4.627	0.545	0.286

Problem 112	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	84	84	66	72	44	60	78	49	70
normalized size	1	1.00	0.79	0.86	0.52	0.71	0.93	0.58	0.83
time (sec)	N/A	0.070	0.025	0.005	0.617	0.559	1.744	0.351	0.230

Problem 113	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	59	59	42	54	36	52	54	41	50
normalized size	1	1.00	0.71	0.92	0.61	0.88	0.92	0.69	0.85
time (sec)	N/A	0.049	0.032	0.005	0.331	0.396	0.549	0.422	0.147

Problem 114	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	27	27	27	27	26	35	24	26	24
normalized size	1	1.00	1.00	1.00	0.96	1.30	0.89	0.96	0.89
time (sec)	N/A	0.005	0.003	0.006	1.147	0.450	0.272	0.553	0.104

Problem 115	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	27	27	27	29	25	32	20	0	25
normalized size	1	1.00	1.00	1.07	0.93	1.19	0.74	0.00	0.93
time (sec)	N/A	0.031	0.014	0.004	3.003	0.473	0.975	0.000	0.154

Problem 116	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	56	56	49	53	27	51	48	0	46
normalized size	1	1.00	0.88	0.95	0.48	0.91	0.86	0.00	0.82
time (sec)	N/A	0.054	0.043	0.003	1.955	0.567	1.750	0.000	0.182

Problem 117	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	81	81	73	71	27	62	70	0	66
normalized size	1	1.00	0.90	0.88	0.33	0.77	0.86	0.00	0.81
time (sec)	N/A	0.074	0.023	0.005	3.054	0.497	2.983	0.000	0.188

Problem 118	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	292	292	268	729	0	314	746	435	352
normalized size	1	1.00	0.92	2.50	0.00	1.08	2.55	1.49	1.21
time (sec)	N/A	0.272	0.390	0.004	0.000	0.729	9.141	1.163	0.391

Problem 119	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	194	194	159	428	0	197	398	280	220
normalized size	1	1.00	0.82	2.21	0.00	1.02	2.05	1.44	1.13
time (sec)	N/A	0.181	0.313	0.007	0.000	0.400	3.778	1.880	0.306

Problem 120	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	119	119	104	122	0	110	178	158	119
normalized size	1	1.00	0.87	1.03	0.00	0.92	1.50	1.33	1.00
time (sec)	N/A	0.118	0.147	0.004	0.000	0.530	1.451	1.298	0.222

Problem 121	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	37	37	42	33	32	53	53	60	49
normalized size	1	1.00	1.14	0.89	0.86	1.43	1.43	1.62	1.32
time (sec)	N/A	0.007	0.046	0.003	1.129	0.581	0.606	0.402	0.114

Problem 122	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	17	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
time (sec)	N/A	0.015	0.136	0.088	0.000	0.455	0.000	0.000	0.000

Problem 123	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	52	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.039	0.544	0.090	0.000	0.554	0.000	0.000	0.000

Problem 124	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	105	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.079	1.205	0.097	0.000	0.795	0.000	0.000	0.000

Problem 125	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	178	178	173	0	0	149	172	0	143
normalized size	1	1.00	0.97	0.00	0.00	0.84	0.97	0.00	0.80
time (sec)	N/A	0.276	0.466	0.022	0.000	0.424	5.088	0.000	0.324

Problem 126	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	126	126	149	0	0	124	121	0	102
normalized size	1	1.00	1.18	0.00	0.00	0.98	0.96	0.00	0.81
time (sec)	N/A	0.171	0.433	0.021	0.000	0.438	1.864	0.000	0.239

Problem 127	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	72	72	99	0	0	91	68	0	68
normalized size	1	1.00	1.38	0.00	0.00	1.26	0.94	0.00	0.94
time (sec)	N/A	0.081	0.163	0.018	0.000	0.491	0.650	0.000	0.197

Problem 128	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.016	0.167	0.021	0.000	0.434	0.000	0.000	0.000

Problem 129	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	67	67	63	0	0	98	0	0	-1
normalized size	1	1.00	0.94	0.00	0.00	1.46	0.00	0.00	-0.01
time (sec)	N/A	0.095	0.043	0.019	0.000	0.415	0.000	0.000	0.000

Problem 130	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	125	125	97	0	0	141	0	0	-1
normalized size	1	1.00	0.78	0.00	0.00	1.13	0.00	0.00	-0.01
time (sec)	N/A	0.178	0.067	0.019	0.000	0.492	0.000	0.000	0.000

Problem 131	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	177	177	133	0	0	168	0	0	-1
normalized size	1	1.00	0.75	0.00	0.00	0.95	0.00	0.00	-0.01
time (sec)	N/A	0.282	0.039	0.018	0.000	0.535	0.000	0.000	0.000

Problem 132	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	165	165	108	205	0	154	0	218	-1
normalized size	1	1.00	0.65	1.24	0.00	0.93	0.00	1.32	-0.01
time (sec)	N/A	0.231	0.159	0.010	0.000	0.397	0.000	0.858	0.000

Problem 133	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	113	113	88	151	0	123	0	151	-1
normalized size	1	1.00	0.78	1.34	0.00	1.09	0.00	1.34	-0.01
time (sec)	N/A	0.126	0.104	0.007	0.000	0.391	0.000	0.694	0.000

Problem 134	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	56	56	56	48	0	85	0	73	-1
normalized size	1	1.00	1.00	0.86	0.00	1.52	0.00	1.30	-0.02
time (sec)	N/A	0.046	0.054	0.007	0.000	0.479	0.000	0.682	0.000

Problem 135	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.017	0.177	0.019	0.000	0.394	0.000	0.000	0.000

Problem 136	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.017	0.129	0.022	0.000	0.411	0.000	0.000	0.000

Problem 137	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.017	0.182	0.021	0.000	0.522	0.000	0.000	0.000

Problem 138	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	375	375	610	0	0	472	0	0	-1
normalized size	1	1.00	1.63	0.00	0.00	1.26	0.00	0.00	-0.00
time (sec)	N/A	0.375	4.476	0.086	0.000	0.529	0.000	0.000	0.000

Problem 139	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	189	189	301	0	0	273	0	0	-1
normalized size	1	1.00	1.59	0.00	0.00	1.44	0.00	0.00	-0.01
time (sec)	N/A	0.189	1.359	0.024	0.000	0.423	0.000	0.000	0.000

Problem 140	Optimal	Rubi	Mathematica	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	71	71	66	59	0	141	0	0	-1
normalized size	1	1.00	0.93	0.83	0.00	1.99	0.00	0.00	-0.01
time (sec)	N/A	0.156	0.014	0.003	0.000	0.451	0.000	0.000	0.000

Problem 141	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	19	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.023	0.507	0.080	0.000	0.512	0.000	0.000	0.000

Problem 142	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	19	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.023	0.500	0.087	0.000	0.403	0.000	0.000	0.000

Problem 143	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	102	102	87	0	0	130	0	90	-1
normalized size	1	1.00	0.85	0.00	0.00	1.27	0.00	0.88	-0.01
time (sec)	N/A	0.215	0.337	0.158	0.000	0.542	0.000	1.486	0.000

Problem 144	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	94	94	80	0	0	126	0	88	-1
normalized size	1	1.00	0.85	0.00	0.00	1.34	0.00	0.94	-0.01
time (sec)	N/A	0.166	0.296	0.141	0.000	0.429	0.000	1.161	0.000

Problem 145	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	92	92	77	0	0	123	0	82	-1
normalized size	1	1.00	0.84	0.00	0.00	1.34	0.00	0.89	-0.01
time (sec)	N/A	0.101	0.284	0.149	0.000	0.548	0.000	0.793	0.000

Problem 146	Optimal	Rubi	Mathematica	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	66	66	93	80	59	128	0	83	100
normalized size	1	1.00	1.41	1.21	0.89	1.94	0.00	1.26	1.52
time (sec)	N/A	0.043	0.134	0.059	0.323	0.485	0.000	0.224	0.447

Problem 147	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	93	93	81	0	0	128	0	0	-1
normalized size	1	1.00	0.87	0.00	0.00	1.38	0.00	0.00	-0.01
time (sec)	N/A	0.185	0.273	0.211	0.000	0.505	0.000	0.000	0.000

Problem 148	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	95	95	79	0	0	125	0	0	-1
normalized size	1	1.00	0.83	0.00	0.00	1.32	0.00	0.00	-0.01
time (sec)	N/A	0.189	0.263	0.222	0.000	0.433	0.000	0.000	0.000

Problem 149	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	126	126	126	0	0	194	0	169	-1
normalized size	1	1.00	1.00	0.00	0.00	1.54	0.00	1.34	-0.01
time (sec)	N/A	0.254	0.526	0.095	0.000	0.425	0.000	0.803	0.000

Problem 150	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	43	0	31	24	0	16
normalized size	1	1.00	1.00	2.05	0.00	1.48	1.14	0.00	0.76
time (sec)	N/A	0.027	0.012	0.193	0.000	0.509	1.656	0.000	0.153

Problem 151	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	30	0	23	24	0	16
normalized size	1	1.00	1.00	1.43	0.00	1.10	1.14	0.00	0.76
time (sec)	N/A	0.018	0.006	0.062	0.000	0.515	0.625	0.000	0.148

Problem 152	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	20	20	20	0	0	17	24	0	15
normalized size	1	1.00	1.00	0.00	0.00	0.85	1.20	0.00	0.75
time (sec)	N/A	0.028	0.017	0.026	0.000	0.420	0.441	0.000	0.183

Problem 153	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	0	0	19	20	0	16
normalized size	1	1.00	1.00	0.00	0.00	0.90	0.95	0.00	0.76
time (sec)	N/A	0.028	0.010	0.116	0.000	0.393	0.978	0.000	0.164

Problem 154	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	0	0	26	22	0	16
normalized size	1	1.00	1.00	0.00	0.00	1.24	1.05	0.00	0.76
time (sec)	N/A	0.029	0.009	0.359	0.000	1.410	2.060	0.000	0.092

Problem 155	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	28	28	28	0	0	30	60	0	23
normalized size	1	1.00	1.00	0.00	0.00	1.07	2.14	0.00	0.82
time (sec)	N/A	0.033	0.012	0.096	0.000	0.512	5.130	0.000	0.201

Problem 156	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	283	283	138	376	0	356	0	0	-1
normalized size	1	1.00	0.49	1.33	0.00	1.26	0.00	0.00	-0.00
time (sec)	N/A	0.368	0.448	0.082	0.000	0.439	0.000	0.000	0.000

Problem 157	Optimal	Rubi	Mathematica	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	155	155	99	206	0	190	0	0	-1
normalized size	1	1.00	0.64	1.33	0.00	1.23	0.00	0.00	-0.01
time (sec)	N/A	0.157	0.343	0.217	0.000	0.511	0.000	0.000	0.000

Problem 158	Optimal	Rubi	Mathematica	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	57	57	50	92	0	70	0	0	-1
normalized size	1	1.00	0.88	1.61	0.00	1.23	0.00	0.00	-0.02
time (sec)	N/A	0.039	0.058	0.211	0.000	0.463	0.000	0.000	0.000

Problem 159	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	20	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.037	0.623	0.093	0.000	0.495	0.000	0.000	0.000

Problem 160	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	99	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.147	0.784	0.273	0.000	0.521	0.000	0.000	0.000

Problem 161	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	231	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.325	0.814	0.290	0.000	0.415	0.000	0.000	0.000

Problem 162	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	186	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.233	0.953	0.095	0.000	0.424	0.000	0.000	0.000

Problem 163	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	84	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.094	0.834	0.192	0.000	0.565	0.000	0.000	0.000

Problem 164	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	17	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
time (sec)	N/A	0.015	0.035	0.069	0.000	0.513	0.000	0.000	0.000

Problem 165	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	63	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.114	0.860	0.114	0.000	0.423	0.000	0.000	0.000

Problem 166	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	155	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.268	1.016	0.292	0.000	0.480	0.000	0.000	0.000

Problem 167	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	118	118	73	135	0	97	0	0	94
normalized size	1	1.00	0.62	1.14	0.00	0.82	0.00	0.00	0.80
time (sec)	N/A	0.147	0.045	0.066	0.000	0.471	0.000	0.000	0.311

Problem 168	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	80	80	58	99	0	68	83	0	63
normalized size	1	1.00	0.72	1.24	0.00	0.85	1.04	0.00	0.79
time (sec)	N/A	0.089	0.034	0.181	0.000	0.409	120.005	0.000	0.163

Problem 169	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	36	36	36	51	0	38	41	0	30
normalized size	1	1.00	1.00	1.42	0.00	1.06	1.14	0.00	0.83
time (sec)	N/A	0.035	0.021	0.092	0.000	0.965	13.389	0.000	0.175

Problem 170	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	48	48	45	0	0	0	0	0	-1
normalized size	1	1.00	0.94	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.120	0.188	0.058	0.000	0.432	0.000	0.000	0.000

Problem 171	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	88	88	65	0	0	0	0	0	-1
normalized size	1	1.00	0.74	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.166	0.224	0.229	0.000	0.397	0.000	0.000	0.000

Problem 172	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-1)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	134	134	83	0	0	0	0	0	-1
normalized size	1	1.00	0.62	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.202	0.258	0.253	0.000	0.421	0.000	0.000	0.000

Problem 173	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-1)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	138	138	147	0	0	0	0	0	-1
normalized size	1	1.00	1.07	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.138	0.296	0.079	0.000	0.556	0.000	0.000	0.000

Problem 174	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	95	95	104	0	0	0	0	0	-1
normalized size	1	1.00	1.09	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.082	0.339	0.181	0.000	0.433	0.000	0.000	0.000

Problem 175	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F(-2)	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	50	50	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.035	0.111	0.063	0.000	0.582	0.000	0.000	0.000

Problem 176	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	80	80	99	0	0	0	0	0	-1
normalized size	1	1.00	1.24	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.079	0.309	0.094	0.000	0.410	0.000	0.000	0.000

Problem 177	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-1)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	134	134	151	0	0	0	0	0	-1
normalized size	1	1.00	1.13	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.129	0.239	0.244	0.000	0.416	0.000	0.000	0.000

Problem 178	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	135	135	87	172	0	121	0	0	-1
normalized size	1	1.00	0.64	1.27	0.00	0.90	0.00	0.00	-0.01
time (sec)	N/A	0.194	0.167	0.087	0.000	0.418	0.000	0.000	0.000

Problem 179	Optimal	Rubi	Mathematica	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	90	90	69	118	0	90	0	0	-1
normalized size	1	1.00	0.77	1.31	0.00	1.00	0.00	0.00	-0.01
time (sec)	N/A	0.101	0.094	0.223	0.000	0.483	0.000	0.000	0.000

Problem 180	Optimal	Rubi	Mathematica	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	43	43	39	53	0	47	0	0	-1
normalized size	1	1.00	0.91	1.23	0.00	1.09	0.00	0.00	-0.02
time (sec)	N/A	0.031	0.023	0.083	0.000	0.409	0.000	0.000	0.000

Problem 181	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	21	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.032	0.168	0.076	0.000	0.416	0.000	0.000	0.000

Problem 182	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	86	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.094	0.301	0.260	0.000	0.432	0.000	0.000	0.000

Problem 183	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	162	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.182	0.285	0.279	0.000	0.408	0.000	0.000	0.000

Problem 184	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	112	112	112	0	0	97	112	0	90
normalized size	1	1.00	1.00	0.00	0.00	0.87	1.00	0.00	0.80
time (sec)	N/A	0.166	0.181	0.218	0.000	0.453	34.167	0.000	0.202

Problem 185	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	63	63	79	0	0	66	63	0	49
normalized size	1	1.00	1.25	0.00	0.00	1.05	1.00	0.00	0.78
time (sec)	N/A	0.080	0.150	0.198	0.000	0.437	5.777	0.000	0.191

Problem 186	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	18	18	18	22	14	21	17	0	14
normalized size	1	1.00	1.00	1.22	0.78	1.17	0.94	0.00	0.78
time (sec)	N/A	0.018	0.009	0.037	0.299	0.456	0.919	0.000	0.072

Problem 187	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	53	53	53	0	0	77	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	1.45	0.00	0.00	-0.02
time (sec)	N/A	0.086	0.022	0.232	0.000	0.420	0.000	0.000	0.000

Problem 188	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	108	108	85	0	0	122	0	0	-1
normalized size	1	1.00	0.79	0.00	0.00	1.13	0.00	0.00	-0.01
time (sec)	N/A	0.157	0.067	0.284	0.000	0.415	0.000	0.000	0.000

Problem 189	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	342	342	256	0	0	328	0	0	-1
normalized size	1	1.00	0.75	0.00	0.00	0.96	0.00	0.00	-0.00
time (sec)	N/A	0.470	2.617	0.274	0.000	0.488	0.000	0.000	0.000

Problem 190	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	86	86	81	175	0	108	0	0	-1
normalized size	1	1.00	0.94	2.03	0.00	1.26	0.00	0.00	-0.01
time (sec)	N/A	0.054	0.118	0.247	0.000	0.510	0.000	0.000	0.000

Problem 191	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	22	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.038	0.772	0.061	0.000	0.642	0.000	0.000	0.000

Problem 192	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	183	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.411	1.031	0.387	0.000	0.504	0.000	0.000	0.000

Problem 193	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	527	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.907	1.195	0.111	0.000	0.500	0.000	0.000	0.000

Problem 194	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	164	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.182	1.004	0.223	0.000	0.499	0.000	0.000	0.000

Problem 195	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	19	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.014	0.044	0.096	0.000	0.447	0.000	0.000	0.000

Problem 196	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	83	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.205	1.088	0.138	0.000	0.423	0.000	0.000	0.000

Problem 197	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	355	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.869	1.299	0.339	0.000	0.407	0.000	0.000	0.000

Problem 198	Optimal	Rubi	Mathematica	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	60	60	60	84	0	71	0	0	-1
normalized size	1	1.00	1.00	1.40	0.00	1.18	0.00	0.00	-0.02
time (sec)	N/A	0.135	0.096	0.276	0.000	0.425	0.000	0.000	0.000

Problem 199	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	91	91	94	0	0	0	0	0	-1
normalized size	1	1.00	1.03	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.077	0.668	0.231	0.000	0.529	0.000	0.000	0.000

Problem 200	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	91	91	101	0	0	0	0	0	-1
normalized size	1	1.00	1.11	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.075	0.546	0.189	0.000	0.503	0.000	0.000	0.000

Problem 201	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	85	85	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.073	1.741	0.382	0.000	0.637	0.000	0.000	0.000

Problem 202	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	85	85	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.074	1.663	0.319	0.000	0.426	0.000	0.000	0.000

Problem 203	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	75	75	83	0	0	0	0	0	-1
normalized size	1	1.00	1.11	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.070	0.202	0.164	0.000	0.420	0.000	0.000	0.000

Problem 204	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	77	77	84	0	0	0	0	0	-1
normalized size	1	1.00	1.09	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.071	0.179	0.141	0.000	0.532	0.000	0.000	0.000

Problem 205	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	75	75	114	0	0	0	0	0	-1
normalized size	1	1.00	1.52	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.072	0.134	0.301	0.000	0.478	0.000	0.000	0.000

Problem 206	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	77	77	117	0	0	0	0	0	-1
normalized size	1	1.00	1.52	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.071	0.132	0.283	0.000	0.496	0.000	0.000	0.000

Problem 207	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	C	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	93	93	64	77	63	62	88	0	108
normalized size	1	1.00	0.69	0.83	0.68	0.67	0.95	0.00	1.16
time (sec)	N/A	0.082	0.039	0.007	0.325	0.417	2.650	0.000	0.122

Problem 208	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	C	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	69	69	51	61	55	53	65	0	89
normalized size	1	1.00	0.74	0.88	0.80	0.77	0.94	0.00	1.29
time (sec)	N/A	0.058	0.037	0.004	0.313	0.472	0.798	0.000	0.088

Problem 209	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	C	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	45	45	39	45	44	41	39	0	43
normalized size	1	1.00	0.87	1.00	0.98	0.91	0.87	0.00	0.96
time (sec)	N/A	0.033	0.036	0.005	0.327	1.181	0.187	0.000	0.188

Problem 210	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	31	31	31	22	0	0	0	0	-1
normalized size	1	1.00	1.00	0.71	0.00	0.00	0.00	0.00	-0.03
time (sec)	N/A	0.013	0.024	0.025	0.000	0.410	0.000	0.000	0.000

Problem 211	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	40	40	37	47	39	40	34	0	69
normalized size	1	1.00	0.92	1.18	0.98	1.00	0.85	0.00	1.72
time (sec)	N/A	0.036	0.029	0.006	0.371	0.497	0.431	0.000	0.115

Problem 212	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	69	69	51	65	39	52	60	0	89
normalized size	1	1.00	0.74	0.94	0.57	0.75	0.87	0.00	1.29
time (sec)	N/A	0.055	0.041	0.005	0.376	0.546	1.101	0.000	0.080

Problem 213	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	93	93	64	81	39	61	87	0	108
normalized size	1	1.00	0.69	0.87	0.42	0.66	0.94	0.00	1.16
time (sec)	N/A	0.079	0.027	0.006	0.357	0.397	2.815	0.000	0.121

Problem 214	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	105	105	57	82	51	59	99	0	51
normalized size	1	1.00	0.54	0.78	0.49	0.56	0.94	0.00	0.49
time (sec)	N/A	0.086	0.049	0.005	0.318	0.439	4.459	0.000	0.134

Problem 215	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	81	81	49	64	43	51	75	0	43
normalized size	1	1.00	0.60	0.79	0.53	0.63	0.93	0.00	0.53
time (sec)	N/A	0.065	0.029	0.006	0.317	0.532	1.449	0.000	0.105

Problem 216	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	57	57	41	50	35	43	49	0	35
normalized size	1	1.00	0.72	0.88	0.61	0.75	0.86	0.00	0.61
time (sec)	N/A	0.044	0.036	0.005	0.319	0.394	0.391	0.000	0.153

Problem 217	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	26	26	26	26	25	29	22	0	23
normalized size	1	1.00	1.00	1.00	0.96	1.12	0.85	0.00	0.88
time (sec)	N/A	0.005	0.007	0.003	0.324	0.392	0.127	0.000	0.052

Problem 218	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	C	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	25	25	25	31	23	29	32	0	23
normalized size	1	1.00	1.00	1.24	0.92	1.16	1.28	0.00	0.92
time (sec)	N/A	0.029	0.020	0.005	0.352	0.447	0.978	0.000	0.181

Problem 219	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	C	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	54	54	50	52	28	48	63	0	43
normalized size	1	1.00	0.93	0.96	0.52	0.89	1.17	0.00	0.80
time (sec)	N/A	0.050	0.023	0.006	0.379	0.439	1.672	0.000	0.219

Problem 220	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	C	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	78	78	61	68	28	58	85	0	62
normalized size	1	1.00	0.78	0.87	0.36	0.74	1.09	0.00	0.79
time (sec)	N/A	0.070	0.032	0.003	0.358	1.264	2.915	0.000	0.220

Problem 221	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	279	279	237	703	0	263	746	0	357
normalized size	1	1.00	0.85	2.52	0.00	0.94	2.67	0.00	1.28
time (sec)	N/A	0.250	0.334	0.012	0.000	0.482	8.007	0.000	0.644

Problem 222	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	186	186	142	414	0	161	398	0	190
normalized size	1	1.00	0.76	2.23	0.00	0.87	2.14	0.00	1.02
time (sec)	N/A	0.165	0.207	0.009	0.000	0.459	3.086	0.000	0.365

Problem 223	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	115	115	78	117	0	89	178	0	106
normalized size	1	1.00	0.68	1.02	0.00	0.77	1.55	0.00	0.92
time (sec)	N/A	0.105	0.091	0.004	0.000	0.422	1.072	0.000	0.331

Problem 224	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	35	35	33	31	30	45	51	0	46
normalized size	1	1.00	0.94	0.89	0.86	1.29	1.46	0.00	1.31
time (sec)	N/A	0.006	0.047	0.003	0.310	0.410	0.318	0.000	0.136

Problem 225	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	17	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
time (sec)	N/A	0.014	1.265	0.085	0.000	0.429	0.000	0.000	0.000

Problem 226	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	50	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.036	0.357	0.101	0.000	0.492	0.000	0.000	0.000

Problem 227	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	102	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.074	0.642	0.089	0.000	0.434	0.000	0.000	0.000

Problem 228	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	175	175	99	0	0	97	168	0	139
normalized size	1	1.00	0.57	0.00	0.00	0.55	0.96	0.00	0.79
time (sec)	N/A	0.256	0.049	0.007	0.000	0.423	4.655	0.000	0.303

Problem 229	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	124	124	82	0	0	79	116	0	100
normalized size	1	1.00	0.66	0.00	0.00	0.64	0.94	0.00	0.81
time (sec)	N/A	0.159	0.032	0.008	0.000	0.437	1.583	0.000	0.219

Problem 230	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	63	0	0	58	63	0	66
normalized size	1	1.00	0.89	0.00	0.00	0.82	0.89	0.00	0.93
time (sec)	N/A	0.077	0.021	0.010	0.000	0.435	0.400	0.000	0.184

Problem 231	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.016	0.034	0.007	0.000	0.522	0.000	0.000	0.000

Problem 232	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	65	65	60	0	0	64	0	0	-1
normalized size	1	1.00	0.92	0.00	0.00	0.98	0.00	0.00	-0.02
time (sec)	N/A	0.090	0.032	0.009	0.000	0.491	0.000	0.000	0.000

Problem 233	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	123	123	97	0	0	93	0	0	-1
normalized size	1	1.00	0.79	0.00	0.00	0.76	0.00	0.00	-0.01
time (sec)	N/A	0.165	0.036	0.007	0.000	0.423	0.000	0.000	0.000

Problem 234	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	174	174	114	0	0	113	0	0	-1
normalized size	1	1.00	0.66	0.00	0.00	0.65	0.00	0.00	-0.01
time (sec)	N/A	0.279	0.043	0.006	0.000	0.527	0.000	0.000	0.000

Problem 235	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	162	162	105	0	0	110	0	0	-1
normalized size	1	1.00	0.65	0.00	0.00	0.68	0.00	0.00	-0.01
time (sec)	N/A	0.225	0.051	0.009	0.000	0.606	0.000	0.000	0.000

Problem 236	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	111	111	87	0	0	91	0	0	-1
normalized size	1	1.00	0.78	0.00	0.00	0.82	0.00	0.00	-0.01
time (sec)	N/A	0.120	0.032	0.007	0.000	0.426	0.000	0.000	0.000

Problem 237	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	54	54	54	0	0	61	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	1.13	0.00	0.00	-0.02
time (sec)	N/A	0.045	0.021	0.004	0.000	0.445	0.000	0.000	0.000

Problem 238	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.018	0.038	0.005	0.000	0.503	0.000	0.000	0.000

Problem 239	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.017	0.039	0.007	0.000	0.391	0.000	0.000	0.000

Problem 240	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	13	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
time (sec)	N/A	0.017	0.040	0.007	0.000	0.576	0.000	0.000	0.000

Problem 241	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	A	F	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	366	366	0	0	0	278	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.76	0.00	0.00	-0.00
time (sec)	N/A	0.361	0.861	0.088	0.000	0.610	0.000	0.000	0.000

Problem 242	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	184	184	128	0	0	167	0	0	-1
normalized size	1	1.00	0.70	0.00	0.00	0.91	0.00	0.00	-0.01
time (sec)	N/A	0.182	0.182	0.007	0.000	0.421	0.000	0.000	0.000

Problem 243	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	68	68	64	0	0	90	0	0	-1
normalized size	1	1.00	0.94	0.00	0.00	1.32	0.00	0.00	-0.01
time (sec)	N/A	0.135	0.057	0.006	0.000	0.428	0.000	0.000	0.000

Problem 244	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	19	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.023	0.064	0.094	0.000	0.405	0.000	0.000	0.000

Problem 245	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	19	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.021	0.116	0.087	0.000	0.464	0.000	0.000	0.000

Problem 246	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	102	102	90	0	0	125	0	0	-1
normalized size	1	1.00	0.88	0.00	0.00	1.23	0.00	0.00	-0.01
time (sec)	N/A	0.220	0.363	0.120	0.000	0.578	0.000	0.000	0.000

Problem 247	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	93	93	81	0	0	121	0	0	-1
normalized size	1	1.00	0.87	0.00	0.00	1.30	0.00	0.00	-0.01
time (sec)	N/A	0.166	0.359	0.095	0.000	0.541	0.000	0.000	0.000

Problem 248	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	91	91	78	0	0	122	0	0	-1
normalized size	1	1.00	0.86	0.00	0.00	1.34	0.00	0.00	-0.01
time (sec)	N/A	0.133	0.359	0.019	0.000	0.585	0.000	0.000	0.000

Problem 249	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	64	64	83	78	58	117	0	0	112
normalized size	1	1.00	1.30	1.22	0.91	1.83	0.00	0.00	1.75
time (sec)	N/A	0.038	0.129	0.065	0.319	0.717	0.000	0.000	0.452

Problem 250	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	94	94	82	0	0	126	0	0	-1
normalized size	1	1.00	0.87	0.00	0.00	1.34	0.00	0.00	-0.01
time (sec)	N/A	0.217	0.311	0.207	0.000	0.558	0.000	0.000	0.000

Problem 251	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	95	95	80	0	0	124	0	0	-1
normalized size	1	1.00	0.84	0.00	0.00	1.31	0.00	0.00	-0.01
time (sec)	N/A	0.205	0.299	0.211	0.000	0.589	0.000	0.000	0.000

Problem 252	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	126	126	126	0	0	180	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	1.43	0.00	0.00	-0.01
time (sec)	N/A	0.322	0.536	0.057	0.000	0.532	0.000	0.000	0.000

Problem 253	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	0	0	16	19	0	16
normalized size	1	1.00	1.00	0.00	0.00	0.76	0.90	0.00	0.76
time (sec)	N/A	0.027	0.007	0.009	0.000	0.450	1.589	0.000	0.097

Problem 254	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	0	0	16	19	0	91
normalized size	1	1.00	1.00	0.00	0.00	0.76	0.90	0.00	4.33
time (sec)	N/A	0.018	0.006	0.059	0.000	0.418	0.520	0.000	0.447

Problem 255	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	20	20	20	0	0	15	24	0	15
normalized size	1	1.00	1.00	0.00	0.00	0.75	1.20	0.00	0.75
time (sec)	N/A	0.029	0.012	0.020	0.000	0.470	0.342	0.000	0.171

Problem 256	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	0	0	16	24	0	16
normalized size	1	1.00	1.00	0.00	0.00	0.76	1.14	0.00	0.76
time (sec)	N/A	0.026	0.007	0.005	0.000	0.558	0.973	0.000	0.096

Problem 257	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	0	0	16	26	0	16
normalized size	1	1.00	1.00	0.00	0.00	0.76	1.24	0.00	0.76
time (sec)	N/A	0.027	0.006	0.007	0.000	0.576	2.067	0.000	0.145

Problem 258	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	28	28	28	0	0	24	63	0	23
normalized size	1	1.00	1.00	0.00	0.00	0.86	2.25	0.00	0.82
time (sec)	N/A	0.032	0.017	0.007	0.000	0.593	5.019	0.000	0.186

Problem 259	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	257	257	131	0	0	255	0	0	232
normalized size	1	1.00	0.51	0.00	0.00	0.99	0.00	0.00	0.90
time (sec)	N/A	0.409	0.342	0.065	0.000	0.568	0.000	0.000	0.769

Problem 260	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	142	142	91	0	0	151	0	0	128
normalized size	1	1.00	0.64	0.00	0.00	1.06	0.00	0.00	0.90
time (sec)	N/A	0.152	0.220	0.221	0.000	0.409	0.000	0.000	0.593

Problem 261	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	53	53	47	0	0	61	0	0	51
normalized size	1	1.00	0.89	0.00	0.00	1.15	0.00	0.00	0.96
time (sec)	N/A	0.039	0.026	0.206	0.000	0.448	0.000	0.000	0.174

Problem 262	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	20	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.039	0.150	0.036	0.000	0.408	0.000	0.000	0.000

Problem 263	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	93	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.148	0.249	0.240	0.000	0.419	0.000	0.000	0.000

Problem 264	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	212	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.320	0.303	0.264	0.000	0.416	0.000	0.000	0.000

Problem 265	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	171	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.234	0.282	0.060	0.000	0.418	0.000	0.000	0.000

Problem 266	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	79	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.095	0.216	0.179	0.000	0.822	0.000	0.000	0.000

Problem 267	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	17	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
time (sec)	N/A	0.015	0.037	0.062	0.000	0.516	0.000	0.000	0.000

Problem 268	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	59	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.114	0.208	0.080	0.000	0.509	0.000	0.000	0.000

Problem 269	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	144	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.273	0.321	0.248	0.000	0.595	0.000	0.000	0.000

Problem 270	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	107	107	68	103	0	79	0	0	82
normalized size	1	1.00	0.64	0.96	0.00	0.74	0.00	0.00	0.77
time (sec)	N/A	0.115	0.052	0.280	0.000	0.564	0.000	0.000	0.248

Problem 271	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	51	72	0	59	63	0	56
normalized size	1	1.00	0.72	1.01	0.00	0.83	0.89	0.00	0.79
time (sec)	N/A	0.069	0.034	0.087	0.000	0.614	154.660	0.000	0.182

Problem 272	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	32	32	32	41	0	40	27	0	27
normalized size	1	1.00	1.00	1.28	0.00	1.25	0.84	0.00	0.84
time (sec)	N/A	0.028	0.021	0.028	0.000	0.507	16.494	0.000	0.049

Problem 273	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	30	30	30	0	0	0	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	-0.03
time (sec)	N/A	0.036	0.021	0.035	0.000	0.439	0.000	0.000	0.000

Problem 274	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	65	65	32	0	0	0	0	0	-1
normalized size	1	1.00	0.49	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.075	0.023	0.158	0.000	0.519	0.000	0.000	0.000

Problem 275	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	105	105	34	0	0	0	0	0	-1
normalized size	1	1.00	0.32	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.113	0.028	0.612	0.000	0.415	0.000	0.000	0.000

Problem 276	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-1)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	148	148	52	0	0	0	0	0	-1
normalized size	1	1.00	0.35	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.142	0.025	0.386	0.000	0.411	0.000	0.000	0.000

Problem 277	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-1)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	109	109	43	0	0	0	0	0	-1
normalized size	1	1.00	0.39	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.099	0.034	0.220	0.000	0.454	0.000	0.000	0.000

Problem 278	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	70	70	36	0	0	0	0	0	-1
normalized size	1	1.00	0.51	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.056	0.018	0.064	0.000	0.400	0.000	0.000	0.000

Problem 279	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-2)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	27	27	27	0	0	0	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	-0.04
time (sec)	N/A	0.016	0.010	0.028	0.000	0.470	0.000	0.000	0.000

Problem 280	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	F	F	F	F(-2)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	60	60	26	0	0	0	0	0	-1
normalized size	1	1.00	0.43	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.056	0.023	0.081	0.000	0.436	0.000	0.000	0.000

Problem 281	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	F	F	F	F(-2)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	105	105	29	0	0	0	0	0	-1
normalized size	1	1.00	0.28	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.098	0.019	0.295	0.000	0.541	0.000	0.000	0.000

Problem 282	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	F	F	F	F(-1)	F	F
verified	N/A	Yes	NO	TBD	TBD	TBD	TBD	TBD	TBD
size	144	144	29	0	0	0	0	0	-1
normalized size	1	1.00	0.20	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.137	0.031	0.541	0.000	0.444	0.000	0.000	0.000

Problem 283	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	144	144	95	0	0	102	0	0	206
normalized size	1	1.00	0.66	0.00	0.00	0.71	0.00	0.00	1.43
time (sec)	N/A	0.229	0.081	0.060	0.000	0.429	0.000	0.000	0.560

Problem 284	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	97	97	77	0	0	82	0	0	117
normalized size	1	1.00	0.79	0.00	0.00	0.85	0.00	0.00	1.21
time (sec)	N/A	0.115	0.053	0.189	0.000	0.471	0.000	0.000	0.440

Problem 285	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	47	47	42	0	0	46	0	0	50
normalized size	1	1.00	0.89	0.00	0.00	0.98	0.00	0.00	1.06
time (sec)	N/A	0.038	0.013	0.197	0.000	1.219	0.000	0.000	0.279

Problem 286	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	22	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.039	0.087	0.036	0.000	0.429	0.000	0.000	0.000

Problem 287	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	93	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.111	0.175	0.213	0.000	0.481	0.000	0.000	0.000

Problem 288	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	174	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.219	0.222	0.232	0.000	0.566	0.000	0.000	0.000

Problem 289	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	121	121	78	0	0	74	124	0	126
normalized size	1	1.00	0.64	0.00	0.00	0.61	1.02	0.00	1.04
time (sec)	N/A	0.163	0.052	0.061	0.000	0.539	19.831	0.000	0.505

Problem 290	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	69	69	58	0	0	53	68	0	86
normalized size	1	1.00	0.84	0.00	0.00	0.77	0.99	0.00	1.25
time (sec)	N/A	0.076	0.016	0.178	0.000	0.576	3.789	0.000	0.324

Problem 291	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	21	21	21	0	0	16	19	0	91
normalized size	1	1.00	1.00	0.00	0.00	0.76	0.90	0.00	4.33
time (sec)	N/A	0.018	0.005	0.000	0.000	0.423	0.540	0.000	0.307

Problem 292	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	59	59	56	0	0	55	0	0	-1
normalized size	1	1.00	0.95	0.00	0.00	0.93	0.00	0.00	-0.02
time (sec)	N/A	0.082	0.031	0.082	0.000	0.440	0.000	0.000	0.000

Problem 293	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	118	118	91	0	0	85	0	0	-1
normalized size	1	1.00	0.77	0.00	0.00	0.72	0.00	0.00	-0.01
time (sec)	N/A	0.173	0.043	0.233	0.000	0.428	0.000	0.000	0.000

Problem 294	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	304	304	206	0	0	262	0	0	336
normalized size	1	1.00	0.68	0.00	0.00	0.86	0.00	0.00	1.11
time (sec)	N/A	0.468	2.548	0.235	0.000	0.490	0.000	0.000	1.135

Problem 295	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	78	78	73	0	0	100	0	0	79
normalized size	1	1.00	0.94	0.00	0.00	1.28	0.00	0.00	1.01
time (sec)	N/A	0.053	0.074	0.222	0.000	0.510	0.000	0.000	0.251

Problem 296	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	22	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.037	0.199	0.036	0.000	0.482	0.000	0.000	0.000

Problem 297	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	167	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.387	0.367	0.292	0.000	0.431	0.000	0.000	0.000

Problem 298	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	468	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.892	0.575	0.065	0.000	0.392	0.000	0.000	0.000

Problem 299	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	149	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.174	0.422	0.249	0.000	0.407	0.000	0.000	0.000

Problem 300	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	19	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05
time (sec)	N/A	0.014	0.038	0.071	0.000	0.493	0.000	0.000	0.000

Problem 301	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	79	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.203	0.396	0.106	0.000	0.517	0.000	0.000	0.000

Problem 302	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	A
verified	N/A	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	323	0	0	0	0	0	0	0	-1
normalized size	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.854	0.580	0.290	0.000	0.466	0.000	0.000	0.000

Problem 303	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	33	33	33	41	0	39	53	0	28
normalized size	1	1.00	1.00	1.24	0.00	1.18	1.61	0.00	0.85
time (sec)	N/A	0.119	0.056	0.181	0.000	0.590	31.157	0.000	0.173

Problem 304	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	67	67	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.056	0.659	0.026	0.000	0.515	0.000	0.000	0.000

Problem 305	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	67	67	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.055	0.711	0.026	0.000	0.439	0.000	0.000	0.000

Problem 306	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	63	63	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.055	0.540	0.037	0.000	0.526	0.000	0.000	0.000

Problem 307	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	F	F	F	F	F	F
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	63	63	0	0	0	0	0	0	-1
normalized size	1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.053	0.510	0.030	0.000	0.514	0.000	0.000	0.000

Problem 308	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	57	57	74	0	0	0	0	0	-1
normalized size	1	1.00	1.30	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.051	1.560	0.020	0.000	0.483	0.000	0.000	0.000

Problem 309	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	57	57	72	0	0	0	0	0	-1
normalized size	1	1.00	1.26	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.051	0.973	0.021	0.000	0.559	0.000	0.000	0.000

Problem 310	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	57	57	74	0	0	0	0	0	-1
normalized size	1	1.00	1.30	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.049	12.953	0.026	0.000	0.530	0.000	0.000	0.000

Problem 311	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	57	57	72	0	0	0	0	0	-1
normalized size	1	1.00	1.26	0.00	0.00	0.00	0.00	0.00	-0.02
time (sec)	N/A	0.051	1.958	0.027	0.000	0.457	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 [31] had the largest ratio of [.6667]

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	5	3	1.00	8	0.375
2	A	4	3	1.00	8	0.375
3	A	3	3	1.00	6	0.500
4	A	1	1	1.00	8	0.125
5	A	3	3	1.00	8	0.375
6	A	4	3	1.00	8	0.375
7	A	5	3	1.00	8	0.375
8	A	5	3	1.00	8	0.375
9	A	4	3	1.00	8	0.375
10	A	3	3	1.00	8	0.375
11	A	1	1	1.00	4	0.250
12	A	2	2	1.00	8	0.250
13	A	3	3	1.00	8	0.375
14	A	4	3	1.00	8	0.375
15	A	12	5	1.00	14	0.357
16	A	9	5	1.00	14	0.357
17	A	7	5	1.00	12	0.417
18	A	1	1	1.00	6	0.167
19	A	0	0	0.00	0	0.000
20	A	0	0	0.00	0	0.000
21	A	0	0	0.00	0	0.000
22	A	12	6	1.00	10	0.600
23	A	8	6	1.00	10	0.600
24	A	5	5	1.00	8	0.625
25	A	0	0	0.00	0	0.000

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Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
26	A	5	5	1.00	10	0.500
27	A	8	6	1.00	10	0.600
28	A	12	6	1.00	10	0.600
29	A	10	5	1.00	10	0.500
30	A	6	5	1.00	10	0.500
31	A	4	4	1.00	6	0.667
32	A	0	0	0.00	0	0.000
33	A	0	0	0.00	0	0.000
34	A	0	0	0.00	0	0.000
35	A	16	10	1.00	16	0.625
36	A	10	9	1.00	14	0.643
37	A	4	3	1.00	8	0.375
38	A	0	0	0.00	0	0.000
39	A	0	0	0.00	0	0.000
40	A	7	7	1.00	17	0.412
41	A	7	7	1.00	15	0.467
42	A	7	7	1.00	13	0.538
43	A	3	1	1.00	17	0.059
44	A	7	7	1.00	17	0.412
45	A	7	7	1.00	17	0.412
46	A	8	8	1.00	19	0.421
47	A	2	2	1.00	19	0.105
48	A	2	2	1.00	17	0.118
49	A	2	2	1.00	19	0.105
50	A	2	2	1.00	19	0.105
51	A	2	2	1.00	19	0.105

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
52	A	2	2	1.00	19	0.105
53	A	9	4	1.00	17	0.235
54	A	5	4	1.00	17	0.235
55	A	2	2	1.00	15	0.133
56	A	0	0	0.00	0	0.000
57	A	0	0	0.00	0	0.000
58	A	0	0	0.00	0	0.000
59	A	0	0	0.00	0	0.000
60	A	0	0	0.00	0	0.000
61	A	0	0	0.00	0	0.000
62	A	0	0	0.00	0	0.000
63	A	0	0	0.00	0	0.000
64	A	8	5	1.00	19	0.263
65	A	5	5	1.00	19	0.263
66	A	2	2	1.00	17	0.118
67	A	1	1	1.00	19	0.053
68	A	4	4	1.00	19	0.210
69	A	7	4	1.00	19	0.210
70	A	7	4	1.00	19	0.210
71	A	4	4	1.00	19	0.210
72	A	1	1	1.00	16	0.062
73	A	4	4	1.00	19	0.210
74	A	7	5	1.00	19	0.263
75	A	9	4	1.00	18	0.222
76	A	5	4	1.00	18	0.222
77	A	2	2	1.00	16	0.125

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
78	A	0	0	0.00	0	0.000
79	A	0	0	0.00	0	0.000
80	A	0	0	0.00	0	0.000
81	A	7	5	1.00	18	0.278
82	A	4	4	1.00	18	0.222
83	A	2	2	1.00	15	0.133
84	A	4	4	1.00	18	0.222
85	A	7	5	1.00	18	0.278
86	A	10	6	1.00	19	0.316
87	A	3	3	1.00	17	0.176
88	A	0	0	0.00	0	0.000
89	A	0	0	0.00	0	0.000
90	A	0	0	0.00	0	0.000
91	A	0	0	0.00	0	0.000
92	A	0	0	0.00	0	0.000
93	A	0	0	0.00	0	0.000
94	A	0	0	0.00	0	0.000
95	A	4	3	1.00	40	0.075
96	A	4	4	1.00	18	0.222
97	A	4	4	1.00	18	0.222
98	A	4	4	1.00	18	0.222
99	A	4	4	1.00	18	0.222
100	A	4	4	1.00	15	0.267
101	A	4	4	1.00	16	0.250
102	A	4	4	1.00	15	0.267
103	A	4	4	1.00	16	0.250

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
104	A	5	3	1.00	8	0.375
105	A	4	3	1.00	8	0.375
106	A	3	3	1.00	6	0.500
107	A	2	2	1.00	8	0.250
108	A	3	3	1.00	8	0.375
109	A	4	3	1.00	8	0.375
110	A	5	3	1.00	8	0.375
111	A	5	3	1.00	8	0.375
112	A	4	3	1.00	8	0.375
113	A	3	3	1.00	8	0.375
114	A	1	1	1.00	4	0.250
115	A	2	2	1.00	8	0.250
116	A	3	3	1.00	8	0.375
117	A	4	3	1.00	8	0.375
118	A	12	5	1.00	14	0.357
119	A	9	5	1.00	14	0.357
120	A	7	5	1.00	12	0.417
121	A	1	1	1.00	6	0.167
122	A	0	0	0.00	0	0.000
123	A	0	0	0.00	0	0.000
124	A	0	0	0.00	0	0.000
125	A	12	6	1.00	10	0.600
126	A	8	6	1.00	10	0.600
127	A	5	5	1.00	8	0.625
128	A	0	0	0.00	0	0.000
129	A	5	5	1.00	10	0.500

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
130	A	8	6	1.00	10	0.600
131	A	12	6	1.00	10	0.600
132	A	10	5	1.00	10	0.500
133	A	6	5	1.00	10	0.500
134	A	4	4	1.00	6	0.667
135	A	0	0	0.00	0	0.000
136	A	0	0	0.00	0	0.000
137	A	0	0	0.00	0	0.000
138	A	16	10	1.00	16	0.625
139	A	10	9	1.00	14	0.643
140	A	4	3	1.00	8	0.375
141	A	0	0	0.00	0	0.000
142	A	0	0	0.00	0	0.000
143	A	7	7	1.00	17	0.412
144	A	7	7	1.00	15	0.467
145	A	7	7	1.00	13	0.538
146	A	3	1	1.00	17	0.059
147	A	7	7	1.00	17	0.412
148	A	7	7	1.00	17	0.412
149	A	8	8	1.00	19	0.421
150	A	2	2	1.00	19	0.105
151	A	2	2	1.00	17	0.118
152	A	2	2	1.00	19	0.105
153	A	2	2	1.00	19	0.105
154	A	2	2	1.00	19	0.105
155	A	2	2	1.00	19	0.105

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
156	A	9	4	1.00	17	0.235
157	A	5	4	1.00	17	0.235
158	A	2	2	1.00	15	0.133
159	A	0	0	0.00	0	0.000
160	A	0	0	0.00	0	0.000
161	A	0	0	0.00	0	0.000
162	A	0	0	0.00	0	0.000
163	A	0	0	0.00	0	0.000
164	A	0	0	0.00	0	0.000
165	A	0	0	0.00	0	0.000
166	A	0	0	0.00	0	0.000
167	A	8	5	1.00	19	0.263
168	A	5	5	1.00	19	0.263
169	A	2	2	1.00	17	0.118
170	A	3	3	1.00	19	0.158
171	A	6	6	1.00	19	0.316
172	A	9	6	1.00	19	0.316
173	A	9	6	1.00	19	0.316
174	A	6	6	1.00	19	0.316
175	A	3	3	1.00	16	0.188
176	A	6	6	1.00	19	0.316
177	A	9	7	1.00	19	0.368
178	A	9	4	1.00	18	0.222
179	A	5	4	1.00	18	0.222
180	A	2	2	1.00	16	0.125
181	A	0	0	0.00	0	0.000

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Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	number of rules / integrand leaf size
182	A	0	0	0.00	0	0.000
183	A	0	0	0.00	0	0.000
184	A	7	5	1.00	18	0.278
185	A	4	4	1.00	18	0.222
186	A	2	2	1.00	15	0.133
187	A	4	4	1.00	18	0.222
188	A	7	5	1.00	18	0.278
189	A	10	6	1.00	19	0.316
190	A	3	3	1.00	17	0.176
191	A	0	0	0.00	0	0.000
192	A	0	0	0.00	0	0.000
193	A	0	0	0.00	0	0.000
194	A	0	0	0.00	0	0.000
195	A	0	0	0.00	0	0.000
196	A	0	0	0.00	0	0.000
197	A	0	0	0.00	0	0.000
198	A	4	3	1.00	40	0.075
199	A	6	6	1.00	18	0.333
200	A	6	6	1.00	18	0.333
201	A	6	6	1.00	18	0.333
202	A	6	6	1.00	18	0.333
203	A	6	6	1.00	15	0.400
204	A	6	6	1.00	16	0.375
205	A	6	6	1.00	15	0.400
206	A	6	6	1.00	16	0.375
207	A	5	3	1.00	8	0.375

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
208	A	4	3	1.00	8	0.375
209	A	3	3	1.00	6	0.500
210	A	1	1	1.00	8	0.125
211	A	3	3	1.00	8	0.375
212	A	4	3	1.00	8	0.375
213	A	5	3	1.00	8	0.375
214	A	5	3	1.00	8	0.375
215	A	4	3	1.00	8	0.375
216	A	3	3	1.00	8	0.375
217	A	1	1	1.00	4	0.250
218	A	2	2	1.00	8	0.250
219	A	3	3	1.00	8	0.375
220	A	4	3	1.00	8	0.375
221	A	12	5	1.00	14	0.357
222	A	9	5	1.00	14	0.357
223	A	7	5	1.00	12	0.417
224	A	1	1	1.00	6	0.167
225	A	0	0	0.00	0	0.000
226	A	0	0	0.00	0	0.000
227	A	0	0	0.00	0	0.000
228	A	12	6	1.00	10	0.600
229	A	8	6	1.00	10	0.600
230	A	5	5	1.00	8	0.625
231	A	0	0	0.00	0	0.000
232	A	5	5	1.00	10	0.500
233	A	8	6	1.00	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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
234	A	12	6	1.00	10	0.600
235	A	10	5	1.00	10	0.500
236	A	6	5	1.00	10	0.500
237	A	4	4	1.00	6	0.667
238	A	0	0	0.00	0	0.000
239	A	0	0	0.00	0	0.000
240	A	0	0	0.00	0	0.000
241	A	16	10	1.00	16	0.625
242	A	10	9	1.00	14	0.643
243	A	4	3	1.00	8	0.375
244	A	0	0	0.00	0	0.000
245	A	0	0	0.00	0	0.000
246	A	7	7	1.00	17	0.412
247	A	7	7	1.00	15	0.467
248	A	7	7	1.00	13	0.538
249	A	3	1	1.00	17	0.059
250	A	7	7	1.00	17	0.412
251	A	7	7	1.00	17	0.412
252	A	8	8	1.00	19	0.421
253	A	2	2	1.00	18	0.111
254	A	2	2	1.00	16	0.125
255	A	2	2	1.00	18	0.111
256	A	2	2	1.00	18	0.111
257	A	2	2	1.00	18	0.111
258	A	2	2	1.00	18	0.111
259	A	9	4	1.00	17	0.235

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Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	number of rules / integrand leaf size
260	A	5	4	1.00	17	0.235
261	A	2	2	1.00	15	0.133
262	A	0	0	0.00	0	0.000
263	A	0	0	0.00	0	0.000
264	A	0	0	0.00	0	0.000
265	A	0	0	0.00	0	0.000
266	A	0	0	0.00	0	0.000
267	A	0	0	0.00	0	0.000
268	A	0	0	0.00	0	0.000
269	A	0	0	0.00	0	0.000
270	A	6	4	1.00	18	0.222
271	A	4	4	1.00	18	0.222
272	A	2	2	1.00	16	0.125
273	A	1	1	1.00	18	0.056
274	A	3	3	1.00	18	0.167
275	A	5	3	1.00	18	0.167
276	A	7	3	1.00	18	0.167
277	A	5	3	1.00	18	0.167
278	A	3	3	1.00	18	0.167
279	A	1	1	1.00	15	0.067
280	A	3	3	1.00	18	0.167
281	A	5	4	1.00	18	0.222
282	A	7	4	1.00	18	0.222
283	A	9	4	1.00	19	0.210
284	A	5	4	1.00	19	0.210
285	A	2	2	1.00	17	0.118

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
286	A	0	0	0.00	0	0.000
287	A	0	0	0.00	0	0.000
288	A	0	0	0.00	0	0.000
289	A	7	5	1.00	19	0.263
290	A	4	4	1.00	19	0.210
291	A	2	2	1.00	16	0.125
292	A	4	4	1.00	19	0.210
293	A	7	5	1.00	19	0.263
294	A	10	6	1.00	19	0.316
295	A	3	3	1.00	17	0.176
296	A	0	0	0.00	0	0.000
297	A	0	0	0.00	0	0.000
298	A	0	0	0.00	0	0.000
299	A	0	0	0.00	0	0.000
300	A	0	0	0.00	0	0.000
301	A	0	0	0.00	0	0.000
302	A	0	0	0.00	0	0.000
303	A	5	3	1.00	40	0.075
304	A	4	4	1.00	18	0.222
305	A	4	4	1.00	18	0.222
306	A	4	4	1.00	18	0.222
307	A	4	4	1.00	18	0.222
308	A	4	4	1.00	15	0.267
309	A	4	4	1.00	16	0.250
310	A	4	4	1.00	15	0.267
311	A	4	4	1.00	16	0.250

Chapter 3

Listing of integrals

3.1 $\int x^5 \mathbf{erf}(bx)\, dx$

Optimal. Leaf size=96

$$-\frac{5\operatorname{erf}(bx)}{16b^6}+\frac{x^5e^{-b^2x^2}}{6\sqrt{\pi}\,b}+\frac{5xe^{-b^2x^2}}{8\sqrt{\pi}\,b^5}+\frac{5x^3e^{-b^2x^2}}{12\sqrt{\pi}\,b^3}+\frac{1}{6}x^6\operatorname{erf}(bx)$$

```
[Out] -5/16*erf(b*x)/b^6+1/6*x^6*erf(b*x)+5/8*x/b^5/exp(b^2*x^2)/Pi^(1/2)+5/12*x^
3/b^3/exp(b^2*x^2)/Pi^(1/2)+1/6*x^5/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.10, antiderivative size = 96, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2212, 2205}

$$-\frac{5\operatorname{Erf}(bx)}{16b^6}+\frac{x^5e^{-b^2x^2}}{6\sqrt{\pi}\,b}+\frac{5x^3e^{-b^2x^2}}{12\sqrt{\pi}\,b^3}+\frac{5xe^{-b^2x^2}}{8\sqrt{\pi}\,b^5}+\frac{1}{6}x^6\operatorname{Erf}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^5*Erf[b*x],x]
```

```
[Out] (5*x)/(8*b^5*E^(b^2*x^2)*Sqrt[Pi]) + (5*x^3)/(12*b^3*E^(b^2*x^2)*Sqrt[Pi])
+ x^5/(6*b*E^(b^2*x^2)*Sqrt[Pi]) - (5*Erf[b*x])/(16*b^6) + (x^6*Erf[b*x])/6
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6361

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

Rubi steps

$$
\begin{aligned}
\int x^5\text{erf}(bx)\,dx &= \frac{1}{6}x^6\text{erf}(bx)-\frac{b\int e^{-b^2x^2}x^6\,dx}{3\sqrt{\pi}}\\
&= \frac{e^{-b^2x^2}x^5}{6b\sqrt{\pi}}+\frac{1}{6}x^6\text{erf}(bx)-\frac{5\int e^{-b^2x^2}x^4\,dx}{6b\sqrt{\pi}}\\
&= \frac{5e^{-b^2x^2}x^3}{12b^3\sqrt{\pi}}+\frac{e^{-b^2x^2}x^5}{6b\sqrt{\pi}}+\frac{1}{6}x^6\text{erf}(bx)-\frac{5\int e^{-b^2x^2}x^2\,dx}{4b^3\sqrt{\pi}}\\
&= \frac{5e^{-b^2x^2}x}{8b^5\sqrt{\pi}}+\frac{5e^{-b^2x^2}x^3}{12b^3\sqrt{\pi}}+\frac{e^{-b^2x^2}x^5}{6b\sqrt{\pi}}+\frac{1}{6}x^6\text{erf}(bx)-\frac{5\int e^{-b^2x^2}\,dx}{8b^5\sqrt{\pi}}\\
&= \frac{5e^{-b^2x^2}x}{8b^5\sqrt{\pi}}+\frac{5e^{-b^2x^2}x^3}{12b^3\sqrt{\pi}}+\frac{e^{-b^2x^2}x^5}{6b\sqrt{\pi}}-\frac{5\text{erf}(bx)}{16b^6}+\frac{1}{6}x^6\text{erf}(bx)
\end{aligned}
$$

Mathematica [A] time = 0.13, size = 72, normalized size = 0.75

$$\frac{e^{-b^2x^2}\left(8b^5x^5+20b^3x^3+\sqrt{\pi}\,e^{b^2x^2}\left(8b^6x^6-15\right)\text{erf}(bx)+30bx\right)}{48\sqrt{\pi}\,b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*Erf[b*x],x]
```

```
[Out] (30*b*x + 20*b^3*x^3 + 8*b^5*x^5 + E^(b^2*x^2)*Sqrt[Pi]*(-15 + 8*b^6*x^6)*E
rf[b*x])/(48*b^6*E^(b^2*x^2)*Sqrt[Pi])
```

fricas [A] time = 2.23, size = 63, normalized size = 0.66

$$\frac{2\,\sqrt{\pi}\left(4\,b^{5}x^{5}+10\,b^{3}x^{3}+15\,bx\right)e^{\left(-b^{2}x^{2}\right)}-\left(15\,\pi-8\,\pi b^{6}x^{6}\right)\operatorname{erf}\left(bx\right)}{48\,\pi b^{6}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erf(b*x),x, algorithm="fricas")
```

```
[Out] 1/48*(2*sqrt(pi)*(4*b^5*x^5 + 10*b^3*x^3 + 15*b*x)*e^(-b^2*x^2) - (15*pi -
8*pi*b^6*x^6)*erf(b*x))/(pi*b^6)
```

giac [A] time = 0.42, size = 64, normalized size = 0.67

$$\frac{1}{6}\,x^{6}\operatorname{erf}\left(bx\right)+\frac{b\left(\frac{2\left(4\,b^{4}x^{5}+10\,b^{2}x^{3}+15\,x\right)e^{\left(-b^{2}x^{2}\right)}}{b^{6}}+\frac{15\,\sqrt{\pi}\,\operatorname{erf}(-bx)}{b^{7}}\right)}{48\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erf(b*x),x, algorithm="giac")
```

```
[Out] 1/6*x^6*erf(b*x) + 1/48*b*(2*(4*b^4*x^5 + 10*b^2*x^3 + 15*x)*e^(-b^2*x^2)/b
^6 + 15*sqrt(pi)*erf(-b*x)/b^7)/sqrt(pi)
```

maple [A] time = 0.13, size = 83, normalized size = 0.86

$$\frac{\frac{\operatorname{erf}(bx)b^{6}x^{6}}{6}-\frac{-\frac{e^{-b^{2}x^{2}}b^{5}x^{5}}{2}-\frac{5b^{3}x^{3}e^{-b^{2}x^{2}}}{4}-\frac{15\,e^{-b^{2}x^{2}}bx}{8}+\frac{15\sqrt{\pi}\,\operatorname{erf}(bx)}{16}}{3\sqrt{\pi}}}{b^{6}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erf(b*x),x)
```

```
[Out] 1/b^6*(1/6*erf(b*x)*b^6*x^6-1/3/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^5*x^5-5/4*b^3
*x^3/exp(b^2*x^2)-15/8*b*x/exp(b^2*x^2)+15/16*Pi^(1/2)*erf(b*x)))
```

maxima [A] time = 0.47, size = 63, normalized size = 0.66

$$\frac{1}{6}\,x^{6}\operatorname{erf}\left(bx\right)+\frac{b\left(\frac{2\left(4\,b^{4}x^{5}+10\,b^{2}x^{3}+15\,x\right)e^{\left(-b^{2}x^{2}\right)}}{b^{6}}-\frac{15\,\sqrt{\pi}\,\operatorname{erf}(bx)}{b^{7}}\right)}{48\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/6*x^6*erf(b*x) + 1/48*b*(2*(4*b^4*x^5 + 10*b^2*x^3 + 15*x)*e^(-b^2*x^2)/b
^6 - 15*sqrt(pi)*erf(b*x)/b^7)/sqrt(pi)
```

mupad [B] time = 0.47, size = 108, normalized size = 1.12

$$\frac{x^6\,\mathrm{erf}\left(b\,x\right)}{6}-\frac{5\,b\,x^7}{16\,{\left(b^2\,x^2\right)}^{7/2}}+\frac{x^5\,\mathrm{e}^{-b^2\,x^2}}{6\,b\,\sqrt{\pi}}+\frac{5\,x^3\,\mathrm{e}^{-b^2\,x^2}}{12\,b^3\,\sqrt{\pi}}+\frac{5\,x\,\mathrm{e}^{-b^2\,x^2}}{8\,b^5\,\sqrt{\pi}}+\frac{5\,b\,x^7\,\mathrm{erfc}\left(\sqrt{b^2\,x^2}\right)}{16\,{\left(b^2\,x^2\right)}^{7/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erf(b*x),x)
```

```
[Out] (x^6*erf(b*x))/6 - (5*b*x^7)/(16*(b^2*x^2)^(7/2)) + (x^5*exp(-b^2*x^2))/(6*
b*pi^(1/2)) + (5*x^3*exp(-b^2*x^2))/(12*b^3*pi^(1/2)) + (5*x*exp(-b^2*x^2))
/(8*b^5*pi^(1/2)) + (5*b*x^7*erfc((b^2*x^2)^(1/2)))/(16*(b^2*x^2)^(7/2))
```

sympy [A] time = 2.94, size = 88, normalized size = 0.92

$$\begin{cases} \frac{x^6 \operatorname{erf}{\left(bx \right)}}{6} + \frac{x^5 e^{-b^2x^2}}{6\sqrt{\pi}\,b} + \frac{5x^3 e^{-b^2x^2}}{12\sqrt{\pi}\,b^3} + \frac{5x e^{-b^2x^2}}{8\sqrt{\pi}\,b^5} - \frac{5 \operatorname{erf}{\left(bx \right)}}{16b^6} & \text{for}\: b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*erf(b*x),x)
```

```
[Out] Piecewise((x**6*erf(b*x)/6 + x**5*exp(-b**2*x**2)/(6*sqrt(pi)*b) + 5*x**3*e
xp(-b**2*x**2)/(12*sqrt(pi)*b**3) + 5*x*exp(-b**2*x**2)/(8*sqrt(pi)*b**5) -
 5*erf(b*x)/(16*b**6), Ne(b, 0)), (0, True))
```

3.2 $\int x^3 \mathbf{erf}(bx)\, dx$

Optimal. Leaf size=71

$$-\frac{3\text{erf}(bx)}{16b^4}+\frac{x^3e^{-b^2x^2}}{4\sqrt{\pi}\,b}+\frac{3xe^{-b^2x^2}}{8\sqrt{\pi}\,b^3}+\frac{1}{4}x^4\text{erf}(bx)$$

```
[Out] -3/16*erf(b*x)/b^4+1/4*x^4*erf(b*x)+3/8*x/b^3/exp(b^2*x^2)/Pi^(1/2)+1/4*x^3
/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2212, 2205}

$$-\frac{3\text{Erf}(bx)}{16b^4}+\frac{x^3e^{-b^2x^2}}{4\sqrt{\pi}\,b}+\frac{3xe^{-b^2x^2}}{8\sqrt{\pi}\,b^3}+\frac{1}{4}x^4\text{Erf}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^3*Erf[b*x],x]
```

```
[Out] (3*x)/(8*b^3*E^(b^2*x^2)*Sqrt[Pi]) + x^3/(4*b*E^(b^2*x^2)*Sqrt[Pi]) - (3*Er
f[b*x])/(16*b^4) + (x^4*Erf[b*x])/4
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6361

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

Rubi steps

$$\int x^3\text{erf}(bx)\,dx = \frac{1}{4}x^4\text{erf}(bx) - \frac{b\int e^{-b^2x^2}x^4\,dx}{2\sqrt{\pi}}$$
$$= \frac{e^{-b^2x^2}x^3}{4b\sqrt{\pi}} + \frac{1}{4}x^4\text{erf}(bx) - \frac{3\int e^{-b^2x^2}x^2\,dx}{4b\sqrt{\pi}}$$
$$= \frac{3e^{-b^2x^2}x}{8b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^3}{4b\sqrt{\pi}} + \frac{1}{4}x^4\text{erf}(bx) - \frac{3\int e^{-b^2x^2}\,dx}{8b^3\sqrt{\pi}}$$
$$= \frac{3e^{-b^2x^2}x}{8b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^3}{4b\sqrt{\pi}} - \frac{3\text{erf}(bx)}{16b^4} + \frac{1}{4}x^4\text{erf}(bx)$$

Mathematica [A] time = 0.03, size = 63, normalized size = 0.89

$$-\frac{3\text{erf}(bx)}{16b^4} + e^{-b^2x^2}\left(\frac{3x}{8\sqrt{\pi}\,b^3} + \frac{x^3}{4\sqrt{\pi}\,b}\right) + \frac{1}{4}x^4\text{erf}(bx)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*Erf[b*x],x]
```

```
[Out] ((3*x)/(8*b^3*Sqrt[Pi]) + x^3/(4*b*Sqrt[Pi]))/E^(b^2*x^2) - (3*Erf[b*x])/(1
6*b^4) + (x^4*Erf[b*x])/4
```

fricas [A] time = 0.41, size = 55, normalized size = 0.77

$$\frac{2\sqrt{\pi}\left(2\,b^3x^3 + 3\,bx\right)e^{\left(-b^2x^2\right)} - \left(3\,\pi - 4\,\pi b^4x^4\right)\text{erf}\,(bx)}{16\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/16*(2*sqrt(pi)*(2*b^3*x^3 + 3*b*x)*e^(-b^2*x^2) - (3*pi - 4*pi*b^4*x^4)*e
rf(b*x))/(pi*b^4)
```

giac [A] time = 0.48, size = 56, normalized size = 0.79

$$\frac{1}{4}\,x^4\,\text{erf}\,(bx) + \frac{b\left(\frac{2\left(2\,b^2x^3+3\,x\right)e^{\left(-b^2x^2\right)}}{b^4} + \frac{3\,\sqrt{\pi}\,\text{erf}(-bx)}{b^5}\right)}{16\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*x^4*erf(b*x) + 1/16*b*(2*(2*b^2*x^3 + 3*x)*e^(-b^2*x^2)/b^4 + 3*sqrt(pi
)*erf(-b*x)/b^5)/sqrt(pi)
```

maple [A] time = 0.02, size = 65, normalized size = 0.92

$$\frac{\frac{\operatorname{erf}(bx)b^4x^4}{4}-\frac{-\frac{b^3x^3\mathrm{e}^{-b^2x^2}}{2}-\frac{3\,\mathrm{e}^{-b^2x^2}bx}{4}+\frac{3\sqrt{\pi}\,\operatorname{erf}(bx)}{8}}{2\sqrt{\pi}}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erf(b*x),x)
```

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

maxima [A] time = 0.62, size = 55, normalized size = 0.77

$$\frac{1}{4}\,x^4\operatorname{erf}(bx)+\frac{b\left(\frac{2\left(2\,b^2x^3+3\,x\right)e^{\left(-b^2x^2\right)}}{b^4}-\frac{3\,\sqrt{\pi}\,\operatorname{erf}(bx)}{b^5}\right)}{16\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*x^4*erf(b*x) + 1/16*b*(2*(2*b^2*x^3 + 3*x)*e^(-b^2*x^2)/b^4 - 3*sqrt(pi
)*erf(b*x)/b^5)/sqrt(pi)
```

mupad [B] time = 0.10, size = 88, normalized size = 1.24

$$\frac{x^4\operatorname{erf}(b\,x)}{4}-\frac{3\,b\,x^5}{16\,{\left(b^2\,x^2\right)}^{5/2}}+\frac{x^3\,\mathrm{e}^{-b^2\,x^2}}{4\,b\,\sqrt{\pi}}+\frac{3\,x\,\mathrm{e}^{-b^2\,x^2}}{8\,b^3\,\sqrt{\pi}}+\frac{3\,b\,x^5\operatorname{erfc}\left(\sqrt{b^2\,x^2}\right)}{16\,{\left(b^2\,x^2\right)}^{5/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erf(b*x),x)
```

```
[Out] (x^4*erf(b*x))/4 - (3*b*x^5)/(16*(b^2*x^2)^(5/2)) + (x^3*exp(-b^2*x^2))/(4*
b*pi^(1/2)) + (3*x*exp(-b^2*x^2))/(8*b^3*pi^(1/2)) + (3*b*x^5*erfc((b^2*x^2
)^(1/2)))/(16*(b^2*x^2)^(5/2))
```

sympy [A] time = 0.98, size = 65, normalized size = 0.92

$$\begin{cases} \frac{x^4 \operatorname{erf}(bx)}{4} + \frac{x^3 e^{-b^2 x^2}}{4\sqrt{\pi}\, b} + \frac{3xe^{-b^2 x^2}}{8\sqrt{\pi}\, b^3} - \frac{3 \operatorname{erf}(bx)}{16b^4} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*erf(b*x),x)
```

```
[Out] Piecewise((x**4*erf(b*x)/4 + x**3*exp(-b**2*x**2)/(4*sqrt(pi)*b) + 3*x*exp(
-b**2*x**2)/(8*sqrt(pi)*b**3) - 3*erf(b*x)/(16*b**4), Ne(b, 0)), (0, True))
```

3.3 $\int x\,\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=46

$$-\frac{\text{erf}(bx)}{4b^2}+\frac{xe^{-b^2x^2}}{2\sqrt{\pi}\,b}+\frac{1}{2}x^2\text{erf}(bx)$$

```
[Out] -1/4*erf(b*x)/b^2+1/2*x^2*erf(b*x)+1/2*x/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.04, antiderivative size = 46, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6361, 2212, 2205}

$$-\frac{\text{Erf}(bx)}{4b^2}+\frac{xe^{-b^2x^2}}{2\sqrt{\pi}\,b}+\frac{1}{2}x^2\text{Erf}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x*Erf[b*x],x]
```

```
[Out] x/(2*b*E^(b^2*x^2)*Sqrt[Pi]) - Erf[b*x]/(4*b^2) + (x^2*Erf[b*x])/2
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6361

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

Rubi steps

$$\int x\mathrm{erf}(bx)\,dx = \frac{1}{2}x^2\mathrm{erf}(bx) - \frac{b\int e^{-b^2x^2}x^2\,dx}{\sqrt{\pi}}$$
$$= \frac{e^{-b^2x^2}x}{2b\sqrt{\pi}} + \frac{1}{2}x^2\mathrm{erf}(bx) - \frac{\int e^{-b^2x^2}\,dx}{2b\sqrt{\pi}}$$
$$= \frac{e^{-b^2x^2}x}{2b\sqrt{\pi}} - \frac{\mathrm{erf}(bx)}{4b^2} + \frac{1}{2}x^2\mathrm{erf}(bx)$$

Mathematica [**A**] time = 0.04, size = 42, normalized size = 0.91

$$\frac{1}{4}\left(\left(2x^2 - \frac{1}{b^2}\right)\mathrm{erf}(bx) + \frac{2xe^{-b^2x^2}}{\sqrt{\pi}\,b}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Erf[b*x],x]
[Out] ((2*x)/(b*E^(b^2*x^2)*Sqrt[Pi]) + (-b^(-2) + 2*x^2)*Erf[b*x])/4
```

fricas [**A**] time = 0.39, size = 42, normalized size = 0.91

$$\frac{2\sqrt{\pi}\,bxe^{\left(-b^2x^2\right)} - \left(\pi - 2\,\pi b^2x^2\right)\mathrm{erf}\left(bx\right)}{4\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x),x, algorithm="fricas")
[Out] 1/4*(2*sqrt(pi)*b*x*e^(-b^2*x^2) - (pi - 2*pi*b^2*x^2)*erf(b*x))/(pi*b^2)
```

giac [**A**] time = 0.23, size = 44, normalized size = 0.96

$$\frac{1}{2}\,x^2\,\mathrm{erf}\left(bx\right) + \frac{b\left(\frac{2\,xe^{\left(-b^2x^2\right)}}{b^2} + \frac{\sqrt{\pi}\,\mathrm{erf}(-bx)}{b^3}\right)}{4\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x),x, algorithm="giac")
[Out] 1/2*x^2*erf(b*x) + 1/4*b*(2*x*e^(-b^2*x^2)/b^2 + sqrt(pi)*erf(-b*x)/b^3)/sq
rt(pi)
```

maple [A] time = 0.01, size = 47, normalized size = 1.02

$$\frac{\frac{\operatorname{erf}(bx)b^2x^2}{2}-\frac{-\frac{e^{-b^2x^2}bx}{2}+\frac{\sqrt{\pi}\,\operatorname{erf}(bx)}{4}}{\sqrt{\pi}}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erf(b*x),x)
```

```
[Out] 1/b^2*(1/2*erf(b*x)*b^2*x^2-1/Pi^(1/2)*(-1/2*b*x/exp(b^2*x^2)+1/4*Pi^(1/2)*
erf(b*x)))
```

maxima [A] time = 0.40, size = 44, normalized size = 0.96

$$\frac{1}{2}\,x^2\operatorname{erf}(bx)+\frac{b\left(\frac{2\,xe^{\left(-b^2x^2\right)}}{b^2}-\frac{\sqrt{\pi}\,\operatorname{erf}(bx)}{b^3}\right)}{4\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*erf(b*x) + 1/4*b*(2*x*e^(-b^2*x^2)/b^2 - sqrt(pi)*erf(b*x)/b^3)/sqr
t(pi)
```

mupad [B] time = 0.17, size = 48, normalized size = 1.04

$$\frac{x^2\operatorname{erf}(b\,x)}{2}+\frac{b\operatorname{erfi}\left(x\,\sqrt{-b^2}\right)}{4\left(-b^2\right)^{3/2}}+\frac{x\,e^{-b^2\,x^2}}{2\,b\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erf(b*x),x)
```

```
[Out] (x^2*erf(b*x))/2 + (b*erfi(x*(-b^2)^(1/2)))/(4*(-b^2)^(3/2)) + (x*exp(-b^2*
x^2))/(2*b*pi^(1/2))
```

sympy [A] time = 0.36, size = 39, normalized size = 0.85

$$\begin{cases}\frac{x^2\operatorname{erf}(bx)}{2}+\frac{xe^{-b^2x^2}}{2\sqrt{\pi}\,b}-\frac{\operatorname{erf}(bx)}{4b^2} & \text{for } b\neq 0\\ 0 & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x),x)
```

```
[Out] Piecewise((x**2*erf(b*x)/2 + x*exp(-b**2*x**2)/(2*sqrt(pi)*b) - erf(b*x)/(4
*b**2), Ne(b, 0)), (0, True))
```

3.4 $\int \frac{\textbf{erf}(bx)}{x} \, dx$

Optimal. Leaf size=32

$$\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

```
[Out] 2*b*x*HypergeometricPFQ([1/2, 1/2],[3/2, 3/2],-b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.01, antiderivative size = 32, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.125, Rules used = {6358}

$$\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/x,x]
```

```
[Out] (2*b*x*HypergeometricPFQ[{1/2, 1/2}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi]
```

Rule 6358

```
Int[Erf[(b_.)*(x_)]/(x_), x_Symbol] :> Simp[(2*b*x*HypergeometricPFQ[{1/2,
1/2}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[b, x]
```

Rubi steps

$$\int \frac{\text{erf}(bx)}{x} \, dx = \frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

Mathematica [A] time = 0.08, size = 32, normalized size = 1.00

$$\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/x,x]
```

```
[Out] (2*b*x*HypergeometricPFQ[{1/2, 1/2}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi]
```

fricas [F] time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx)}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x,x, algorithm="fricas")
[Out] integral(erf(b*x)/x, x)
```

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

$$\int \frac{\text{erf}\,(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x,x, algorithm="giac")
[Out] integrate(erf(b*x)/x, x)
```

maple [A] time = 0.21, size = 23, normalized size = 0.72

$$\frac{2bx\,\text{hypergeom}\left(\left[\frac{1}{2}, \frac{1}{2}\right], \left[\frac{3}{2}, \frac{3}{2}\right], -b^2x^2\right)}{\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x,x)
[Out] 2/Pi^(1/2)*b*x*hypergeom([1/2,1/2],[3/2,3/2],-b^2*x^2)
```

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

$$\int \frac{\text{erf}\,(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x,x, algorithm="maxima")
[Out] integrate(erf(b*x)/x, x)
```

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

$$\int \frac{\text{erf}\,(b\,x)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x,x)
```

```
[Out] int(erf(b*x)/x, x)
```

sympy [**F**(**-2**)]   time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x,x)
```

```
[Out] Exception raised: AttributeError
```

3.5 $\int \frac{\text{erf}(bx)}{x^3}\,dx$

Optimal. Leaf size=42

$$b^2(-\text{erf}(bx))-\frac{be^{-b^2x^2}}{\sqrt{\pi}\,x}-\frac{\text{erf}(bx)}{2x^2}$$

```
[Out] -b^2*erf(b*x)-1/2*erf(b*x)/x^2-b/exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.04, antiderivative size = 42, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2214, 2205}

$$b^2(-\text{Erf}(bx))-\frac{be^{-b^2x^2}}{\sqrt{\pi}\,x}-\frac{\text{Erf}(bx)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/x^3,x]
```

```
[Out] -(b/(E^(b^2*x^2)*Sqrt[Pi]*x)) - b^2*Erf[b*x] - Erf[b*x]/(2*x^2)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6361

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

Rubi steps

$$\int \frac{\operatorname{erf}(bx)}{x^3}\,dx = -\frac{\operatorname{erf}(bx)}{2x^2} + \frac{b\int \frac{e^{-b^2x^2}}{x^2}\,dx}{\sqrt{\pi}}$$
$$= -\frac{be^{-b^2x^2}}{\sqrt{\pi}\,x} - \frac{\operatorname{erf}(bx)}{2x^2} - \frac{\left(2b^3\right)\int e^{-b^2x^2}\,dx}{\sqrt{\pi}}$$
$$= -\frac{be^{-b^2x^2}}{\sqrt{\pi}\,x} - b^2\operatorname{erf}(bx) - \frac{\operatorname{erf}(bx)}{2x^2}$$

Mathematica [A] time = 0.05, size = 42, normalized size = 1.00

$$b^2(-\operatorname{erf}(bx)) - \frac{be^{-b^2x^2}}{\sqrt{\pi}\,x} - \frac{\operatorname{erf}(bx)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/x^3,x]
[Out] -(b/(E^(b^2*x^2)*Sqrt[Pi]*x)) - b^2*Erf[b*x] - Erf[b*x]/(2*x^2)
```

fricas [A] time = 0.41, size = 41, normalized size = 0.98

$$-\frac{2\sqrt{\pi}\,bxe^{\left(-b^2x^2\right)} + \left(\pi + 2\,\pi b^2x^2\right)\operatorname{erf}(bx)}{2\,\pi x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^3,x, algorithm="fricas")
[Out] -1/2*(2*sqrt(pi)*b*x*e^(-b^2*x^2) + (pi + 2*pi*b^2*x^2)*erf(b*x))/(pi*x^2)
```

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

$$\int \frac{\operatorname{erf}(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^3,x, algorithm="giac")
[Out] integrate(erf(b*x)/x^3, x)
```

maple [A] time = 0.01, size = 50, normalized size = 1.19

$$b^2\left(-\frac{\operatorname{erf}(bx)}{2b^2x^2}+\frac{-\frac{e^{-b^2x^2}}{bx}-\sqrt{\pi}\ \operatorname{erf}(bx)}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^3,x)
```

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

maxima [A] time = 0.69, size = 35, normalized size = 0.83

$$-\frac{b^2\sqrt{x^2}\,\Gamma\left(-\frac{1}{2},b^2x^2\right)}{2\sqrt{\pi}\,x}-\frac{\operatorname{erf}(bx)}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/2*b^2*sqrt(x^2)*gamma(-1/2, b^2*x^2)/(sqrt(pi)*x) - 1/2*erf(b*x)/x^2
```

mupad [B] time = 0.15, size = 67, normalized size = 1.60

$$\frac{b\operatorname{erfc}\left(\sqrt{b^2\,x^2}\right)\,\sqrt{b^2\,x^2}}{x}-\frac{b\,\sqrt{b^2\,x^2}}{x}-\frac{b\,e^{-b^2\,x^2}}{x\,\sqrt{\pi}}-\frac{\operatorname{erf}(b\,x)}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^3,x)
```

```
[Out] (b*erfc((b^2*x^2)^(1/2))*(b^2*x^2)^(1/2))/x - (b*(b^2*x^2)^(1/2))/x - (b*ex
p(-b^2*x^2))/(x*pi^(1/2)) - erf(b*x)/(2*x^2)
```

sympy [A] time = 0.48, size = 36, normalized size = 0.86

$$-b^2\operatorname{erf}(bx)-\frac{be^{-b^2x^2}}{\sqrt{\pi}\,x}-\frac{\operatorname{erf}(bx)}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x**3,x)
```

```
[Out] -b**2*erf(b*x) - b*exp(-b**2*x**2)/(sqrt(pi)*x) - erf(b*x)/(2*x**2)
```

3.6 $\int \frac{\mathbf{erf}(bx)}{x^5}\,dx$

Optimal. Leaf size=71

$$\frac{1}{3}b^4\mathrm{erf}(bx)-\frac{be^{-b^2x^2}}{6\sqrt{\pi}\,x^3}+\frac{b^3e^{-b^2x^2}}{3\sqrt{\pi}\,x}-\frac{\mathrm{erf}(bx)}{4x^4}$$

```
[Out] 1/3*b^4*erf(b*x)-1/4*erf(b*x)/x^4-1/6*b/exp(b^2*x^2)/x^3/Pi^(1/2)+1/3*b^3/e
xp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.07, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2214, 2205}

$$\frac{1}{3}b^4\mathrm{Erf}(bx)+\frac{b^3e^{-b^2x^2}}{3\sqrt{\pi}\,x}-\frac{be^{-b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{\mathrm{Erf}(bx)}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/x^5,x]
```

```
[Out] -b/(6*E^(b^2*x^2)*Sqrt[Pi]*x^3) + b^3/(3*E^(b^2*x^2)*Sqrt[Pi]*x) + (b^4*Erf
[b*x])/3 - Erf[b*x]/(4*x^4)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6361

```
Int[Erf[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[(
(c + d*x)^(m + 1)*Erf[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*(m
 + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d, m
```

```
}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\text{erf}(bx)}{x^5} \, dx &= -\frac{\text{erf}(bx)}{4x^4} + \frac{b \int \frac{e^{-b^2x^2}}{x^4} \, dx}{2\sqrt{\pi}} \\
&= -\frac{be^{-b^2x^2}}{6\sqrt{\pi}\, x^3} - \frac{\text{erf}(bx)}{4x^4} - \frac{b^3 \int \frac{e^{-b^2x^2}}{x^2} \, dx}{3\sqrt{\pi}} \\
&= -\frac{be^{-b^2x^2}}{6\sqrt{\pi}\, x^3} + \frac{b^3e^{-b^2x^2}}{3\sqrt{\pi}\, x} - \frac{\text{erf}(bx)}{4x^4} + \frac{\left(2b^5\right) \int e^{-b^2x^2} \, dx}{3\sqrt{\pi}} \\
&= -\frac{be^{-b^2x^2}}{6\sqrt{\pi}\, x^3} + \frac{b^3e^{-b^2x^2}}{3\sqrt{\pi}\, x} + \frac{1}{3}b^4\text{erf}(bx) - \frac{\text{erf}(bx)}{4x^4}
\end{aligned}
$$

Mathematica [A] time = 0.02, size = 63, normalized size = 0.89

$$\frac{1}{3}b^4\text{erf}(bx) + e^{-b^2x^2}\left(\frac{b^3}{3\sqrt{\pi}\, x} - \frac{b}{6\sqrt{\pi}\, x^3}\right) - \frac{\text{erf}(bx)}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/x^5,x]
```

```
[Out] (-1/6*b/(Sqrt[Pi]*x^3) + b^3/(3*Sqrt[Pi]*x))/E^(b^2*x^2) + (b^4*Erf[b*x])/3
 - Erf[b*x]/(4*x^4)
```

fricas [A] time = 0.41, size = 55, normalized size = 0.77

$$\frac{2\sqrt{\pi}\left(2\,b^3x^3 - bx\right)e^{\left(-b^2x^2\right)} - \left(3\,\pi - 4\,\pi b^4x^4\right)\text{erf}\left(bx\right)}{12\,\pi x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/12*(2*sqrt(pi)*(2*b^3*x^3 - b*x)*e^(-b^2*x^2) - (3*pi - 4*pi*b^4*x^4)*erf
(b*x))/(pi*x^4)
```

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

$$\int \frac{\text{erf}\left(bx\right)}{x^5} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erf(b*x)/x^5, x)
```

maple [A] time = 0.01, size = 69, normalized size = 0.97

$$b^4\left(-\frac{\operatorname{erf}(bx)}{4b^4x^4}+\frac{-\frac{e^{-b^2x^2}}{3b^3x^3}+\frac{2\,e^{-b^2x^2}}{3bx}+\frac{2\sqrt{\pi}\ \operatorname{erf}(bx)}{3}}{2\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^5,x)
```

```
[Out] b^4*(-1/4*erf(b*x)/b^4/x^4+1/2/Pi^(1/2)*(-1/3/exp(b^2*x^2)/b^3/x^3+2/3/exp(
b^2*x^2)/b/x+2/3*Pi^(1/2)*erf(b*x)))
```

maxima [A] time = 0.46, size = 35, normalized size = 0.49

$$-\frac{b^4\left(x^2\right)^{\frac{3}{2}}\Gamma\left(-\frac{3}{2},b^2x^2\right)}{4\sqrt{\pi}\,x^3}-\frac{\operatorname{erf}(bx)}{4\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/4*b^4*(x^2)^(3/2)*gamma(-3/2, b^2*x^2)/(sqrt(pi)*x^3) - 1/4*erf(b*x)/x^4
```

mupad [B] time = 0.11, size = 88, normalized size = 1.24

$$\frac{b\left(b^2\,x^2\right)^{3/2}}{3\,x^3}-\frac{\operatorname{erf}(b\,x)}{4\,x^4}+\frac{b^3\,e^{-b^2\,x^2}}{3\,x\,\sqrt{\pi}}-\frac{b\,e^{-b^2\,x^2}}{6\,x^3\,\sqrt{\pi}}-\frac{b\operatorname{erfc}\left(\sqrt{b^2\,x^2}\right)\left(b^2\,x^2\right)^{3/2}}{3\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^5,x)
```

```
[Out] (b*(b^2*x^2)^(3/2))/(3*x^3) - erf(b*x)/(4*x^4) + (b^3*exp(-b^2*x^2))/(3*x*p
i^(1/2)) - (b*exp(-b^2*x^2))/(6*x^3*pi^(1/2)) - (b*erfc((b^2*x^2)^(1/2))*(b
^2*x^2)^(3/2))/(3*x^3)
```

sympy [A] time = 1.15, size = 60, normalized size = 0.85

$$\frac{b^4\operatorname{erf}(bx)}{3}+\frac{b^3e^{-b^2x^2}}{3\sqrt{\pi}\,x}-\frac{be^{-b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{\operatorname{erf}(bx)}{4x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x**5,x)
```

```
[Out] b**4*erf(b*x)/3 + b**3*exp(-b**2*x**2)/(3*sqrt(pi)*x) - b*exp(-b**2*x**2)/(
6*sqrt(pi)*x**3) - erf(b*x)/(4*x**4)
```

3.7 $\int \frac{\text{erf}(bx)}{x^7} dx$

Optimal. Leaf size=96

$$-\frac{4}{45}b^6\text{erf}(bx) - \frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} - \frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x} + \frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3} - \frac{\text{erf}(bx)}{6x^6}$$

```
[Out] -4/45*b^6*erf(b*x)-1/6*erf(b*x)/x^6-1/15*b/exp(b^2*x^2)/x^5/Pi^(1/2)+2/45*b
^3/exp(b^2*x^2)/x^3/Pi^(1/2)-4/45*b^5/exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 96, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2214, 2205}

$$-\frac{4}{45}b^6\text{Erf}(bx) - \frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x} + \frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3} - \frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} - \frac{\text{Erf}(bx)}{6x^6}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/x^7,x]
```

```
[Out] -b/(15*E^(b^2*x^2)*Sqrt[Pi]*x^5) + (2*b^3)/(45*E^(b^2*x^2)*Sqrt[Pi]*x^3) -
(4*b^5)/(45*E^(b^2*x^2)*Sqrt[Pi]*x) - (4*b^6*Erf[b*x])/45 - Erf[b*x]/(6*x^6
)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6361

```
Int[Erf[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[(
(c + d*x)^(m + 1)*Erf[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*(m
 + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d, m
```

```
}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\operatorname{erf}(bx)}{x^7}\,dx &= -\frac{\operatorname{erf}(bx)}{6x^6} + \frac{b\int \frac{e^{-b^2x^2}}{x^6}\,dx}{3\sqrt{\pi}}\\
&= -\frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} - \frac{\operatorname{erf}(bx)}{6x^6} - \frac{\left(2b^3\right)\int \frac{e^{-b^2x^2}}{x^4}\,dx}{15\sqrt{\pi}}\\
&= -\frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} + \frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3} - \frac{\operatorname{erf}(bx)}{6x^6} + \frac{\left(4b^5\right)\int \frac{e^{-b^2x^2}}{x^2}\,dx}{45\sqrt{\pi}}\\
&= -\frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} + \frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3} - \frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x} - \frac{\operatorname{erf}(bx)}{6x^6} - \frac{\left(8b^7\right)\int e^{-b^2x^2}\,dx}{45\sqrt{\pi}}\\
&= -\frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} + \frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3} - \frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x} - \frac{4}{45}b^6\operatorname{erf}(bx) - \frac{\operatorname{erf}(bx)}{6x^6}
\end{aligned}$$

Mathematica [A] time = 0.02, size = 73, normalized size = 0.76

$$\frac{e^{-b^2x^2}\left(-8b^5x^5+4b^3x^3-\sqrt{\pi}\,e^{b^2x^2}\left(8b^6x^6+15\right)\operatorname{erf}(bx)-6bx\right)}{90\sqrt{\pi}\,x^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/x^7,x]
```

```
[Out] (-6*b*x + 4*b^3*x^3 - 8*b^5*x^5 - E^(b^2*x^2)*Sqrt[Pi]*(15 + 8*b^6*x^6)*Erf
[b*x])/(90*E^(b^2*x^2)*Sqrt[Pi]*x^6)
```

fricas [A] time = 0.40, size = 62, normalized size = 0.65

$$-\frac{2\sqrt{\pi}\left(4\,b^5x^5-2\,b^3x^3+3\,bx\right)e^{\left(-b^2x^2\right)}+\left(15\,\pi+8\,\pi b^6x^6\right)\operatorname{erf}\left(bx\right)}{90\,\pi x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^7,x, algorithm="fricas")
```

```
[Out] -1/90*(2*sqrt(pi)*(4*b^5*x^5 - 2*b^3*x^3 + 3*b*x)*e^(-b^2*x^2) + (15*pi + 8
*pi*b^6*x^6)*erf(b*x))/(pi*x^6)
```

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

$$\int \frac{\operatorname{erf}(bx)}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^7,x, algorithm="giac")
```

```
[Out] integrate(erf(b*x)/x^7, x)
```

maple [A] time = 0.01, size = 87, normalized size = 0.91

$$b^6\left(-\frac{\operatorname{erf}(bx)}{6b^6x^6}+\frac{-\frac{e^{-b^2x^2}}{5b^5x^5}+\frac{2\,e^{-b^2x^2}}{15b^3x^3}-\frac{4\,e^{-b^2x^2}}{15bx}-\frac{4\sqrt{\pi}\,\operatorname{erf}(bx)}{15}}{3\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^7,x)
```

```
[Out] b^6*(-1/6*erf(b*x)/b^6/x^6+1/3/Pi^(1/2)*(-1/5/exp(b^2*x^2)/b^5/x^5+2/15/exp
(b^2*x^2)/b^3/x^3-4/15/exp(b^2*x^2)/b/x-4/15*Pi^(1/2)*erf(b*x)))
```

maxima [A] time = 0.59, size = 35, normalized size = 0.36

$$-\frac{b^6\left(x^2\right)^{\frac{5}{2}}\Gamma\left(-\frac{5}{2},b^2x^2\right)}{6\sqrt{\pi}\,x^5}-\frac{\operatorname{erf}(bx)}{6\,x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^7,x, algorithm="maxima")
```

```
[Out] -1/6*b^6*(x^2)^(5/2)*gamma(-5/2, b^2*x^2)/(sqrt(pi)*x^5) - 1/6*erf(b*x)/x^6
```

mupad [B] time = 0.16, size = 113, normalized size = 1.18

$$-\frac{\operatorname{erf}(b\,x)}{6\,x^6}-\frac{3\,b\,e^{-b^2\,x^2}-2\,b^3\,x^2\,e^{-b^2\,x^2}+4\,b^5\,x^4\,e^{-b^2\,x^2}+4\,b^5\,\sqrt{\pi}\,\sqrt{b^2}\,\left(x^2\right)^{5/2}-4\,b^5\,\sqrt{\pi}\,\operatorname{erfc}\left(\sqrt{b^2}\,\sqrt{x^2}\right)\,\sqrt{b^2}\,\left(x^2\right.}{45\,x^5\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^7,x)
```

```
[Out] - erf(b*x)/(6*x^6) - (3*b*exp(-b^2*x^2) - 2*b^3*x^2*exp(-b^2*x^2) + 4*b^5*x
^4*exp(-b^2*x^2) + 4*b^5*pi^(1/2)*(b^2)^(1/2)*(x^2)^(5/2) - 4*b^5*pi^(1/2)*
erfc((b^2)^(1/2)*(x^2)^(1/2))*(b^2)^(1/2)*(x^2)^(5/2))/(45*x^5*pi^(1/2))
```

sympy [A] time = 3.02, size = 87, normalized size = 0.91

$$-\frac{4b^6\operatorname{erf}(bx)}{45}-\frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x}+\frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3}-\frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5}-\frac{\operatorname{erf}(bx)}{6x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x**7,x)
```

```
[Out] -4*b**6*erf(b*x)/45 - 4*b**5*exp(-b**2*x**2)/(45*sqrt(pi)*x) + 2*b**3*exp(-
b**2*x**2)/(45*sqrt(pi)*x**3) - b*exp(-b**2*x**2)/(15*sqrt(pi)*x**5) - erf(
b*x)/(6*x**6)
```

3.8 $\int x^6 \mathbf{erf}(bx)\,dx$

Optimal. Leaf size=109

$$\frac{x^6 e^{-b^2x^2}}{7\sqrt{\pi}\,b}+\frac{6e^{-b^2x^2}}{7\sqrt{\pi}\,b^7}+\frac{6x^2e^{-b^2x^2}}{7\sqrt{\pi}\,b^5}+\frac{3x^4e^{-b^2x^2}}{7\sqrt{\pi}\,b^3}+\frac{1}{7}x^7\mathrm{erf}(bx)$$

```
[Out] 1/7*x^7*erf(b*x)+6/7/b^7/exp(b^2*x^2)/Pi^(1/2)+6/7*x^2/b^5/exp(b^2*x^2)/Pi^
(1/2)+3/7*x^4/b^3/exp(b^2*x^2)/Pi^(1/2)+1/7*x^6/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.10, antiderivative size = 109, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2212, 2209}

$$\frac{x^6 e^{-b^2x^2}}{7\sqrt{\pi}\,b}+\frac{3x^4e^{-b^2x^2}}{7\sqrt{\pi}\,b^3}+\frac{6x^2e^{-b^2x^2}}{7\sqrt{\pi}\,b^5}+\frac{6e^{-b^2x^2}}{7\sqrt{\pi}\,b^7}+\frac{1}{7}x^7\mathrm{Erf}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^6*Erf[b*x],x]
```

```
[Out] 6/(7*b^7*E^(b^2*x^2)*Sqrt[Pi]) + (6*x^2)/(7*b^5*E^(b^2*x^2)*Sqrt[Pi]) + (3*
x^4)/(7*b^3*E^(b^2*x^2)*Sqrt[Pi]) + x^6/(7*b*E^(b^2*x^2)*Sqrt[Pi]) + (x^7*E
rf[b*x])/7
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6361

```
Int[Erf[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[(
(c + d*x)^(m + 1)*Erf[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*(m
```

```
 + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d, m
}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int x^6\operatorname{erf}(bx)\,dx &= \frac{1}{7}x^7\operatorname{erf}(bx)-\frac{(2b)\int e^{-b^2x^2}x^7\,dx}{7\sqrt{\pi}}\\
&= \frac{e^{-b^2x^2}x^6}{7b\sqrt{\pi}}+\frac{1}{7}x^7\operatorname{erf}(bx)-\frac{6\int e^{-b^2x^2}x^5\,dx}{7b\sqrt{\pi}}\\
&= \frac{3e^{-b^2x^2}x^4}{7b^3\sqrt{\pi}}+\frac{e^{-b^2x^2}x^6}{7b\sqrt{\pi}}+\frac{1}{7}x^7\operatorname{erf}(bx)-\frac{12\int e^{-b^2x^2}x^3\,dx}{7b^3\sqrt{\pi}}\\
&= \frac{6e^{-b^2x^2}x^2}{7b^5\sqrt{\pi}}+\frac{3e^{-b^2x^2}x^4}{7b^3\sqrt{\pi}}+\frac{e^{-b^2x^2}x^6}{7b\sqrt{\pi}}+\frac{1}{7}x^7\operatorname{erf}(bx)-\frac{12\int e^{-b^2x^2}x\,dx}{7b^5\sqrt{\pi}}\\
&= \frac{6e^{-b^2x^2}}{7b^7\sqrt{\pi}}+\frac{6e^{-b^2x^2}x^2}{7b^5\sqrt{\pi}}+\frac{3e^{-b^2x^2}x^4}{7b^3\sqrt{\pi}}+\frac{e^{-b^2x^2}x^6}{7b\sqrt{\pi}}+\frac{1}{7}x^7\operatorname{erf}(bx)
\end{aligned}
$$

Mathematica [A] time = 0.02, size = 72, normalized size = 0.66

$$
\frac{e^{-b^2x^2}\left(b^6x^6+3b^4x^4+6b^2x^2+\sqrt{\pi}\,b^7x^7e^{b^2x^2}\operatorname{erf}(bx)+6\right)}{7\sqrt{\pi}\,b^7}
$$

Antiderivative was successfully verified.

```
[In] Integrate[x^6*Erf[b*x],x]
```

```
[Out] (6 + 6*b^2*x^2 + 3*b^4*x^4 + b^6*x^6 + b^7*E^(b^2*x^2)*Sqrt[Pi]*x^7*Erf[b*x
])/(7*b^7*E^(b^2*x^2)*Sqrt[Pi])
```

fricas [A] time = 0.38, size = 59, normalized size = 0.54

$$
\frac{\pi b^7x^7\operatorname{erf}(bx)+\sqrt{\pi}\left(b^6x^6+3\,b^4x^4+6\,b^2x^2+6\right)e^{\left(-b^2x^2\right)}}{7\,\pi b^7}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erf(b*x),x, algorithm="fricas")
```

```
[Out] 1/7*(pi*b^7*x^7*erf(b*x) + sqrt(pi)*(b^6*x^6 + 3*b^4*x^4 + 6*b^2*x^2 + 6)*e
^(-b^2*x^2))/(pi*b^7)
```

giac [A] time = 0.19, size = 52, normalized size = 0.48

$$\frac{1}{7}\,x^{7}\,\mathrm{erf}\left(bx\right)+\frac{\left(b^{6}x^{6}+3\,b^{4}x^{4}+6\,b^{2}x^{2}+6\right)e^{\left(-b^{2}x^{2}\right)}}{7\,\sqrt{\pi}\,b^{7}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erf(b*x),x, algorithm="giac")
```

```
[Out] 1/7*x^7*erf(b*x) + 1/7*(b^6*x^6 + 3*b^4*x^4 + 6*b^2*x^2 + 6)*e^(-b^2*x^2)/(
sqrt(pi)*b^7)
```

maple [A] time = 0.01, size = 90, normalized size = 0.83

$$\frac{\frac{\mathrm{erf}(bx)b^{7}x^{7}}{7}-\frac{2\left(-\frac{\mathrm{e}^{-b^{2}x^{2}}b^{6}x^{6}}{2}-\frac{3\,\mathrm{e}^{-b^{2}x^{2}}b^{4}x^{4}}{2}-3\,\mathrm{e}^{-b^{2}x^{2}}b^{2}x^{2}-3\,\mathrm{e}^{-b^{2}x^{2}}\right)}{7\sqrt{\pi}}}{b^{7}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*erf(b*x),x)
```

```
[Out] 1/b^7*(1/7*erf(b*x)*b^7*x^7-2/7/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^6*x^6-3/2/exp
(b^2*x^2)*b^4*x^4-3/exp(b^2*x^2)*b^2*x^2-3/exp(b^2*x^2)))
```

maxima [A] time = 0.42, size = 52, normalized size = 0.48

$$\frac{1}{7}\,x^{7}\,\mathrm{erf}\left(bx\right)+\frac{\left(b^{6}x^{6}+3\,b^{4}x^{4}+6\,b^{2}x^{2}+6\right)e^{\left(-b^{2}x^{2}\right)}}{7\,\sqrt{\pi}\,b^{7}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erf(b*x),x, algorithm="maxima")
```

```
[Out] 1/7*x^7*erf(b*x) + 1/7*(b^6*x^6 + 3*b^4*x^4 + 6*b^2*x^2 + 6)*e^(-b^2*x^2)/(
sqrt(pi)*b^7)
```

mupad [B] time = 0.14, size = 52, normalized size = 0.48

$$\frac{x^{7}\,\mathrm{erf}\left(b\,x\right)}{7}+\frac{\mathrm{e}^{-b^{2}\,x^{2}}\,\left(b^{6}\,x^{6}+3\,b^{4}\,x^{4}+6\,b^{2}\,x^{2}+6\right)}{7\,b^{7}\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*erf(b*x),x)
```

```
[Out] (x^7*erf(b*x))/7 + (exp(-b^2*x^2)*(6*b^2*x^2 + 3*b^4*x^4 + b^6*x^6 + 6))/(7
*b^7*pi^(1/2))
```

sympy [A] time = 5.16, size = 99, normalized size = 0.91

$$\begin{cases} \frac{x^7 \operatorname{erf}(bx)}{7} + \frac{x^6 e^{-b^2 x^2}}{7\sqrt{\pi}\, b} + \frac{3x^4 e^{-b^2 x^2}}{7\sqrt{\pi}\, b^3} + \frac{6x^2 e^{-b^2 x^2}}{7\sqrt{\pi}\, b^5} + \frac{6e^{-b^2 x^2}}{7\sqrt{\pi}\, b^7} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**6*erf(b*x),x)
```

```
[Out] Piecewise((x**7*erf(b*x)/7 + x**6*exp(-b**2*x**2)/(7*sqrt(pi)*b) + 3*x**4*e
xp(-b**2*x**2)/(7*sqrt(pi)*b**3) + 6*x**2*exp(-b**2*x**2)/(7*sqrt(pi)*b**5)
 + 6*exp(-b**2*x**2)/(7*sqrt(pi)*b**7), Ne(b, 0)), (0, True))
```

3.9 $\int x^4 \mathbf{erf}(bx)\, dx$

Optimal. Leaf size=84

$$\frac{x^4 e^{-b^2x^2}}{5\sqrt{\pi}\, b} + \frac{2e^{-b^2x^2}}{5\sqrt{\pi}\, b^5} + \frac{2x^2 e^{-b^2x^2}}{5\sqrt{\pi}\, b^3} + \frac{1}{5}x^5 \mathrm{erf}(bx)$$

```
[Out] 1/5*x^5*erf(b*x)+2/5/b^5/exp(b^2*x^2)/Pi^(1/2)+2/5*x^2/b^3/exp(b^2*x^2)/Pi^
(1/2)+1/5*x^4/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.07, antiderivative size = 84, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2212, 2209}

$$\frac{x^4 e^{-b^2x^2}}{5\sqrt{\pi}\, b} + \frac{2x^2 e^{-b^2x^2}}{5\sqrt{\pi}\, b^3} + \frac{2e^{-b^2x^2}}{5\sqrt{\pi}\, b^5} + \frac{1}{5}x^5 \mathrm{Erf}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^4*Erf[b*x],x]
```

```
[Out] 2/(5*b^5*E^(b^2*x^2)*Sqrt[Pi]) + (2*x^2)/(5*b^3*E^(b^2*x^2)*Sqrt[Pi]) + x^4
/(5*b*E^(b^2*x^2)*Sqrt[Pi]) + (x^5*Erf[b*x])/5
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6361

```
Int[Erf[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[(
(c + d*x)^(m + 1)*Erf[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*(m
 + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d, m
```

```
}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int x^4\mathrm{erf}(bx)\,dx &= \frac{1}{5}x^5\mathrm{erf}(bx)-\frac{(2b)\int e^{-b^2x^2}x^5\,dx}{5\sqrt{\pi}}\\
&= \frac{e^{-b^2x^2}x^4}{5b\sqrt{\pi}}+\frac{1}{5}x^5\mathrm{erf}(bx)-\frac{4\int e^{-b^2x^2}x^3\,dx}{5b\sqrt{\pi}}\\
&= \frac{2e^{-b^2x^2}x^2}{5b^3\sqrt{\pi}}+\frac{e^{-b^2x^2}x^4}{5b\sqrt{\pi}}+\frac{1}{5}x^5\mathrm{erf}(bx)-\frac{4\int e^{-b^2x^2}x\,dx}{5b^3\sqrt{\pi}}\\
&= \frac{2e^{-b^2x^2}}{5b^5\sqrt{\pi}}+\frac{2e^{-b^2x^2}x^2}{5b^3\sqrt{\pi}}+\frac{e^{-b^2x^2}x^4}{5b\sqrt{\pi}}+\frac{1}{5}x^5\mathrm{erf}(bx)
\end{aligned}
$$

Mathematica [A] time = 0.02, size = 66, normalized size = 0.79

$$e^{-b^2x^2}\left(\frac{2}{5\sqrt{\pi}\,b^5}+\frac{2x^2}{5\sqrt{\pi}\,b^3}+\frac{x^4}{5\sqrt{\pi}\,b}\right)+\frac{1}{5}x^5\mathrm{erf}(bx)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*Erf[b*x],x]
```

```
[Out] (2/(5*b^5*Sqrt[Pi]) + (2*x^2)/(5*b^3*Sqrt[Pi]) + x^4/(5*b*Sqrt[Pi]))/E^(b^2
*x^2) + (x^5*Erf[b*x])/5
```

fricas [A] time = 0.40, size = 51, normalized size = 0.61

$$\frac{\pi b^5x^5\,\mathrm{erf}\,(bx)+\sqrt{\pi}\left(b^4x^4+2\,b^2x^2+2\right)e^{\left(-b^2x^2\right)}}{5\,\pi b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/5*(pi*b^5*x^5*erf(b*x) + sqrt(pi)*(b^4*x^4 + 2*b^2*x^2 + 2)*e^(-b^2*x^2))
/(pi*b^5)
```

giac [A] time = 0.40, size = 44, normalized size = 0.52

$$\frac{1}{5}\,x^5\,\mathrm{erf}\,(bx)+\frac{\left(b^4x^4+2\,b^2x^2+2\right)e^{\left(-b^2x^2\right)}}{5\,\sqrt{\pi}\,b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/5*x^5*erf(b*x) + 1/5*(b^4*x^4 + 2*b^2*x^2 + 2)*e^(-b^2*x^2)/(sqrt(pi)*b^5
)
```

maple [A] time = 0.01, size = 72, normalized size = 0.86

$$\frac{\frac{b^5 x^5 \operatorname{erf}(bx)}{5} - \frac{2\left(-\frac{e^{-b^2 x^2} b^4 x^4}{2} - e^{-b^2 x^2} b^2 x^2 - e^{-b^2 x^2}\right)}{5\sqrt{\pi}}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erf(b*x),x)
```

```
[Out] 1/b^5*(1/5*b^5*x^5*erf(b*x)-2/5/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^4*x^4-1/exp(b
^2*x^2)*b^2*x^2-1/exp(b^2*x^2)))
```

maxima [A] time = 0.38, size = 44, normalized size = 0.52

$$\frac{1}{5} x^5 \operatorname{erf}(bx) + \frac{\left(b^4 x^4 + 2 b^2 x^2 + 2\right) e^{\left(-b^2 x^2\right)}}{5 \sqrt{\pi} b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/5*x^5*erf(b*x) + 1/5*(b^4*x^4 + 2*b^2*x^2 + 2)*e^(-b^2*x^2)/(sqrt(pi)*b^5
)
```

mupad [B] time = 0.13, size = 44, normalized size = 0.52

$$\frac{x^5 \operatorname{erf}(b\,x)}{5} + \frac{e^{-b^2\,x^2}\,\left(b^4\,x^4 + 2\,b^2\,x^2 + 2\right)}{5\,b^5\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erf(b*x),x)
```

```
[Out] (x^5*erf(b*x))/5 + (exp(-b^2*x^2)*(2*b^2*x^2 + b^4*x^4 + 2))/(5*b^5*pi^(1/2
))
```

sympy [A] time = 2.25, size = 75, normalized size = 0.89

$$\begin{cases} \frac{x^5 \operatorname{erf}(bx)}{5} + \frac{x^4 e^{-b^2 x^2}}{5\sqrt{\pi}\, b} + \frac{2x^2 e^{-b^2 x^2}}{5\sqrt{\pi}\, b^3} + \frac{2e^{-b^2 x^2}}{5\sqrt{\pi}\, b^5} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*erf(b*x),x)
```

```
[Out] Piecewise((x**5*erf(b*x)/5 + x**4*exp(-b**2*x**2)/(5*sqrt(pi)*b) + 2*x**2*e
xp(-b**2*x**2)/(5*sqrt(pi)*b**3) + 2*exp(-b**2*x**2)/(5*sqrt(pi)*b**5), Ne(
b, 0)), (0, True))
```

3.10 $\int x^2 \mathbf{erf}(bx)\,dx$

Optimal. Leaf size=59

$$\frac{x^2 e^{-b^2x^2}}{3\sqrt{\pi}\,b}+\frac{e^{-b^2x^2}}{3\sqrt{\pi}\,b^3}+\frac{1}{3}x^3\operatorname{erf}(bx)$$

```
[Out] 1/3*x^3*erf(b*x)+1/3/b^3/exp(b^2*x^2)/Pi^(1/2)+1/3*x^2/b/exp(b^2*x^2)/Pi^(1
/2)
```

Rubi [A] time = 0.05, antiderivative size = 59, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2212, 2209}

$$\frac{x^2 e^{-b^2x^2}}{3\sqrt{\pi}\,b}+\frac{e^{-b^2x^2}}{3\sqrt{\pi}\,b^3}+\frac{1}{3}x^3\operatorname{Erf}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Erf[b*x],x]
```

```
[Out] 1/(3*b^3*E^(b^2*x^2)*Sqrt[Pi]) + x^2/(3*b*E^(b^2*x^2)*Sqrt[Pi]) + (x^3*Erf[
b*x])/3
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6361

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

Rubi steps

$$
\begin{aligned}
\int x^2\text{erf}(bx)\,dx &= \frac{1}{3}x^3\text{erf}(bx) - \frac{(2b)\int e^{-b^2x^2}x^3\,dx}{3\sqrt{\pi}} \\
&= \frac{e^{-b^2x^2}x^2}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erf}(bx) - \frac{2\int e^{-b^2x^2}x\,dx}{3b\sqrt{\pi}} \\
&= \frac{e^{-b^2x^2}}{3b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^2}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erf}(bx)
\end{aligned}
$$

Mathematica [A] time = 0.03, size = 41, normalized size = 0.69

$$
\frac{1}{3}\left(\frac{e^{-b^2x^2}\left(b^2x^2+1\right)}{\sqrt{\pi}\,b^3} + x^3\text{erf}(bx)\right)
$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*Erf[b*x],x]
[Out] ((1 + b^2*x^2)/(b^3*E^(b^2*x^2)*Sqrt[Pi]) + x^3*Erf[b*x])/3
```

fricas [A] time = 0.39, size = 43, normalized size = 0.73

$$
\frac{\pi b^3x^3\,\text{erf}\,(bx) + \sqrt{\pi}\left(b^2x^2+1\right)e^{\left(-b^2x^2\right)}}{3\,\pi b^3}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erf(b*x),x, algorithm="fricas")
[Out] 1/3*(pi*b^3*x^3*erf(b*x) + sqrt(pi)*(b^2*x^2 + 1)*e^(-b^2*x^2))/(pi*b^3)
```

giac [A] time = 0.19, size = 36, normalized size = 0.61

$$
\frac{1}{3}\,x^3\,\text{erf}\,(bx) + \frac{\left(b^2x^2+1\right)e^{\left(-b^2x^2\right)}}{3\,\sqrt{\pi}\,b^3}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erf(b*x),x, algorithm="giac")
[Out] 1/3*x^3*erf(b*x) + 1/3*(b^2*x^2 + 1)*e^(-b^2*x^2)/(sqrt(pi)*b^3)
```

maple [A] time = 0.01, size = 54, normalized size = 0.92

$$\frac{\frac{b^3x^3\operatorname{erf}(bx)}{3}-\frac{2\left(-\frac{\mathrm{e}^{-b^2x^2}b^2x^2}{2}-\frac{\mathrm{e}^{-b^2x^2}}{2}\right)}{3\sqrt{\pi}}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erf(b*x),x)
```

```
[Out] 1/b^3*(1/3*b^3*x^3*erf(b*x)-2/3/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^2*x^2-1/2/exp
(b^2*x^2)))
```

maxima [A] time = 0.51, size = 36, normalized size = 0.61

$$\frac{1}{3}\,x^3\operatorname{erf}(bx)+\frac{\left(b^2x^2+1\right)e^{\left(-b^2x^2\right)}}{3\,\sqrt{\pi}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erf(b*x),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*erf(b*x) + 1/3*(b^2*x^2 + 1)*e^(-b^2*x^2)/(sqrt(pi)*b^3)
```

mupad [B] time = 0.09, size = 36, normalized size = 0.61

$$\frac{x^3\operatorname{erf}(b\,x)}{3}+\frac{\mathrm{e}^{-b^2\,x^2}\,\left(b^2\,x^2+1\right)}{3\,b^3\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erf(b*x),x)
```

```
[Out] (x^3*erf(b*x))/3 + (exp(-b^2*x^2)*(b^2*x^2 + 1))/(3*b^3*pi^(1/2))
```

sympy [A] time = 0.65, size = 51, normalized size = 0.86

$$\begin{cases}\frac{x^3\operatorname{erf}(bx)}{3}+\frac{x^2e^{-b^2x^2}}{3\sqrt{\pi}\,b}+\frac{e^{-b^2x^2}}{3\sqrt{\pi}\,b^3} & \text{for } b\neq 0\\ 0 & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erf(b*x),x)
```

```
[Out] Piecewise((x**3*erf(b*x)/3 + x**2*exp(-b**2*x**2)/(3*sqrt(pi)*b) + exp(-b**
2*x**2)/(3*sqrt(pi)*b**3), Ne(b, 0)), (0, True))
```

3.11 $\int \mathrm{erf}(bx)\,dx$

Optimal. Leaf size=26

$$\frac{e^{-b^2x^2}}{\sqrt{\pi}\,b}+x\,\mathrm{erf}(bx)$$

[Out] x*erf(b*x)+1/b/exp(b^2*x^2)/Pi^(1/2)

Rubi [A] time = 0.01, antiderivative size = 26, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6349}

$$\frac{e^{-b^2x^2}}{\sqrt{\pi}\,b}+x\,\mathrm{Erf}(bx)$$

Antiderivative was successfully verified.

[In] Int[Erf[b*x],x]

[Out] 1/(b*E^(b^2*x^2)*Sqrt[Pi]) + x*Erf[b*x]

Rule 6349

```
Int[Erf[(a_.) + (b_.)*(x_)], x_Symbol] :> Simp[((a + b*x)*Erf[a + b*x])/b,
x] + Simp[1/(b*Sqrt[Pi]*E^(a + b*x)^2), x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\int \mathrm{erf}(bx)\,dx=\frac{e^{-b^2x^2}}{b\sqrt{\pi}}+x\,\mathrm{erf}(bx)$$

Mathematica [A] time = 0.01, size = 26, normalized size = 1.00

$$\frac{e^{-b^2x^2}}{\sqrt{\pi}\,b}+x\,\mathrm{erf}(bx)$$

Antiderivative was successfully verified.

[In] Integrate[Erf[b*x],x]

[Out] 1/(b*E^(b^2*x^2)*Sqrt[Pi]) + x*Erf[b*x]

fricas [A] time = 0.38, size = 29, normalized size = 1.12

$$\frac{\pi bx \operatorname{erf}(bx) + \sqrt{\pi}\, e^{\left(-b^2x^2\right)}}{\pi b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x),x, algorithm="fricas")
[Out] (pi*b*x*erf(b*x) + sqrt(pi)*e^(-b^2*x^2))/(pi*b)
```

giac [A] time = 0.44, size = 23, normalized size = 0.88

$$x \operatorname{erf}(bx) + \frac{e^{\left(-b^2x^2\right)}}{\sqrt{\pi}\, b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x),x, algorithm="giac")
[Out] x*erf(b*x) + e^(-b^2*x^2)/(sqrt(pi)*b)
```

maple [A] time = 0.01, size = 26, normalized size = 1.00

$$\frac{bx \operatorname{erf}(bx) + \frac{e^{-b^2x^2}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x),x)
[Out] 1/b*(b*x*erf(b*x)+1/Pi^(1/2)*exp(-b^2*x^2))
```

maxima [A] time = 0.38, size = 25, normalized size = 0.96

$$\frac{bx \operatorname{erf}(bx) + \frac{e^{\left(-b^2x^2\right)}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x),x, algorithm="maxima")
[Out] (b*x*erf(b*x) + e^(-b^2*x^2)/sqrt(pi))/b
```

mupad [B] time = 0.08, size = 23, normalized size = 0.88

$$x \operatorname{erf}(b x) + \frac{\mathrm{e}^{-b^2 x^2}}{b \sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x),x)
```

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

sympy [A] time = 0.39, size = 24, normalized size = 0.92

$$\begin{cases} x \operatorname{erf}(bx) + \frac{e^{-b^2 x^2}}{\sqrt{\pi} b} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x),x)
```

```
[Out] Piecewise((x*erf(b*x) + exp(-b**2*x**2)/(sqrt(pi)*b), Ne(b, 0)), (0, True))
```

3.12 $\int \frac{\text{erf}(bx)}{x^2} \, dx$

Optimal. Leaf size=26

$$\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{erf}(bx)}{x}$$

```
[Out] -erf(b*x)/x+b*Ei(-b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 26, 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 = {6361, 2210}

$$\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{Erf}(bx)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/x^2,x]
```

```
[Out] -(Erf[b*x]/x) + (b*ExpIntegralEi[-(b^2*x^2)])/Sqrt[Pi]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6361

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

Rubi steps

$$\begin{aligned}
\int \frac{\text{erf}(bx)}{x^2} \, dx &= -\frac{\text{erf}(bx)}{x}+\frac{(2b)\int \frac{e^{-b^2x^2}}{x} \, dx}{\sqrt{\pi}}\\
&= -\frac{\text{erf}(bx)}{x}+\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}
\end{aligned}$$

Mathematica [A] time = 0.01, size = 26, normalized size = 1.00

$$\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{erf}(bx)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/x^2,x]
```

```
[Out] -(Erf[b*x]/x) + (b*ExpIntegralEi[-(b^2*x^2)])/Sqrt[Pi]
```

fricas [A] time = 0.41, size = 30, normalized size = 1.15

$$\frac{\sqrt{\pi}\,bx\text{Ei}\left(-b^2x^2\right)-\pi\,\text{erf}\left(bx\right)}{\pi x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^2,x, algorithm="fricas")
```

```
[Out] (sqrt(pi)*b*x*Ei(-b^2*x^2) - pi*erf(b*x))/(pi*x)
```

giac [A] time = 0.19, size = 24, normalized size = 0.92

$$\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{erf}\left(bx\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^2,x, algorithm="giac")
```

```
[Out] b*Ei(-b^2*x^2)/sqrt(pi) - erf(b*x)/x
```

maple [A] time = 0.01, size = 30, normalized size = 1.15

$$b\left(-\frac{\text{erf}\left(bx\right)}{bx}-\frac{\text{Ei}\left(1,b^2x^2\right)}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^2,x)
```

```
[Out] b*(-erf(b*x)/b/x-1/Pi^(1/2)*Ei(1,b^2*x^2))
```

maxima [A] time = 0.41, size = 24, normalized size = 0.92

$$\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{erf}\left(bx\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] b*Ei(-b^2*x^2)/sqrt(pi) - erf(b*x)/x
```

mupad [B] time = 0.15, size = 24, normalized size = 0.92

$$\frac{b\,\mathrm{ei}\left(-b^2\,x^2\right)}{\sqrt{\pi}} - \frac{\mathrm{erf}\,(b\,x)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^2,x)
```

```
[Out] (b*ei(-b^2*x^2))/pi^(1/2) - erf(b*x)/x
```

sympy [A] time = 1.47, size = 24, normalized size = 0.92

$$-\frac{b\,\mathrm{E}_1\left(b^2x^2\right)}{\sqrt{\pi}} + \frac{\mathrm{erfc}\,(bx)}{x} - \frac{1}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x**2,x)
```

```
[Out] -b*expint(1, b**2*x**2)/sqrt(pi) + erfc(b*x)/x - 1/x
```

3.13 $\int \frac{\text{erf}(bx)}{x^4} \, dx$

Optimal. Leaf size=56

$$-\frac{be^{-b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{b^3\text{Ei}\left(-b^2x^2\right)}{3\sqrt{\pi}}-\frac{\text{erf}(bx)}{3x^3}$$

```
[Out] -1/3*erf(b*x)/x^3-1/3*b/exp(b^2*x^2)/x^2/Pi^(1/2)-1/3*b^3*Ei(-b^2*x^2)/Pi^(
1/2)
```

Rubi [A] time = 0.05, antiderivative size = 56, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2214, 2210}

$$-\frac{b^3\text{Ei}\left(-b^2x^2\right)}{3\sqrt{\pi}}-\frac{be^{-b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{\text{Erf}(bx)}{3x^3}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/x^4,x]
```

```
[Out] -b/(3*E^(b^2*x^2)*Sqrt[Pi]*x^2) - Erf[b*x]/(3*x^3) - (b^3*ExpIntegralEi[-(b
^2*x^2)])/(3*Sqrt[Pi])
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6361

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

Rubi steps

$$\int \frac{\operatorname{erf}(bx)}{x^4}\,dx = -\frac{\operatorname{erf}(bx)}{3x^3} + \frac{(2b)\int \frac{e^{-b^2x^2}}{x^3}\,dx}{3\sqrt{\pi}}$$
$$= -\frac{be^{-b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{\operatorname{erf}(bx)}{3x^3} - \frac{\left(2b^3\right)\int \frac{e^{-b^2x^2}}{x}\,dx}{3\sqrt{\pi}}$$
$$= -\frac{be^{-b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{\operatorname{erf}(bx)}{3x^3} - \frac{b^3\operatorname{Ei}\left(-b^2x^2\right)}{3\sqrt{\pi}}$$

Mathematica [A] time = 0.05, size = 47, normalized size = 0.84

$$-\frac{\frac{bx\left(b^2x^2\operatorname{Ei}\left(-b^2x^2\right)+e^{-b^2x^2}\right)}{\sqrt{\pi}} + \operatorname{erf}(bx)}{3x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/x^4,x]
```

```
[Out] -1/3*(Erf[b*x] + (b*x*(E^(-(b^2*x^2)) + b^2*x^2*ExpIntegralEi[-(b^2*x^2)]))
/Sqrt[Pi])/x^3
```

fricas [A] time = 0.42, size = 48, normalized size = 0.86

$$-\frac{\pi \operatorname{erf}(bx) + \sqrt{\pi}\left(b^3x^3\operatorname{Ei}\left(-b^2x^2\right) + bxe^{\left(-b^2x^2\right)}\right)}{3\,\pi x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/3*(pi*erf(b*x) + sqrt(pi)*(b^3*x^3*Ei(-b^2*x^2) + b*x*e^(-b^2*x^2)))/(pi
*x^3)
```

giac [A] time = 0.24, size = 51, normalized size = 0.91

$$-\frac{\operatorname{erf}(bx)}{3\,x^3} - \frac{b^6x^2\operatorname{Ei}\left(-b^2x^2\right) + b^4e^{\left(-b^2x^2\right)}}{3\,\sqrt{\pi}\,b^3x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/3*erf(b*x)/x^3 - 1/3*(b^6*x^2*Ei(-b^2*x^2) + b^4*e^(-b^2*x^2))/(sqrt(pi)
*b^3*x^2)
```

maple [A] time = 0.01, size = 53, normalized size = 0.95

$$b^3\left(-\frac{\operatorname{erf}(bx)}{3b^3x^3}+\frac{-\frac{\mathrm{e}^{-b^2x^2}}{3b^2x^2}+\frac{\operatorname{Ei}\left(1,b^2x^2\right)}{3}}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^4,x)
```

```
[Out] b^3*(-1/3*erf(b*x)/b^3/x^3+2/3/Pi^(1/2)*(-1/2/exp(b^2*x^2)/b^2/x^2+1/2*Ei(1
,b^2*x^2)))
```

maxima [A] time = 0.53, size = 27, normalized size = 0.48

$$-\frac{b^3\Gamma\left(-1,b^2x^2\right)}{3\sqrt{\pi}}-\frac{\operatorname{erf}(bx)}{3x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/3*b^3*gamma(-1, b^2*x^2)/sqrt(pi) - 1/3*erf(b*x)/x^3
```

mupad [B] time = 0.18, size = 45, normalized size = 0.80

$$-\frac{\operatorname{erf}(b\,x)}{3\,x^3}-\frac{b^3\operatorname{ei}\left(-b^2\,x^2\right)}{3\sqrt{\pi}}-\frac{b\,\mathrm{e}^{-b^2\,x^2}}{3\,x^2\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^4,x)
```

```
[Out] - erf(b*x)/(3*x^3) - (b^3*ei(-b^2*x^2))/(3*pi^(1/2)) - (b*exp(-b^2*x^2))/(3
*x^2*pi^(1/2))
```

sympy [A] time = 2.43, size = 54, normalized size = 0.96

$$\frac{b^3\operatorname{E}_1\left(b^2x^2\right)}{3\sqrt{\pi}}-\frac{be^{-b^2x^2}}{3\sqrt{\pi}\,x^2}+\frac{\operatorname{erfc}(bx)}{3x^3}-\frac{1}{3x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x**4,x)

[Out] b**3*expint(1, b**2*x**2)/(3*sqrt(pi)) - b*exp(-b**2*x**2)/(3*sqrt(pi)*x**2
) + erfc(b*x)/(3*x**3) - 1/(3*x**3)
```

3.14 $\int \frac{\mathbf{erf}(bx)}{x^6}\,dx$

Optimal. Leaf size=81

$$-\frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4}+\frac{b^5\text{Ei}\left(-b^2x^2\right)}{10\sqrt{\pi}}+\frac{b^3e^{-b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{\text{erf}(bx)}{5x^5}$$

```
[Out] -1/5*erf(b*x)/x^5-1/10*b/exp(b^2*x^2)/x^4/Pi^(1/2)+1/10*b^3/exp(b^2*x^2)/x^
2/Pi^(1/2)+1/10*b^5*Ei(-b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.07, antiderivative size = 81, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6361, 2214, 2210}

$$\frac{b^5\text{Ei}\left(-b^2x^2\right)}{10\sqrt{\pi}}+\frac{b^3e^{-b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4}-\frac{\text{Erf}(bx)}{5x^5}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/x^6,x]
```

```
[Out] -b/(10*E^(b^2*x^2)*Sqrt[Pi]*x^4) + b^3/(10*E^(b^2*x^2)*Sqrt[Pi]*x^2) - Erf[
b*x]/(5*x^5) + (b^5*ExpIntegralEi[-(b^2*x^2)])/(10*Sqrt[Pi])
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6361

```
Int[Erf[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[(
(c + d*x)^(m + 1)*Erf[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*(m
 + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d, m
```

```
}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{\operatorname{erf}(bx)}{x^6}\,dx &= -\frac{\operatorname{erf}(bx)}{5x^5}+\frac{(2b)\int \frac{e^{-b^2x^2}}{x^5}\,dx}{5\sqrt{\pi}}\\ &= -\frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4}-\frac{\operatorname{erf}(bx)}{5x^5}-\frac{b^3\int \frac{e^{-b^2x^2}}{x^3}\,dx}{5\sqrt{\pi}}\\ &= -\frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4}+\frac{b^3e^{-b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{\operatorname{erf}(bx)}{5x^5}+\frac{b^5\int \frac{e^{-b^2x^2}}{x}\,dx}{5\sqrt{\pi}}\\ &= -\frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4}+\frac{b^3e^{-b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{\operatorname{erf}(bx)}{5x^5}+\frac{b^5\operatorname{Ei}\left(-b^2x^2\right)}{10\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.05, size = 62, normalized size = 0.77

$$\frac{bxe^{-b^2x^2}\left(b^2x^2-1\right)+b^5x^5\operatorname{Ei}\left(-b^2x^2\right)-2\sqrt{\pi}\operatorname{erf}(bx)}{10\sqrt{\pi}\,x^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/x^6,x]
```

```
[Out] ((b*x*(-1 + b^2*x^2))/E^(b^2*x^2) - 2*Sqrt[Pi]*Erf[b*x] + b^5*x^5*ExpIntegr
alEi[-(b^2*x^2)])/(10*Sqrt[Pi]*x^5)
```

fricas [A] time = 0.65, size = 60, normalized size = 0.74

$$-\frac{2\,\pi\operatorname{erf}(bx)-\sqrt{\pi}\left(b^5x^5\operatorname{Ei}\left(-b^2x^2\right)+\left(b^3x^3-bx\right)e^{\left(-b^2x^2\right)}\right)}{10\,\pi x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^6,x, algorithm="fricas")
```

```
[Out] -1/10*(2*pi*erf(b*x) - sqrt(pi)*(b^5*x^5*Ei(-b^2*x^2) + (b^3*x^3 - b*x)*e^(
-b^2*x^2)))/(pi*x^5)
```

giac [A] time = 0.16, size = 68, normalized size = 0.84

$$-\frac{\operatorname{erf}(bx)}{5x^5}+\frac{b^{10}x^4\operatorname{Ei}\left(-b^2x^2\right)+b^8x^2e^{\left(-b^2x^2\right)}-b^6e^{\left(-b^2x^2\right)}}{10\sqrt{\pi}\,b^5x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^6,x, algorithm="giac")
```

```
[Out] -1/5*erf(b*x)/x^5 + 1/10*(b^10*x^4*Ei(-b^2*x^2) + b^8*x^2*e^(-b^2*x^2) - b^
6*e^(-b^2*x^2))/(sqrt(pi)*b^5*x^4)
```

maple [A] time = 0.01, size = 71, normalized size = 0.88

$$b^5\left(-\frac{\operatorname{erf}(bx)}{5b^5x^5}+\frac{-\frac{e^{-b^2x^2}}{10b^4x^4}+\frac{e^{-b^2x^2}}{10b^2x^2}-\frac{\operatorname{Ei}(1,b^2x^2)}{10}}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^6,x)
```

```
[Out] b^5*(-1/5*erf(b*x)/b^5/x^5+2/5/Pi^(1/2)*(-1/4/exp(b^2*x^2)/b^4/x^4+1/4/exp(
b^2*x^2)/b^2/x^2-1/4*Ei(1,b^2*x^2)))
```

maxima [A] time = 0.61, size = 27, normalized size = 0.33

$$-\frac{b^5\Gamma\left(-2,b^2x^2\right)}{5\sqrt{\pi}}-\frac{\operatorname{erf}(bx)}{5x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x^6,x, algorithm="maxima")
```

```
[Out] -1/5*b^5*gamma(-2, b^2*x^2)/sqrt(pi) - 1/5*erf(b*x)/x^5
```

mupad [B] time = 0.20, size = 65, normalized size = 0.80

$$\frac{b^5\operatorname{ei}\left(-b^2x^2\right)}{10\sqrt{\pi}}-\frac{\operatorname{erf}(b\,x)}{5x^5}-\frac{\frac{b\,e^{-b^2x^2}}{2}-\frac{b^3x^2e^{-b^2x^2}}{2}}{5x^4\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/x^6,x)
```

```
[Out] (b^5*ei(-b^2*x^2))/(10*pi^(1/2)) - erf(b*x)/(5*x^5) - ((b*exp(-b^2*x^2))/2
- (b^3*x^2*exp(-b^2*x^2))/2)/(5*x^4*pi^(1/2))
```

sympy [A] time = 3.39, size = 76, normalized size = 0.94

$$-\frac{b^5\,\mathrm{E}_1\left(b^2x^2\right)}{10\sqrt{\pi}}+\frac{b^3e^{-b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4}+\frac{\operatorname{erfc}(bx)}{5x^5}-\frac{1}{5x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/x**6,x)
```

```
[Out] -b**5*expint(1, b**2*x**2)/(10*sqrt(pi)) + b**3*exp(-b**2*x**2)/(10*sqrt(pi
)*x**2) - b*exp(-b**2*x**2)/(10*sqrt(pi)*x**4) + erfc(b*x)/(5*x**5) - 1/(5*
x**5)
```

3.15 $\int (c+dx)^3 \operatorname{erf}(a+bx)\,dx$

Optimal. Leaf size=289

$$\frac{d^2e^{-(a+bx)^2}(a+bx)^2(bc-ad)}{\sqrt{\pi}\,b^4}+\frac{d^2e^{-(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^4}-\frac{(bc-ad)^4\operatorname{erf}(a+bx)}{4b^4d}-\frac{3d(bc-ad)^2\operatorname{erf}(a+bx)}{4b^4}+\frac{e^{-(a+bx)^2}(bc-}{\sqrt{\pi}\,b^4}$$

```
[Out] -3/16*d^3*erf(b*x+a)/b^4-3/4*d*(-a*d+b*c)^2*erf(b*x+a)/b^4-1/4*(-a*d+b*c)^4
*erf(b*x+a)/b^4/d+1/4*(d*x+c)^4*erf(b*x+a)/d+d^2*(-a*d+b*c)/b^4/exp((b*x+a)
^2)/Pi^(1/2)+(-a*d+b*c)^3/b^4/exp((b*x+a)^2)/Pi^(1/2)+3/8*d^3*(b*x+a)/b^4/e
xp((b*x+a)^2)/Pi^(1/2)+3/2*d*(-a*d+b*c)^2*(b*x+a)/b^4/exp((b*x+a)^2)/Pi^(1/
2)+d^2*(-a*d+b*c)*(b*x+a)^2/b^4/exp((b*x+a)^2)/Pi^(1/2)+1/4*d^3*(b*x+a)^3/b
^4/exp((b*x+a)^2)/Pi^(1/2)
```

Rubi [A] time = 0.32, antiderivative size = 289, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 5, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.357, Rules used = {6361, 2226, 2205, 2209, 2212}

$$\frac{d^2e^{-(a+bx)^2}(a+bx)^2(bc-ad)}{\sqrt{\pi}\,b^4}+\frac{d^2e^{-(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^4}-\frac{(bc-ad)^4\operatorname{Erf}(a+bx)}{4b^4d}-\frac{3d(bc-ad)^2\operatorname{Erf}(a+bx)}{4b^4}+\frac{e^{-(a+bx)^2}(bc}{\sqrt{\pi}\,b^4}$$

Antiderivative was successfully verified.

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

```
[Out] (d^2*(b*c - a*d))/(b^4*E^(a + b*x)^2*Sqrt[Pi]) + (b*c - a*d)^3/(b^4*E^(a +
b*x)^2*Sqrt[Pi]) + (3*d^3*(a + b*x))/(8*b^4*E^(a + b*x)^2*Sqrt[Pi]) + (3*d*
(b*c - a*d)^2*(a + b*x))/(2*b^4*E^(a + b*x)^2*Sqrt[Pi]) + (d^2*(b*c - a*d)*
(a + b*x)^2)/(b^4*E^(a + b*x)^2*Sqrt[Pi]) + (d^3*(a + b*x)^3)/(4*b^4*E^(a +
 b*x)^2*Sqrt[Pi]) - (3*d^3*Erf[a + b*x])/(16*b^4) - (3*d*(b*c - a*d)^2*Erf[
a + b*x])/(4*b^4) - ((b*c - a*d)^4*Erf[a + b*x])/(4*b^4*d) + ((c + d*x)^4*E
rf[a + b*x])/(4*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 2226

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*(u_), x_Symbol] :> Int[E
xpandLinearProduct[F^(a + b*(c + d*x)^n), u, c, d, x], x] /; FreeQ[{F, a, b
, c, d, n}, x] && PolynomialQ[u, x]
```

Rule 6361

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

Rubi steps

$$\int (c+dx)^3 \operatorname{erf}(a+bx)\,dx = \frac{(c+dx)^4 \operatorname{erf}(a+bx)}{4d} - \frac{b\int e^{-(a+bx)^2}(c+dx)^4\,dx}{2d\sqrt{\pi}}$$

$$= \frac{(c+dx)^4 \operatorname{erf}(a+bx)}{4d} - \frac{b\int \left(\frac{(bc-ad)^4 e^{-(a+bx)^2}}{b^4} + \frac{4d(bc-ad)^3 e^{-(a+bx)^2}(a+bx)}{b^4} + \frac{6d^2(bc-ad)^2 e^{-(a+bx}}{b^4}\right.}{2d\sqrt{\pi}}$$

$$= \frac{(c+dx)^4 \operatorname{erf}(a+bx)}{4d} - \frac{d^3\int e^{-(a+bx)^2}(a+bx)^4\,dx}{2b^3\sqrt{\pi}} - \frac{\left(2d^2(bc-ad)\right)\int e^{-(a+bx)^2}(a+b}{b^3\sqrt{\pi}}$$

$$= \frac{(bc-ad)^3 e^{-(a+bx)^2}}{b^4\sqrt{\pi}} + \frac{3d(bc-ad)^2 e^{-(a+bx)^2}(a+bx)}{2b^4\sqrt{\pi}} + \frac{d^2(bc-ad)e^{-(a+bx)^2}(a+bx)^2}{b^4\sqrt{\pi}}$$

$$= \frac{d^2(bc-ad)e^{-(a+bx)^2}}{b^4\sqrt{\pi}} + \frac{(bc-ad)^3 e^{-(a+bx)^2}}{b^4\sqrt{\pi}} + \frac{3d^3 e^{-(a+bx)^2}(a+bx)}{8b^4\sqrt{\pi}} + \frac{3d(bc-ad)^2 e^{-(a}}{2b^4\sqrt{}}$$

$$= \frac{d^2(bc-ad)e^{-(a+bx)^2}}{b^4\sqrt{\pi}} + \frac{(bc-ad)^3 e^{-(a+bx)^2}}{b^4\sqrt{\pi}} + \frac{3d^3 e^{-(a+bx)^2}(a+bx)}{8b^4\sqrt{\pi}} + \frac{3d(bc-ad)^2 e^{-(a}}{2b^4\sqrt{}}$$

Mathematica [A] time = 0.31, size = 248, normalized size = 0.86

$$\frac{e^{-(a+bx)^2}\left(2bd^2\left(8\left(a^2+1\right)c+\left(2a^2+3\right)dx\right)-2a\left(2a^2+5\right)d^3-\sqrt{\pi}\,e^{(a+bx)^2}\operatorname{erf}(a+bx)\left(4a^4d^3-16a^3bcd^2+12a^2\left(\right.\right.\right.}{}$$

Antiderivative was successfully verified.

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

```
[Out] (-2*a*(5 + 2*a^2)*d^3 + 2*b*d^2*(8*(1 + a^2)*c + (3 + 2*a^2)*d*x) - 4*a*b^2
*d*(6*c^2 + 4*c*d*x + d^2*x^2) + 4*b^3*(4*c^3 + 6*c^2*d*x + 4*c*d^2*x^2 + d
^3*x^3) - E^(a + b*x)^2*Sqrt[Pi]*(12*b^2*c^2*d - 16*a^3*b*c*d^2 + 3*d^3 + 4
*a^4*d^3 - 8*a*(2*b^3*c^3 + 3*b*c*d^2) + 12*a^2*(2*b^2*c^2*d + d^3) - 4*b^4
*x*(4*c^3 + 6*c^2*d*x + 4*c*d^2*x^2 + d^3*x^3))*Erf[a + b*x])/(16*b^4*E^(a
+ b*x)^2*Sqrt[Pi])
```

fricas [A] time = 0.95, size = 265, normalized size = 0.92

$$\frac{2\sqrt{\pi}\left(2\,b^3d^3x^3+8\,b^3c^3-12\,ab^2c^2d+8\left(a^2+1\right)bcd^2-\left(2\,a^3+5\,a\right)d^3+2\left(4\,b^3cd^2-ab^2d^3\right)x^2+\left(12\,b^3c^2d-8\,ab^2\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/16*(2*sqrt(pi)*(2*b^3*d^3*x^3 + 8*b^3*c^3 - 12*a*b^2*c^2*d + 8*(a^2 + 1)*
b*c*d^2 - (2*a^3 + 5*a)*d^3 + 2*(4*b^3*c*d^2 - a*b^2*d^3)*x^2 + (12*b^3*c^2
*d - 8*a*b^2*c*d^2 + (2*a^2 + 3)*b*d^3)*x)*e^(-b^2*x^2 - 2*a*b*x - a^2) + (
4*pi*b^4*d^3*x^4 + 16*pi*b^4*c*d^2*x^3 + 24*pi*b^4*c^2*d*x^2 + 16*pi*b^4*c^
3*x + pi*(16*a*b^3*c^3 - 12*(2*a^2 + 1)*b^2*c^2*d + 8*(2*a^3 + 3*a)*b*c*d^2
 - (4*a^4 + 12*a^2 + 3)*d^3))*erf(b*x + a))/(pi*b^4)
```

giac [A] time = 0.33, size = 400, normalized size = 1.38

$$\frac{(dx+c)^4\operatorname{erf}(bx+a)}{4\,d}+\frac{4\,\pi c^4\operatorname{erf}\left(-b\left(x+\frac{a}{b}\right)\right)-16\sqrt{\pi}\left(\frac{\sqrt{\pi}\,a\operatorname{erf}\left(-b\left(x+\frac{a}{b}\right)\right)}{b}-\frac{e^{\left(-b^2x^2-2\,abx-a^2\right)}}{b}\right)c^3d+12\sqrt{\pi}\left(\frac{\sqrt{\pi}\left(2\,a^2+1\right)\operatorname{erf}\left(-b\left(x\right.\right.}{b}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*(d*x + c)^4*erf(b*x + a)/d + 1/16*(4*pi*c^4*erf(-b*(x + a/b)) - 16*sqrt
(pi)*(sqrt(pi)*a*erf(-b*(x + a/b))/b - e^(-b^2*x^2 - 2*a*b*x - a^2)/b)*c^3*
```

```
d + 12*sqrt(pi)*(sqrt(pi)*(2*a^2 + 1)*erf(-b*(x + a/b))/b + 2*(b*(x + a/b)
- 2*a)*e^(-b^2*x^2 - 2*a*b*x - a^2)/b)*c^2*d^2/b - 8*sqrt(pi)*(sqrt(pi)*(2*
a^3 + 3*a)*erf(-b*(x + a/b))/b - 2*(b^2*(x + a/b)^2 - 3*a*b*(x + a/b) + 3*a
^2 + 1)*e^(-b^2*x^2 - 2*a*b*x - a^2)/b)*c*d^3/b^2 + sqrt(pi)*(sqrt(pi)*(4*a
^4 + 12*a^2 + 3)*erf(-b*(x + a/b))/b + 2*(2*b^3*(x + a/b)^3 - 8*a*b^2*(x +
a/b)^2 + 12*a^2*b*(x + a/b) - 8*a^3 + 3*b*(x + a/b) - 8*a)*e^(-b^2*x^2 - 2*
a*b*x - a^2)/b)*d^4/b^3)/(pi*d)
```

maple [A] time = 0.03, size = 466, normalized size = 1.61

$$\frac{\frac{\operatorname{erf}(bx+a)((bx+a)d-ad+bc)^4}{4b^3d} - \frac{d^4\left(-\frac{(bx+a)^3e^{-(bx+a)^2}}{2}-\frac{3(bx+a)e^{-(bx+a)^2}}{4}+\frac{3\sqrt{\pi}\ \operatorname{erf}(bx+a)}{8}\right)+\frac{a^4d^4\sqrt{\pi}\ \operatorname{erf}(bx+a)}{2}+\frac{b^4c^4\sqrt{\pi}\ \operatorname{erf}(bx+a)}{2}+2a^3d^4e^{-(bx+a)^2}+6a^2d^4\Big(}{}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/b*(1/4*erf(b*x+a)*((b*x+a)*d-a*d+b*c)^4/b^3/d-1/2/Pi^(1/2)/b^3/d*(d^4*(-1
/2*(b*x+a)^3/exp((b*x+a)^2)-3/4*(b*x+a)/exp((b*x+a)^2)+3/8*Pi^(1/2)*erf(b*x
+a))+1/2*a^4*d^4*Pi^(1/2)*erf(b*x+a)+1/2*b^4*c^4*Pi^(1/2)*erf(b*x+a)+2*a^3*
d^4/exp((b*x+a)^2)+6*a^2*d^4*(-1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(
b*x+a))-4*a*d^4*(-1/2/exp((b*x+a)^2)*(b*x+a)^2-1/2/exp((b*x+a)^2))-2*b^3*c^
3*d/exp((b*x+a)^2)+6*b^2*c^2*d^2*(-1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*
erf(b*x+a))+4*b*c*d^3*(-1/2/exp((b*x+a)^2)*(b*x+a)^2-1/2/exp((b*x+a)^2))-2*
a*b^3*c^3*d*Pi^(1/2)*erf(b*x+a)+3*a^2*b^2*c^2*d^2*Pi^(1/2)*erf(b*x+a)-2*a^3
*b*c*d^3*Pi^(1/2)*erf(b*x+a)+6*a*b^2*c^2*d^2/exp((b*x+a)^2)-6*a^2*b*c*d^3/e
xp((b*x+a)^2)-12*a*b*c*d^3*(-1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*
x+a))))
```

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

$$\frac{1}{4}\left(d^3x^4+4\,cd^2x^3+6\,c^2dx^2+4\,c^3x\right)\operatorname{erf}\left(bx+a\right) - \frac{-\frac{2\left(\frac{\sqrt{\pi}\left(b^2x+ab\right)ab^2\left(\operatorname{erf}\left(\frac{\sqrt{\left(b^2x+ab\right)^2}}{b}\right)-1\right)}{\sqrt{\left(b^2x+ab\right)^2}\left(-b^2\right)^{\frac{3}{2}}}+\frac{b^2e^{\left(-\frac{\left(b^2x+ab\right)^2}{b^2}\right)}}{\left(-b^2\right)^{\frac{3}{2}}}\right)bc^3}{\sqrt{-b^2}} - \frac{3\left(\frac{\sqrt{\pi}\left(b^2x+ab\right)a^2\cdots}{\sqrt{\left(b\cdots\right.}}\right.}{}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*(d^3*x^4 + 4*c*d^2*x^3 + 6*c^2*d*x^2 + 4*c^3*x)*erf(b*x + a) - 1/2*inte
grate((b*d^3*x^4 + 4*b*c*d^2*x^3 + 6*b*c^2*d*x^2 + 4*b*c^3*x)*e^(-b^2*x^2 -
 2*a*b*x - a^2), x)/sqrt(pi)
```

mupad [B] time = 1.09, size = 337, normalized size = 1.17

$$\operatorname{erf}(a+b\,x)\left(c^3\,x+\frac{3\,c^2\,d\,x^2}{2}+c\,d^2\,x^3+\frac{d^3\,x^4}{4}\right)-\frac{\frac{\mathrm{e}^{-a^2-2\,a\,b\,x-b^2\,x^2}\left(\frac{5\,a\,d^3}{4}+\frac{a^3\,d^3}{2}-2\,b^3\,c^3-b\left(2\,c\,a^2\,d^2+2\,c\,d^2\right)+3\,a\,b^2\,c^2\,d\right)}{b^4}-\frac{x\,\mathrm{e}^{-a^2-2\,a\,b}}{}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] erf(a + b*x)*(c^3*x + (d^3*x^4)/4 + (3*c^2*d*x^2)/2 + c*d^2*x^3) - ((exp(-
a^2 - b^2*x^2 - 2*a*b*x)*((5*a*d^3)/4 + (a^3*d^3)/2 - 2*b^3*c^3 - b*(2*c*d^
2 + 2*a^2*c*d^2) + 3*a*b^2*c^2*d))/b^4 - (x*exp(- a^2 - b^2*x^2 - 2*a*b*x)*
(3*d^3 + 2*a^2*d^3 + 12*b^2*c^2*d - 8*a*b*c*d^2))/(4*b^3) - (d^3*x^3*exp(-
a^2 - b^2*x^2 - 2*a*b*x))/(2*b) + (x^2*exp(- a^2 - b^2*x^2 - 2*a*b*x)*(a*d^
3 - 4*b*c*d^2))/(2*b^2))/(2*pi^(1/2)) + (erfi(a*1i + b*x*1i)*(3*d^3 + 12*a^
2*d^3 + 4*a^4*d^3 - 16*a*b^3*c^3 + 12*b^2*c^2*d + 24*a^2*b^2*c^2*d - 24*a*b
*c*d^2 - 16*a^3*b*c*d^2)*1i)/(16*b^4)
```

sympy [A] time = 9.72, size = 746, normalized size = 2.58

$$\begin{cases} -\frac{a^4d^3\operatorname{erf}(a+bx)}{4b^4}+\frac{a^3cd^2\operatorname{erf}(a+bx)}{b^3}-\frac{a^3d^3e^{-a^2}e^{-b^2x^2}e^{-2abx}}{4\sqrt{\pi}\,b^4}-\frac{3a^2c^2d\operatorname{erf}(a+bx)}{2b^2}+\frac{a^2cd^2e^{-a^2}e^{-b^2x^2}e^{-2abx}}{\sqrt{\pi}\,b^3}+\frac{a^2d^3xe^{-a^2}e^{-b^2x^2}e^{-2abx}}{4\sqrt{\pi}\,b^3}-\frac{3a^2d^3}{} \\ \left(c^3x+\frac{3c^2dx^2}{2}+cd^2x^3+\frac{d^3x^4}{4}\right)\operatorname{erf}(a) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Piecewise((-a**4*d**3*erf(a + b*x)/(4*b**4) + a**3*c*d**2*erf(a + b*x)/b**3
 - a**3*d**3*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(4*sqrt(pi)*b**4) - 3
*a**2*c**2*d*erf(a + b*x)/(2*b**2) + a**2*c*d**2*exp(-a**2)*exp(-b**2*x**2)
*exp(-2*a*b*x)/(sqrt(pi)*b**3) + a**2*d**3*x*exp(-a**2)*exp(-b**2*x**2)*exp
(-2*a*b*x)/(4*sqrt(pi)*b**3) - 3*a**2*d**3*erf(a + b*x)/(4*b**4) + a*c**3*e
rf(a + b*x)/b - 3*a*c**2*d*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(2*sqrt
(pi)*b**2) - a*c*d**2*x*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)*
b**2) - a*d**3*x**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(4*sqrt(pi)*b*
*2) + 3*a*c*d**2*erf(a + b*x)/(2*b**3) - 5*a*d**3*exp(-a**2)*exp(-b**2*x**2
)*exp(-2*a*b*x)/(8*sqrt(pi)*b**4) + c**3*x*erf(a + b*x) + 3*c**2*d*x**2*erf
(a + b*x)/2 + c*d**2*x**3*erf(a + b*x) + d**3*x**4*erf(a + b*x)/4 + c**3*ex
```

```
p(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)*b) + 3*c**2*d*x*exp(-a**2)
*exp(-b**2*x**2)*exp(-2*a*b*x)/(2*sqrt(pi)*b) + c*d**2*x**2*exp(-a**2)*exp(
-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)*b) + d**3*x**3*exp(-a**2)*exp(-b**2*x**
2)*exp(-2*a*b*x)/(4*sqrt(pi)*b) - 3*c**2*d*erf(a + b*x)/(4*b**2) + c*d**2*e
xp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)*b**3) + 3*d**3*x*exp(-a**
2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(8*sqrt(pi)*b**3) - 3*d**3*erf(a + b*x)/(1
6*b**4), Ne(b, 0)), ((c**3*x + 3*c**2*d*x**2/2 + c*d**2*x**3 + d**3*x**4/4)
*erf(a), True))
```

3.16 $\int (c+dx)^2 \mathbf{erf}(a+bx)\, dx$

Optimal. Leaf size=192

$$-\frac{(bc-ad)^3\text{erf}(a+bx)}{3b^3d}-\frac{d(bc-ad)\text{erf}(a+bx)}{2b^3}+\frac{e^{-(a+bx)^2}(bc-ad)^2}{\sqrt{\pi}\,b^3}+\frac{de^{-(a+bx)^2}(a+bx)(bc-ad)}{\sqrt{\pi}\,b^3}+\frac{d^2e^{-(a+bx)^2}(a+b}{3\sqrt{\pi}\,b^3}$$

```
[Out] -1/2*d*(-a*d+b*c)*erf(b*x+a)/b^3-1/3*(-a*d+b*c)^3*erf(b*x+a)/b^3/d+1/3*(d*x
+c)^3*erf(b*x+a)/d+1/3*d^2/b^3/exp((b*x+a)^2)/Pi^(1/2)+(-a*d+b*c)^2/b^3/exp
((b*x+a)^2)/Pi^(1/2)+d*(-a*d+b*c)*(b*x+a)/b^3/exp((b*x+a)^2)/Pi^(1/2)+1/3*d
^2*(b*x+a)^2/b^3/exp((b*x+a)^2)/Pi^(1/2)
```

Rubi [A] time = 0.20, antiderivative size = 192, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.357, Rules used = {6361, 2226, 2205, 2209, 2212}

$$-\frac{(bc-ad)^3\text{Erf}(a+bx)}{3b^3d}-\frac{d(bc-ad)\text{Erf}(a+bx)}{2b^3}+\frac{e^{-(a+bx)^2}(bc-ad)^2}{\sqrt{\pi}\,b^3}+\frac{de^{-(a+bx)^2}(a+bx)(bc-ad)}{\sqrt{\pi}\,b^3}+\frac{d^2e^{-(a+bx)^2}(a+b}{3\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

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

```
[Out] d^2/(3*b^3*E^(a + b*x)^2*Sqrt[Pi]) + (b*c - a*d)^2/(b^3*E^(a + b*x)^2*Sqrt[
Pi]) + (d*(b*c - a*d)*(a + b*x))/(b^3*E^(a + b*x)^2*Sqrt[Pi]) + (d^2*(a + b
*x)^2)/(3*b^3*E^(a + b*x)^2*Sqrt[Pi]) - (d*(b*c - a*d)*Erf[a + b*x])/(2*b^3
) - ((b*c - a*d)^3*Erf[a + b*x])/(3*b^3*d) + ((c + d*x)^3*Erf[a + b*x])/(3*
d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
```

```
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 2226

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*(u_), x_Symbol] :> Int[E
xpandLinearProduct[F^(a + b*(c + d*x)^n), u, c, d, x], x] /; FreeQ[{F, a, b
, c, d, n}, x] && PolynomialQ[u, x]
```

Rule 6361

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

Rubi steps

$$\int (c+dx)^2\text{erf}(a+bx)\,dx = \frac{(c+dx)^3\text{erf}(a+bx)}{3d} - \frac{(2b)\int e^{-(a+bx)^2}(c+dx)^3\,dx}{3d\sqrt{\pi}}$$

$$= \frac{(c+dx)^3\text{erf}(a+bx)}{3d} - \frac{(2b)\int \left(\frac{(bc-ad)^3e^{-(a+bx)^2}}{b^3} + \frac{3d(bc-ad)^2e^{-(a+bx)^2}(a+bx)}{b^3} + \frac{3d^2(bc-ad)e^{-(a+}}{b^3}\right.}{3d\sqrt{\pi}}$$

$$= \frac{(c+dx)^3\text{erf}(a+bx)}{3d} - \frac{\left(2d^2\right)\int e^{-(a+bx)^2}(a+bx)^3\,dx}{3b^2\sqrt{\pi}} - \frac{(2d(bc-ad))\int e^{-(a+bx)^2}(a+}{b^2\sqrt{\pi}}$$

$$= \frac{(bc-ad)^2e^{-(a+bx)^2}}{b^3\sqrt{\pi}} + \frac{d(bc-ad)e^{-(a+bx)^2}(a+bx)}{b^3\sqrt{\pi}} + \frac{d^2e^{-(a+bx)^2}(a+bx)^2}{3b^3\sqrt{\pi}} - \frac{(bc-ad)^3}{3}$$

$$= \frac{d^2e^{-(a+bx)^2}}{3b^3\sqrt{\pi}} + \frac{(bc-ad)^2e^{-(a+bx)^2}}{b^3\sqrt{\pi}} + \frac{d(bc-ad)e^{-(a+bx)^2}(a+bx)}{b^3\sqrt{\pi}} + \frac{d^2e^{-(a+bx)^2}(a+bx)}{3b^3\sqrt{\pi}}$$

Mathematica [A] time = 0.23, size = 138, normalized size = 0.72

$$\frac{\frac{2e^{-(a+bx)^2}\left(\left(a^2+1\right)d^2-abd(3c+dx)+b^2\left(3c^2+3cdx+d^2x^2\right)\right)}{\sqrt{\pi}} + \text{erf}(a+bx)\left(2a^3d^2-6a^2bcd+3a\left(2b^2c^2+d^2\right)+2b^3x\left(3c^2+3cdx\right.\right.}{6b^3}$$

Antiderivative was successfully verified.

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

```
[Out] ((2*((1 + a^2)*d^2 - a*b*d*(3*c + d*x) + b^2*(3*c^2 + 3*c*d*x + d^2*x^2)))/
(E^(a + b*x)^2*Sqrt[Pi]) + (-3*b*c*d - 6*a^2*b*c*d + 2*a^3*d^2 + 3*a*(2*b^2
*c^2 + d^2) + 2*b^3*x*(3*c^2 + 3*c*d*x + d^2*x^2))*Erf[a + b*x])/(6*b^3)
```

fricas [A] time = 0.80, size = 163, normalized size = 0.85

$$\frac{2\sqrt{\pi}\left(b^2d^2x^2 + 3\,b^2c^2 - 3\,abcd + \left(a^2+1\right)d^2 + \left(3\,b^2cd - abd^2\right)x\right)e^{\left(-b^2x^2-2\,abx-a^2\right)} + \left(2\,\pi b^3d^2x^3 + 6\,\pi b^3cdx^2 + 6\,\pi b\right.}{6\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/6*(2*sqrt(pi)*(b^2*d^2*x^2 + 3*b^2*c^2 - 3*a*b*c*d + (a^2 + 1)*d^2 + (3*b
^2*c*d - a*b*d^2)*x)*e^(-b^2*x^2 - 2*a*b*x - a^2) + (2*pi*b^3*d^2*x^3 + 6*p
i*b^3*c*d*x^2 + 6*pi*b^3*c^2*x + pi*(6*a*b^2*c^2 - 3*(2*a^2 + 1)*b*c*d + (2
*a^3 + 3*a)*d^2))*erf(b*x + a))/(pi*b^3)
```

giac [A] time = 0.43, size = 270, normalized size = 1.41

$$\frac{(dx+c)^3\,\mathrm{erf}\,(bx+a)}{3\,d} + \frac{2\,\pi c^3\,\mathrm{erf}\left(-b\left(x+\frac{a}{b}\right)\right) - 6\sqrt{\pi}\left(\frac{\sqrt{\pi}\,a\,\mathrm{erf}\left(-b\left(x+\frac{a}{b}\right)\right)}{b} - \frac{e^{\left(-b^2x^2-2\,abx-a^2\right)}}{b}\right)c^2d + \frac{3\sqrt{\pi}\left(\frac{\sqrt{\pi}\left(2\,a^2+1\right)\mathrm{erf}\left(-b\left(x+\frac{a}{b}\right.\right.}{b}\right.}{}}{6}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/3*(d*x + c)^3*erf(b*x + a)/d + 1/6*(2*pi*c^3*erf(-b*(x + a/b)) - 6*sqrt(p
i)*(sqrt(pi)*a*erf(-b*(x + a/b))/b - e^(-b^2*x^2 - 2*a*b*x - a^2)/b)*c^2*d
+ 3*sqrt(pi)*(sqrt(pi)*(2*a^2 + 1)*erf(-b*(x + a/b))/b + 2*(b*(x + a/b) - 2
*a)*e^(-b^2*x^2 - 2*a*b*x - a^2)/b)*c*d^2/b - sqrt(pi)*(sqrt(pi)*(2*a^3 + 3
*a)*erf(-b*(x + a/b))/b - 2*(b^2*(x + a/b)^2 - 3*a*b*(x + a/b) + 3*a^2 + 1)
*e^(-b^2*x^2 - 2*a*b*x - a^2)/b)*d^3/b^2)/(pi*d)
```

maple [A] time = 0.01, size = 283, normalized size = 1.47

$$\frac{\frac{\mathrm{erf}(bx+a)((bx+a)d-ad+bc)^3}{3b^2d} - \frac{2\left(d^3\left(-\frac{\mathrm{e}^{-(bx+a)^2}(bx+a)^2}{2} - \frac{\mathrm{e}^{-(bx+a)^2}}{2}\right) + \frac{b^3c^3\sqrt{\pi}\ \mathrm{erf}(bx+a)}{2} - \frac{a^3d^3\sqrt{\pi}\ \mathrm{erf}(bx+a)}{2} - \frac{3a^2d^3\mathrm{e}^{-(bx+a)^2}}{2} - 3a\,d^3\left(-\frac{(bx+a)\mathrm{e}^{-(bx+a)^2}}{2} + \frac{\sqrt{\pi}}{}\right.\right.}{}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/b*(1/3*erf(b*x+a)*((b*x+a)*d-a*d+b*c)^3/b^2/d-2/3/Pi^(1/2)/b^2/d*(d^3*(-1
/2/exp((b*x+a)^2)*(b*x+a)^2-1/2/exp((b*x+a)^2))+1/2*b^3*c^3*Pi^(1/2)*erf(b*
x+a)-1/2*a^3*d^3*Pi^(1/2)*erf(b*x+a)-3/2*a^2*d^3/exp((b*x+a)^2)-3*a*d^3*(-1
/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*x+a))-3/2*b^2*c^2*d/exp((b*x+a
)^2)+3*b*c*d^2*(-1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*x+a))-3/2*a*
b^2*c^2*d*Pi^(1/2)*erf(b*x+a)+3/2*a^2*b*c*d^2*Pi^(1/2)*erf(b*x+a)+3*a*b*c*d
^2/exp((b*x+a)^2)))
```

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

$$\frac{1}{3}\left(d^2x^3+3\,cdx^2+3\,c^2x\right)\operatorname{erf}\left(bx+a\right)-\frac{-\frac{3\left(\frac{\sqrt{\pi}\left(b^2x+ab\right)ab^2\left(\operatorname{erf}\left(\frac{\sqrt{\left(b^2x+ab\right)^2}}{b}\right)-1\right)}{\sqrt{\left(b^2x+ab\right)^2}\left(-b^2\right)^{\frac{3}{2}}}+\frac{b^2e^{\left(-\frac{\left(b^2x+ab\right)^2}{b^2}\right)}}{\left(-b^2\right)^{\frac{3}{2}}}\right)bc^2}{\sqrt{-b^2}}-\frac{3\left(\frac{\sqrt{\pi}\left(b^2x+ab\right)a^2b^3\left(\operatorname{erf}\left(\frac{\sqrt{\left(b^2x+a\cdots}}{b}\cdots\right)\cdots\right)}{\sqrt{\left(b^2x+ab\right)^2}\left(-b^2\right)^{\frac{5}{2}}}\cdots\right)}{\cdots}}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/3*(d^2*x^3 + 3*c*d*x^2 + 3*c^2*x)*erf(b*x + a) - 1/3*integrate(2*(b*d^2*x
^3 + 3*b*c*d*x^2 + 3*b*c^2*x)*e^(-b^2*x^2 - 2*a*b*x - a^2), x)/sqrt(pi)
```

mupad [B] time = 0.72, size = 204, normalized size = 1.06

$$\frac{\frac{e^{-a^2-2\,a\,b\,x-b^2\,x^2}\,\left(a^2\,d^2-3\,a\,b\,c\,d+3\,b^2\,c^2+d^2\right)}{b^3}+\frac{d^2\,x^2\,e^{-a^2-2\,a\,b\,x-b^2\,x^2}}{b}-\frac{x\,e^{-a^2-2\,a\,b\,x-b^2\,x^2}\,\left(a\,d^2-3\,b\,c\,d\right)}{b^2}}{3\,\sqrt{\pi}}+\operatorname{erf}\left(a+b\,x\right)\,\left(c^2\,x+c\,d\,x^2+\cdots\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((exp(- a^2 - b^2*x^2 - 2*a*b*x)*(d^2 + a^2*d^2 + 3*b^2*c^2 - 3*a*b*c*d))/b
^3 + (d^2*x^2*exp(- a^2 - b^2*x^2 - 2*a*b*x))/b - (x*exp(- a^2 - b^2*x^2 -
2*a*b*x)*(a*d^2 - 3*b*c*d))/b^2)/(3*pi^(1/2)) + erf(a + b*x)*(c^2*x + (d^2*
x^3)/3 + c*d*x^2) - (erfi(a*1i + b*x*1i)*(3*a*d^2 + 2*a^3*d^2 + 6*a*b^2*c^2
 - 3*b*c*d - 6*a^2*b*c*d)*1i)/(6*b^3)
```

sympy [A] time = 3.94, size = 398, normalized size = 2.07

$$\begin{cases} \frac{a^3d^2\operatorname{erf}(a+bx)}{3b^3} - \frac{a^2cd\operatorname{erf}(a+bx)}{b^2} + \frac{a^2d^2e^{-a^2}e^{-b^2x^2}e^{-2abx}}{3\sqrt{\pi}\,b^3} + \frac{ac^2\operatorname{erf}(a+bx)}{b} - \frac{acde^{-a^2}e^{-b^2x^2}e^{-2abx}}{\sqrt{\pi}\,b^2} - \frac{ad^2xe^{-a^2}e^{-b^2x^2}e^{-2abx}}{3\sqrt{\pi}\,b^2} + \frac{ad^2\operatorname{erf}(a+bx)}{2b^3} - \\ \left(c^2x + cdx^2 + \frac{d^2x^3}{3}\right)\operatorname{erf}(a) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Piecewise((a**3*d**2*erf(a + b*x)/(3*b**3) - a**2*c*d*erf(a + b*x)/b**2 + a
**2*d**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(3*sqrt(pi)*b**3) + a*c**
2*erf(a + b*x)/b - a*c*d*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)
*b**2) - a*d**2*x*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(3*sqrt(pi)*b**2
) + a*d**2*erf(a + b*x)/(2*b**3) + c**2*x*erf(a + b*x) + c*d*x**2*erf(a + b
*x) + d**2*x**3*erf(a + b*x)/3 + c**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b
*x)/(sqrt(pi)*b) + c*d*x*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)
*b) + d**2*x**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(3*sqrt(pi)*b) - c
*d*erf(a + b*x)/(2*b**2) + d**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(3
*sqrt(pi)*b**3), Ne(b, 0)), ((c**2*x + c*d*x**2 + d**2*x**3/3)*erf(a), True
))
```

3.17 $\int (c+dx)\,\mathbf{erf}(a+bx)\,dx$

Optimal. Leaf size=118

$$-\frac{(bc-ad)^2\mathrm{erf}(a+bx)}{2b^2d}+\frac{e^{-(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^2}-\frac{d\,\mathrm{erf}(a+bx)}{4b^2}+\frac{de^{-(a+bx)^2}(a+bx)}{2\sqrt{\pi}\,b^2}+\frac{(c+dx)^2\mathrm{erf}(a+bx)}{2d}$$

```
[Out] -1/4*d*erf(b*x+a)/b^2-1/2*(-a*d+b*c)^2*erf(b*x+a)/b^2/d+1/2*(d*x+c)^2*erf(b
*x+a)/d+(-a*d+b*c)/b^2/exp((b*x+a)^2)/Pi^(1/2)+1/2*d*(b*x+a)/b^2/exp((b*x+a
)^2)/Pi^(1/2)
```

Rubi [A] time = 0.12, antiderivative size = 118, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {6361, 2226, 2205, 2209, 2212}

$$-\frac{(bc-ad)^2\mathrm{Erf}(a+bx)}{2b^2d}+\frac{e^{-(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^2}-\frac{d\,\mathrm{Erf}(a+bx)}{4b^2}+\frac{de^{-(a+bx)^2}(a+bx)}{2\sqrt{\pi}\,b^2}+\frac{(c+dx)^2\mathrm{Erf}(a+bx)}{2d}$$

Antiderivative was successfully verified.

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

```
[Out] (b*c - a*d)/(b^2*E^(a + b*x)^2*Sqrt[Pi]) + (d*(a + b*x))/(2*b^2*E^(a + b*x)
^2*Sqrt[Pi]) - (d*Erf[a + b*x])/(4*b^2) - ((b*c - a*d)^2*Erf[a + b*x])/(2*b
^2*d) + ((c + d*x)^2*Erf[a + b*x])/(2*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
```

```
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 2226

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*(u_), x_Symbol] :> Int[E
xpandLinearProduct[F^(a + b*(c + d*x)^n), u, c, d, x], x] /; FreeQ[{F, a, b
, c, d, n}, x] && PolynomialQ[u, x]
```

Rule 6361

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

Rubi steps

$$\int (c+dx)\text{erf}(a+bx)\,dx = \frac{(c+dx)^2\text{erf}(a+bx)}{2d} - \frac{b\int e^{-(a+bx)^2}(c+dx)^2\,dx}{d\sqrt{\pi}}$$
$$= \frac{(c+dx)^2\text{erf}(a+bx)}{2d} - \frac{b\int\left(\frac{(bc-ad)^2e^{-(a+bx)^2}}{b^2} + \frac{2d(bc-ad)e^{-(a+bx)^2}(a+bx)}{b^2} + \frac{d^2e^{-(a+bx)^2}(a+bx)^2}{b^2}\right) d\text{:}}{d\sqrt{\pi}}$$
$$= \frac{(c+dx)^2\text{erf}(a+bx)}{2d} - \frac{d\int e^{-(a+bx)^2}(a+bx)^2\,dx}{b\sqrt{\pi}} - \frac{(2(bc-ad))\int e^{-(a+bx)^2}(a+bx)\,dx}{b\sqrt{\pi}} -$$
$$= \frac{(bc-ad)e^{-(a+bx)^2}}{b^2\sqrt{\pi}} + \frac{de^{-(a+bx)^2}(a+bx)}{2b^2\sqrt{\pi}} - \frac{(bc-ad)^2\text{erf}(a+bx)}{2b^2d} + \frac{(c+dx)^2\text{erf}(a+bx)}{2d}$$
$$= \frac{(bc-ad)e^{-(a+bx)^2}}{b^2\sqrt{\pi}} + \frac{de^{-(a+bx)^2}(a+bx)}{2b^2\sqrt{\pi}} - \frac{d\text{erf}(a+bx)}{4b^2} - \frac{(bc-ad)^2\text{erf}(a+bx)}{2b^2d} + \frac{(c+}{}$$

Mathematica [A] time = 0.10, size = 88, normalized size = 0.75

$$\frac{e^{-(a+bx)^2}\left(-\sqrt{\pi}\,e^{(a+bx)^2}\text{erf}(a+bx)\left(2a^2d-4abc-4b^2cx-2b^2dx^2+d\right)-2ad+4bc+2bdx\right)}{4\sqrt{\pi}\,b^2}$$

Antiderivative was successfully verified.

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

```
[Out] (4*b*c - 2*a*d + 2*b*d*x - E^(a + b*x)^2*Sqrt[Pi]*(-4*a*b*c + d + 2*a^2*d -
 4*b^2*c*x - 2*b^2*d*x^2)*Erf[a + b*x])/(4*b^2*E^(a + b*x)^2*Sqrt[Pi])
```

fricas [A] time = 0.45, size = 91, normalized size = 0.77

$$\frac{2\sqrt{\pi}\,(bdx+2\,bc-ad)e^{\left(-b^2x^2-2\,abx-a^2\right)}+\left(2\,\pi b^2dx^2+4\,\pi b^2cx+\pi\left(4\,abc-\left(2\,a^2+1\right)d\right)\right)\operatorname{erf}(bx+a)}{4\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*(2*sqrt(pi)*(b*d*x + 2*b*c - a*d)*e^(-b^2*x^2 - 2*a*b*x - a^2) + (2*pi*
b^2*d*x^2 + 4*pi*b^2*c*x + pi*(4*a*b*c - (2*a^2 + 1)*d))*erf(b*x + a))/(pi*
b^2)
```

giac [A] time = 0.52, size = 149, normalized size = 1.26

$$\frac{1}{2}\left(dx^2+2\,cx\right)\operatorname{erf}(bx+a)-\frac{4\sqrt{\pi}\left(\frac{\sqrt{\pi}\,a\operatorname{erf}\left(-b\left(x+\frac{a}{b}\right)\right)}{b}-\frac{e^{\left(-b^2x^2-2\,abx-a^2\right)}}{b}\right)c-\frac{\sqrt{\pi}\left(\frac{\sqrt{\pi}\left(2\,a^2+1\right)\operatorname{erf}\left(-b\left(x+\frac{a}{b}\right)\right)}{b}+\frac{2\left(b\left(x+\frac{a}{b}\right)-2\,a\right)e^{\left(-b^2x^2-2\,ab\right.}}{b}\right.}{b}}{4\,\pi}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*(d*x^2 + 2*c*x)*erf(b*x + a) - 1/4*(4*sqrt(pi)*(sqrt(pi)*a*erf(-b*(x +
a/b))/b - e^(-b^2*x^2 - 2*a*b*x - a^2)/b)*c - sqrt(pi)*(sqrt(pi)*(2*a^2 + 1
)*erf(-b*(x + a/b))/b + 2*(b*(x + a/b) - 2*a)*e^(-b^2*x^2 - 2*a*b*x - a^2)/
b)*d/b)/pi
```

maple [A] time = 0.01, size = 111, normalized size = 0.94

$$\frac{\frac{\operatorname{erf}(bx+a)\left(\frac{(bx+a)^2d}{2}-ad(bx+a)+bc(bx+a)\right)}{b}-\frac{d\left(-\frac{(bx+a)\,\mathrm{e}^{-(bx+a)^2}}{2}+\frac{\sqrt{\pi}\,\operatorname{erf}(bx+a)}{4}\right)+ad\,\mathrm{e}^{-(bx+a)^2}-\mathrm{e}^{-(bx+a)^2}bc}{\sqrt{\pi}\,b}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/b*(erf(b*x+a)/b*(1/2*(b*x+a)^2*d-a*d*(b*x+a)+b*c*(b*x+a))-1/Pi^(1/2)/b*(d
*(-1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*x+a))+a*d/exp((b*x+a)^2)-b
*c/exp((b*x+a)^2)))
```

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

$$\frac{1}{2}\left(dx^2+2\,cx\right)\operatorname{erf}\left(bx+a\right)-\frac{-\frac{\left(\frac{\sqrt{\pi}\left(b^2x+ab\right)ab^2\left(\operatorname{erf}\left(\frac{\sqrt{\left(b^2x+ab\right)^2}}{b}\right)-1\right)}{\sqrt{\left(b^2x+ab\right)^2}\left(-b^2\right)^{\frac{3}{2}}}+\frac{b^2e^{\left(-\frac{\left(b^2x+ab\right)^2}{b^2}\right)}}{\left(-b^2\right)^{\frac{3}{2}}}\right)bc}{\sqrt{-b^2}}-\frac{\left(\frac{\sqrt{\pi}\left(b^2x+ab\right)a^2b^3\left(\operatorname{erf}\left(\frac{\sqrt{\left(b^2x+ab\right)^2}}{b}\right)-1\right)}{\sqrt{\left(b^2x+ab\right)^2}\left(-b^2\right)^{\frac{5}{2}}}-\frac{\left(b^2x+ab\right)^3b^3\cdots}{\left(\left(b^2x+ab\cdots\right.\right.}\cdots\right.}{2\sqrt{-b^2}}\cdots}{\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*(d*x^2 + 2*c*x)*erf(b*x + a) - integrate((b*d*x^2 + 2*b*c*x)*e^(-b^2*x^
2 - 2*a*b*x - a^2), x)/sqrt(pi)
```

mupad [B] time = 0.45, size = 126, normalized size = 1.07

$$\operatorname{erf}\left(a+b\,x\right)\left(\frac{d\,x^2}{2}+c\,x\right)-\frac{\frac{\mathrm{e}^{-a^2-2\,a\,b\,x-b^2\,x^2}\left(\frac{a\,d}{2}-b\,c\right)}{b^2}-\frac{d\,x\,\mathrm{e}^{-a^2-2\,a\,b\,x-b^2\,x^2}}{2\,b}}{\sqrt{\pi}}+\frac{\sqrt{\pi}\,\operatorname{erfi}\left(a\,1\mathrm{i}+b\,x\,1\mathrm{i}\right)\left(\frac{2\,d\,a^2+d}{2\,\sqrt{\pi}}-\frac{2\,a\,b\,c}{\sqrt{\pi}}\right)1\mathrm{i}}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] erf(a + b*x)*(c*x + (d*x^2)/2) - ((exp(- a^2 - b^2*x^2 - 2*a*b*x)*((a*d)/2
- b*c))/b^2 - (d*x*exp(- a^2 - b^2*x^2 - 2*a*b*x))/(2*b))/pi^(1/2) + (pi^(1
/2)*erfi(a*1i + b*x*1i)*((d + 2*a^2*d)/(2*pi^(1/2)) - (2*a*b*c)/pi^(1/2))*1
i)/(2*b^2)
```

sympy [A] time = 1.56, size = 178, normalized size = 1.51

$$\begin{cases}-\frac{a^2d\operatorname{erf}\left(a+bx\right)}{2b^2}+\frac{ac\operatorname{erf}\left(a+bx\right)}{b}-\frac{ade^{-a^2}e^{-b^2x^2}e^{-2abx}}{2\sqrt{\pi}\,b^2}+cx\operatorname{erf}\left(a+bx\right)+\frac{dx^2\operatorname{erf}\left(a+bx\right)}{2}+\frac{ce^{-a^2}e^{-b^2x^2}e^{-2abx}}{\sqrt{\pi}\,b}+\frac{dxe^{-a^2}e^{-b^2x^2}e^{-2abx}}{2\sqrt{\pi}\,b}-\cdots \\ \left(cx+\frac{dx^2}{2}\right)\operatorname{erf}\left(a\right)\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Piecewise((-a**2*d*erf(a + b*x)/(2*b**2) + a*c*erf(a + b*x)/b - a*d*exp(-a*
*2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(2*sqrt(pi)*b**2) + c*x*erf(a + b*x) + d*
```

```
x**2*erf(a + b*x)/2 + c*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)*
b) + d*x*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(2*sqrt(pi)*b) - d*erf(a
+ b*x)/(4*b**2), Ne(b, 0)), ((c*x + d*x**2/2)*erf(a), True))
```

3.18 $\int \operatorname{erf}(a + bx)\,dx$

Optimal. Leaf size=36

$$\frac{(a+bx)\operatorname{erf}(a+bx)}{b}+\frac{e^{-(a+bx)^2}}{\sqrt{\pi}\,b}$$

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

Rubi [A] time = 0.01, antiderivative size = 36, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6349}

$$\frac{(a+bx)\operatorname{Erf}(a+bx)}{b}+\frac{e^{-(a+bx)^2}}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[a + b*x],x]
```

```
[Out] 1/(b*E^(a + b*x)^2*Sqrt[Pi]) + ((a + b*x)*Erf[a + b*x])/b
```

Rule 6349

```
Int[Erf[(a_.) + (b_.)*(x_)], x_Symbol] :> Simp[((a + b*x)*Erf[a + b*x])/b,
x] + Simp[1/(b*Sqrt[Pi]*E^(a + b*x)^2), x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\int \operatorname{erf}(a+bx)\,dx=\frac{e^{-(a+bx)^2}}{b\sqrt{\pi}}+\frac{(a+bx)\operatorname{erf}(a+bx)}{b}$$

Mathematica [A] time = 0.05, size = 35, normalized size = 0.97

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

Antiderivative was successfully verified.

```
[In] Integrate[Erf[a + b*x],x]
```

```
[Out] 1/(b*E^(a + b*x)^2*Sqrt[Pi]) + (a/b + x)*Erf[a + b*x]
```

fricas [A] time = 0.44, size = 47, normalized size = 1.31

$$\frac{(\pi bx + \pi a)\operatorname{erf}(bx + a) + \sqrt{\pi}\, e^{\left(-b^2x^2 - 2\,abx - a^2\right)}}{\pi b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.19, size = 59, normalized size = 1.64

$$x\operatorname{erf}(bx + a) - \frac{\frac{\sqrt{\pi}\, a \operatorname{erf}\left(-b\left(x + \frac{a}{b}\right)\right)}{b} - \frac{e^{\left(-b^2x^2 - 2\,abx - a^2\right)}}{b}}{\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.00, size = 32, normalized size = 0.89

$$\frac{(bx + a)\operatorname{erf}(bx + a) + \frac{e^{-(bx+a)^2}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 0.33, size = 31, normalized size = 0.86

$$\frac{(bx + a)\operatorname{erf}(bx + a) + \frac{e^{\left(-(bx+a)^2\right)}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 0.22, size = 48, normalized size = 1.33

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

sympy [A] time = 0.62, size = 53, normalized size = 1.47

$$\begin{cases} \frac{a\,\mathrm{erf}\left(a+bx\right)}{b}+x\,\mathrm{erf}\left(a+bx\right)+\frac{e^{-a^2}e^{-b^2x^2}e^{-2abx}}{\sqrt{\pi}\,b} & \text{for } b\neq 0 \\ x\,\mathrm{erf}\left(a\right) & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Piecewise((a*erf(a + b*x)/b + x*erf(a + b*x) + exp(-a**2)*exp(-b**2*x**2)*e
xp(-2*a*b*x)/(sqrt(pi)*b), Ne(b, 0)), (x*erf(a), True))
```

3.19 $\int \frac{\text{erf}(a+bx)}{c+dx} \, dx$

Optimal. Leaf size=17

$$\text{Int}\left(\frac{\text{erf}(a+bx)}{c+dx},x\right)$$

```
[Out] Unintegrable(erf(b*x+a)/(d*x+c),x)
```

Rubi [A] time = 0.01, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erf}(a+bx)}{c+dx} \, dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[a + b*x]/(c + d*x),x]
[Out] Defer[Int][Erf[a + b*x]/(c + d*x), x]
```

Rubi steps

$$\int \frac{\text{erf}(a+bx)}{c+dx} \, dx = \int \frac{\text{erf}(a+bx)}{c+dx} \, dx$$

Mathematica [A] time = 1.37, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(a+bx)}{c+dx} \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erf[a + b*x]/(c + d*x),x]
[Out] Integrate[Erf[a + b*x]/(c + d*x), x]
```

fricas [A] time = 0.47, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx+a)}{dx+c},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.10, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x+a)/(d*x+c),x)
[Out] int(erf(b*x+a)/(d*x+c),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

mupad [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{\operatorname{erf}(a+b\,x)}{c+d\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(a + b*x)/(c + d*x),x)
[Out] int(erf(a + b*x)/(c + d*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(a+bx)}{c+dx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.20 $\int \frac{\text{erf}(a+bx)}{(c+dx)^2} \, dx$

Optimal. Leaf size=52

$$\frac{2b\text{Int}\left(\frac{e^{-(a+bx)^2}}{c+dx},x\right)}{\sqrt{\pi}\,d}-\frac{\text{erf}(a+bx)}{d(c+dx)}$$

```
[Out] -erf(b*x+a)/d/(d*x+c)+2*b*Unintegrable(1/exp((b*x+a)^2)/(d*x+c),x)/d/Pi^(1/
2)
```

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erf}(a+bx)}{(c+dx)^2} \, dx$$

Verification is Not applicable to the result.

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

```
[Out] -(Erf[a + b*x]/(d*(c + d*x))) + (2*b*Defer[Int][1/(E^(a + b*x)^2*(c + d*x))
, x])/(d*Sqrt[Pi])
```

Rubi steps

$$\int \frac{\text{erf}(a+bx)}{(c+dx)^2} \, dx=-\frac{\text{erf}(a+bx)}{d(c+dx)}+\frac{(2b)\int \frac{e^{-(a+bx)^2}}{c+dx} \, dx}{d\sqrt{\pi}}$$

Mathematica [A] time = 0.34, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(a+bx)}{(c+dx)^2} \, dx$$

Verification is Not applicable to the result.

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

```
[Out] Integrate[Erf[a + b*x]/(c + d*x)^2, x]
```

fricas [A] time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx+a)}{d^2x^2+2\,cdx+c^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(erf(b*x + a)/(d^2*x^2 + 2*c*d*x + c^2), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$2\,b\int \frac{e^{\left(-b^2x^2-2\,abx\right)}}{\sqrt{\pi}\,d^2xe^{\left(a^2\right)}+\sqrt{\pi}\,cde^{\left(a^2\right)}}\,dx-\frac{\operatorname{erf}(bx+a)}{d^2x+cd}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 2*b*integrate(e^(-b^2*x^2 - 2*a*b*x)/(sqrt(pi)*d^2*x*e^(a^2) + sqrt(pi)*c*d
*e^(a^2)), x) - erf(b*x + a)/(d^2*x + c*d)
```

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

$$\int \frac{\operatorname{erf}(a+b\,x)}{(c+d\,x)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(a+bx)}{(c+dx)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(erf(a + b*x)/(c + d*x)**2, x)
```

3.21 $\int \frac{\mathbf{erf}(a+bx)}{(c+dx)^3}\,dx$

Optimal. Leaf size=107

$$\frac{2b^2(bc-ad)\mathrm{Int}\left(\frac{e^{-(a+bx)^2}}{c+dx},x\right)}{\sqrt{\pi}\,d^3}-\frac{b^2\mathrm{erf}(a+bx)}{d^3}-\frac{be^{-(a+bx)^2}}{\sqrt{\pi}\,d^2(c+dx)}-\frac{\mathrm{erf}(a+bx)}{2d(c+dx)^2}$$

```
[Out] -b^2*erf(b*x+a)/d^3-1/2*erf(b*x+a)/d/(d*x+c)^2-b/d^2/exp((b*x+a)^2)/(d*x+c)
/Pi^(1/2)+2*b^2*(-a*d+b*c)*Unintegrable(1/exp((b*x+a)^2)/(d*x+c),x)/d^3/Pi^
(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\mathrm{Erf}(a+bx)}{(c+dx)^3}\,dx$$

Verification is Not applicable to the result.

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

```
[Out] -(b/(d^2*E^(a + b*x)^2*Sqrt[Pi]*(c + d*x))) - (b^2*Erf[a + b*x])/d^3 - Erf[
a + b*x]/(2*d*(c + d*x)^2) + (2*b^2*(b*c - a*d)*Defer[Int][1/(E^(a + b*x)^2
*(c + d*x)), x])/(d^3*Sqrt[Pi])
```

Rubi steps

$$\begin{aligned}\int \frac{\mathrm{erf}(a+bx)}{(c+dx)^3}\,dx &= -\frac{\mathrm{erf}(a+bx)}{2d(c+dx)^2}+\frac{b\int \frac{e^{-(a+bx)^2}}{(c+dx)^2}\,dx}{d\sqrt{\pi}}\\ &= -\frac{be^{-(a+bx)^2}}{d^2\sqrt{\pi}(c+dx)}-\frac{\mathrm{erf}(a+bx)}{2d(c+dx)^2}-\frac{\left(2b^3\right)\int e^{-(a+bx)^2}\,dx}{d^3\sqrt{\pi}}+\frac{\left(2b^2(bc-ad)\right)\int \frac{e^{-(a+bx)^2}}{c+dx}\,dx}{d^3\sqrt{\pi}}\\ &= -\frac{be^{-(a+bx)^2}}{d^2\sqrt{\pi}(c+dx)}-\frac{b^2\mathrm{erf}(a+bx)}{d^3}-\frac{\mathrm{erf}(a+bx)}{2d(c+dx)^2}+\frac{\left(2b^2(bc-ad)\right)\int \frac{e^{-(a+bx)^2}}{c+dx}\,dx}{d^3\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.58, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erf}(a+bx)}{(c+dx)^3}\,dx$$

Verification is Not applicable to the result.

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

fricas [A] time = 0.46, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\left(bx+a\right)}{d^3x^3+3\,cd^2x^2+3\,c^2dx+c^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x+a)/(d*x+c)^3,x, algorithm="fricas")
[Out] integral(erf(b*x + a)/(d^3*x^3 + 3*c*d^2*x^2 + 3*c^2*d*x + c^3), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\left(bx+a\right)}{\left(dx+c\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\left(bx+a\right)}{\left(dx+c\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$b\int \frac{e^{\left(-b^2x^2-2\,abx\right)}}{\sqrt{\pi}\,d^3x^2e^{\left(a^2\right)}+2\,\sqrt{\pi}\,cd^2xe^{\left(a^2\right)}+\sqrt{\pi}\,c^2de^{\left(a^2\right)}}\,dx-\frac{\text{erf}\left(bx+a\right)}{2\left(d^3x^2+2\,cd^2x+c^2d\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] b*integrate(e^(-b^2*x^2 - 2*a*b*x)/(sqrt(pi)*d^3*x^2*e^(a^2) + 2*sqrt(pi)*c
*d^2*x*e^(a^2) + sqrt(pi)*c^2*d*e^(a^2)), x) - 1/2*erf(b*x + a)/(d^3*x^2 +
2*c*d^2*x + c^2*d)
```

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

$$\int \frac{\operatorname{erf}(a+b\,x)}{(c+d\,x)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\operatorname{erf}(a+bx)}{(c+dx)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.22 $\int x^5 \mathbf{erf}(bx)^2 \, dx$

Optimal. Leaf size=178

$$-\frac{5\text{erf}(bx)^2}{16b^6}+\frac{x^5e^{-b^2x^2}\text{erf}(bx)}{3\sqrt{\pi}\,b}+\frac{x^4e^{-2b^2x^2}}{6\pi b^2}+\frac{11e^{-2b^2x^2}}{12\pi b^6}+\frac{5xe^{-b^2x^2}\text{erf}(bx)}{4\sqrt{\pi}\,b^5}+\frac{7x^2e^{-2b^2x^2}}{12\pi b^4}+\frac{5x^3e^{-b^2x^2}\text{erf}(bx)}{6\sqrt{\pi}\,b^3}+\frac{1}{6}x^6\text{erf}(bx)^2$$

```
[Out] 11/12/b^6/exp(2*b^2*x^2)/Pi+7/12*x^2/b^4/exp(2*b^2*x^2)/Pi+1/6*x^4/b^2/exp(
2*b^2*x^2)/Pi-5/16*erf(b*x)^2/b^6+1/6*x^6*erf(b*x)^2+5/4*x*erf(b*x)/b^5/exp
(b^2*x^2)/Pi^(1/2)+5/6*x^3*erf(b*x)/b^3/exp(b^2*x^2)/Pi^(1/2)+1/3*x^5*erf(b
*x)/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.29, antiderivative size = 178, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {6364, 6385, 6373, 30, 2209, 2212}

$$\frac{x^5e^{-b^2x^2}\text{Erf}(bx)}{3\sqrt{\pi}\,b}+\frac{5x^3e^{-b^2x^2}\text{Erf}(bx)}{6\sqrt{\pi}\,b^3}+\frac{5xe^{-b^2x^2}\text{Erf}(bx)}{4\sqrt{\pi}\,b^5}-\frac{5\text{Erf}(bx)^2}{16b^6}+\frac{x^4e^{-2b^2x^2}}{6\pi b^2}+\frac{7x^2e^{-2b^2x^2}}{12\pi b^4}+\frac{11e^{-2b^2x^2}}{12\pi b^6}+\frac{1}{6}x^6\text{Erf}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^5*Erf[b*x]^2,x]
```

```
[Out] 11/(12*b^6*E^(2*b^2*x^2)*Pi) + (7*x^2)/(12*b^4*E^(2*b^2*x^2)*Pi) + x^4/(6*b
^2*E^(2*b^2*x^2)*Pi) + (5*x*Erf[b*x])/(4*b^5*E^(b^2*x^2)*Sqrt[Pi]) + (5*x^3
*Erf[b*x])/(6*b^3*E^(b^2*x^2)*Sqrt[Pi]) + (x^5*Erf[b*x])/(3*b*E^(b^2*x^2)*S
qrt[Pi]) - (5*Erf[b*x]^2)/(16*b^6) + (x^6*Erf[b*x]^2)/6
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
```

```
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6385

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

Rubi steps

$$\int x^5\text{erf}(bx)^2\,dx = \frac{1}{6}x^6\text{erf}(bx)^2 - \frac{(2b)\int e^{-b^2x^2}x^6\text{erf}(bx)\,dx}{3\sqrt{\pi}}$$

$$= \frac{e^{-b^2x^2}x^5\text{erf}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6\text{erf}(bx)^2 - \frac{2\int e^{-2b^2x^2}x^5\,dx}{3\pi} - \frac{5\int e^{-b^2x^2}x^4\text{erf}(bx)\,dx}{3b\sqrt{\pi}}$$

$$= \frac{e^{-2b^2x^2}x^4}{6b^2\pi} + \frac{5e^{-b^2x^2}x^3\text{erf}(bx)}{6b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^5\text{erf}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6\text{erf}(bx)^2 - \frac{2\int e^{-2b^2x^2}x^3\,dx}{3b^2\pi} - \frac{5\int e^{-2b^2x}}{3b^2}$$

$$= \frac{7e^{-2b^2x^2}x^2}{12b^4\pi} + \frac{e^{-2b^2x^2}x^4}{6b^2\pi} + \frac{5e^{-b^2x^2}x\text{erf}(bx)}{4b^5\sqrt{\pi}} + \frac{5e^{-b^2x^2}x^3\text{erf}(bx)}{6b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^5\text{erf}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6\text{erf}(bx)$$

$$= \frac{11e^{-2b^2x^2}}{12b^6\pi} + \frac{7e^{-2b^2x^2}x^2}{12b^4\pi} + \frac{e^{-2b^2x^2}x^4}{6b^2\pi} + \frac{5e^{-b^2x^2}x\text{erf}(bx)}{4b^5\sqrt{\pi}} + \frac{5e^{-b^2x^2}x^3\text{erf}(bx)}{6b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^5\text{erf}(bx)}{3b\sqrt{\pi}} +$$

$$= \frac{11e^{-2b^2x^2}}{12b^6\pi} + \frac{7e^{-2b^2x^2}x^2}{12b^4\pi} + \frac{e^{-2b^2x^2}x^4}{6b^2\pi} + \frac{5e^{-b^2x^2}x\text{erf}(bx)}{4b^5\sqrt{\pi}} + \frac{5e^{-b^2x^2}x^3\text{erf}(bx)}{6b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^5\text{erf}(bx)}{3b\sqrt{\pi}} -$$

Mathematica [A] time = 0.05, size = 106, normalized size = 0.60

$$\frac{e^{-2b^2x^2}\left(8b^4x^4+28b^2x^2+\pi e^{2b^2x^2}\left(8b^6x^6-15\right)\text{erf}(bx)^2+4\sqrt{\pi}bxe^{b^2x^2}\left(4b^4x^4+10b^2x^2+15\right)\text{erf}(bx)+44\right)}{48\pi b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*Erf[b*x]^2,x]
```

```
[Out] (44 + 28*b^2*x^2 + 8*b^4*x^4 + 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(15 + 10*b^2*x^2
+ 4*b^4*x^4)*Erf[b*x] + E^(2*b^2*x^2)*Pi*(-15 + 8*b^6*x^6)*Erf[b*x]^2)/(48*
b^6*E^(2*b^2*x^2)*Pi)
```

fricas [A] time = 0.48, size = 98, normalized size = 0.55

$$\frac{4\sqrt{\pi}\left(4b^5x^5+10b^3x^3+15bx\right)\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}-\left(15\pi-8\pi b^6x^6\right)\operatorname{erf}(bx)^2+4\left(2b^4x^4+7b^2x^2+11\right)e^{\left(-2b^2x^2\right)}}{48\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erf(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/48*(4*sqrt(pi)*(4*b^5*x^5 + 10*b^3*x^3 + 15*b*x)*erf(b*x)*e^(-b^2*x^2) -
(15*pi - 8*pi*b^6*x^6)*erf(b*x)^2 + 4*(2*b^4*x^4 + 7*b^2*x^2 + 11)*e^(-2*b^
2*x^2))/(pi*b^6)
```

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

$$\int x^5 \operatorname{erf}(bx)^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erf(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^5*erf(b*x)^2, x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int x^5 \operatorname{erf}(bx)^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erf(b*x)^2,x)
```

```
[Out] int(x^5*erf(b*x)^2,x)
```

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

$$-\frac{-\frac{\left(2\,b^4x^4+2\,b^2x^2+1\right)e^{\left(-2\,b^2x^2\right)}}{2\,b^2}-\frac{5\left(2\,b^2x^2+1\right)e^{\left(-2\,b^2x^2\right)}}{4\,b^2}-\frac{15\,e^{\left(-2\,b^2x^2\right)}}{4\,b^2}}{6\,\pi b^4}+\frac{\left(8\,\sqrt{\pi}\,b^6x^6-15\,\sqrt{\pi}\right)\mathrm{erf}\left(bx\right)^2+4\left(4\,b^5x^5+10\,b^3x^3\cdots\right.}{48\,\sqrt{\pi}\,b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erf(b*x)^2,x, algorithm="maxima")
```

```
[Out] -1/6*integrate((4*b^4*x^5 + 10*b^2*x^3 + 15*x)*e^(-2*b^2*x^2), x)/(pi*b^4)
+ 1/48*((8*sqrt(pi)*b^6*x^6 - 15*sqrt(pi))*erf(b*x)^2 + 4*(4*b^5*x^5 + 10*b
^3*x^3 + 15*b*x)*erf(b*x)*e^(-b^2*x^2))/(sqrt(pi)*b^6)
```

mupad [B] time = 0.30, size = 142, normalized size = 0.80

$$\frac{x^6\,\mathrm{erf}\left(b\,x\right)^2}{6}+\frac{\frac{11\,\mathrm{e}^{-2\,b^2\,x^2}}{12}-\frac{5\,\pi\,\mathrm{erf}(b\,x)^2}{16}+\frac{7\,b^2\,x^2\,\mathrm{e}^{-2\,b^2\,x^2}}{12}+\frac{b^4\,x^4\,\mathrm{e}^{-2\,b^2\,x^2}}{6}+\frac{5\,b^3\,x^3\,\sqrt{\pi}\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erf}(b\,x)}{6}+\frac{b^5\,x^5\,\sqrt{\pi}\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erf}(b\,x)}{3}+\frac{5\cdots}{\cdots}}{b^6\,\pi}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erf(b*x)^2,x)
```

```
[Out] (x^6*erf(b*x)^2)/6 + ((11*exp(-2*b^2*x^2))/12 - (5*pi*erf(b*x)^2)/16 + (7*b
^2*x^2*exp(-2*b^2*x^2))/12 + (b^4*x^4*exp(-2*b^2*x^2))/6 + (5*b^3*x^3*pi^(1
/2)*exp(-b^2*x^2)*erf(b*x))/6 + (b^5*x^5*pi^(1/2)*exp(-b^2*x^2)*erf(b*x))/3
 + (5*b*x*pi^(1/2)*exp(-b^2*x^2)*erf(b*x))/4)/(b^6*pi)
```

sympy [A] time = 5.39, size = 168, normalized size = 0.94

$$\begin{cases}\frac{x^6\,\mathrm{erf}^2\left(bx\right)}{6}+\frac{x^5e^{-b^2x^2}\,\mathrm{erf}\left(bx\right)}{3\sqrt{\pi}\,b}+\frac{x^4e^{-2b^2x^2}}{6\pi b^2}+\frac{5x^3e^{-b^2x^2}\,\mathrm{erf}\left(bx\right)}{6\sqrt{\pi}\,b^3}+\frac{7x^2e^{-2b^2x^2}}{12\pi b^4}+\frac{5xe^{-b^2x^2}\,\mathrm{erf}\left(bx\right)}{4\sqrt{\pi}\,b^5}-\frac{5\,\mathrm{erf}^2\left(bx\right)}{16b^6}+\frac{11e^{-2b^2x^2}}{12\pi b^6} & \text{for } b \neq \cdots \\ 0 & \text{otherw}\cdots\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*erf(b*x)**2,x)
```

```
[Out] Piecewise((x**6*erf(b*x)**2/6 + x**5*exp(-b**2*x**2)*erf(b*x)/(3*sqrt(pi)*b
) + x**4*exp(-2*b**2*x**2)/(6*pi*b**2) + 5*x**3*exp(-b**2*x**2)*erf(b*x)/(6
*sqrt(pi)*b**3) + 7*x**2*exp(-2*b**2*x**2)/(12*pi*b**4) + 5*x*exp(-b**2*x**
2)*erf(b*x)/(4*sqrt(pi)*b**5) - 5*erf(b*x)**2/(16*b**6) + 11*exp(-2*b**2*x*
*2)/(12*pi*b**6), Ne(b, 0)), (0, True))
```

3.23 $\int x^3 \mathbf{erf}(bx)^2\,dx$

Optimal. Leaf size=126

$$-\frac{3\text{erf}(bx)^2}{16b^4}+\frac{x^3e^{-b^2x^2}\text{erf}(bx)}{2\sqrt{\pi}\,b}+\frac{x^2e^{-2b^2x^2}}{4\pi b^2}+\frac{e^{-2b^2x^2}}{2\pi b^4}+\frac{3xe^{-b^2x^2}\text{erf}(bx)}{4\sqrt{\pi}\,b^3}+\frac{1}{4}x^4\text{erf}(bx)^2$$

```
[Out] 1/2/b^4/exp(2*b^2*x^2)/Pi+1/4*x^2/b^2/exp(2*b^2*x^2)/Pi-3/16*erf(b*x)^2/b^4
+1/4*x^4*erf(b*x)^2+3/4*x*erf(b*x)/b^3/exp(b^2*x^2)/Pi^(1/2)+1/2*x^3*erf(b*
x)/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.18, antiderivative size = 126, 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 = {6364, 6385, 6373, 30, 2209, 2212}

$$\frac{x^3e^{-b^2x^2}\text{Erf}(bx)}{2\sqrt{\pi}\,b}+\frac{3xe^{-b^2x^2}\text{Erf}(bx)}{4\sqrt{\pi}\,b^3}-\frac{3\text{Erf}(bx)^2}{16b^4}+\frac{x^2e^{-2b^2x^2}}{4\pi b^2}+\frac{e^{-2b^2x^2}}{2\pi b^4}+\frac{1}{4}x^4\text{Erf}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^3*Erf[b*x]^2,x]
```

```
[Out] 1/(2*b^4*E^(2*b^2*x^2)*Pi) + x^2/(4*b^2*E^(2*b^2*x^2)*Pi) + (3*x*Erf[b*x])/
(4*b^3*E^(b^2*x^2)*Sqrt[Pi]) + (x^3*Erf[b*x])/(2*b*E^(b^2*x^2)*Sqrt[Pi]) -
(3*Erf[b*x]^2)/(16*b^4) + (x^4*Erf[b*x]^2)/4
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
```

```
0])
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6385

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

Rubi steps

$$\int x^3\text{erf}(bx)^2\,dx = \frac{1}{4}x^4\text{erf}(bx)^2 - \frac{b\int e^{-b^2x^2}x^4\text{erf}(bx)\,dx}{\sqrt{\pi}}$$

$$= \frac{e^{-b^2x^2}x^3\text{erf}(bx)}{2b\sqrt{\pi}} + \frac{1}{4}x^4\text{erf}(bx)^2 - \frac{\int e^{-2b^2x^2}x^3\,dx}{\pi} - \frac{3\int e^{-b^2x^2}x^2\text{erf}(bx)\,dx}{2b\sqrt{\pi}}$$

$$= \frac{e^{-2b^2x^2}x^2}{4b^2\pi} + \frac{3e^{-b^2x^2}x\text{erf}(bx)}{4b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^3\text{erf}(bx)}{2b\sqrt{\pi}} + \frac{1}{4}x^4\text{erf}(bx)^2 - \frac{\int e^{-2b^2x^2}x\,dx}{2b^2\pi} - \frac{3\int e^{-2b^2x^2}x\,d}{2b^2\pi}$$

$$= \frac{e^{-2b^2x^2}}{2b^4\pi} + \frac{e^{-2b^2x^2}x^2}{4b^2\pi} + \frac{3e^{-b^2x^2}x\text{erf}(bx)}{4b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^3\text{erf}(bx)}{2b\sqrt{\pi}} + \frac{1}{4}x^4\text{erf}(bx)^2 - \frac{3\,\text{Subst}(\int x\,dx, x, e}{8b^4}$$

$$= \frac{e^{-2b^2x^2}}{2b^4\pi} + \frac{e^{-2b^2x^2}x^2}{4b^2\pi} + \frac{3e^{-b^2x^2}x\text{erf}(bx)}{4b^3\sqrt{\pi}} + \frac{e^{-b^2x^2}x^3\text{erf}(bx)}{2b\sqrt{\pi}} - \frac{3\text{erf}(bx)^2}{16b^4} + \frac{1}{4}x^4\text{erf}(bx)^2$$

Mathematica [A] time = 0.04, size = 90, normalized size = 0.71

$$\frac{e^{-2b^2x^2}\left(4\sqrt{\pi}\,bxe^{b^2x^2}\left(2b^2x^2+3\right)\text{erf}(bx)+4b^2x^2+\pi e^{2b^2x^2}\left(4b^4x^4-3\right)\text{erf}(bx)^2+8\right)}{16\pi b^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*Erf[b*x]^2,x]
```

```
[Out] (8 + 4*b^2*x^2 + 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(3 + 2*b^2*x^2)*Erf[b*x] + E^(2
*b^2*x^2)*Pi*(-3 + 4*b^4*x^4)*Erf[b*x]^2)/(16*b^4*E^(2*b^2*x^2)*Pi)
```

fricas [A] time = 0.41, size = 81, normalized size = 0.64

$$\frac{4\sqrt{\pi}\left(2\,b^3x^3 + 3\,bx\right)\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)} - \left(3\,\pi - 4\,\pi b^4x^4\right)\operatorname{erf}\left(bx\right)^2 + 4\left(b^2x^2 + 2\right)e^{\left(-2\,b^2x^2\right)}}{16\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erf(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/16*(4*sqrt(pi)*(2*b^3*x^3 + 3*b*x)*erf(b*x)*e^(-b^2*x^2) - (3*pi - 4*pi*b
^4*x^4)*erf(b*x)^2 + 4*(b^2*x^2 + 2)*e^(-2*b^2*x^2))/(pi*b^4)
```

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

$$\int x^3\operatorname{erf}\left(bx\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erf(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^3*erf(b*x)^2, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int x^3\operatorname{erf}\left(bx\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erf(b*x)^2,x)
```

```
[Out] int(x^3*erf(b*x)^2,x)
```

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

$$-\frac{-\frac{\left(2\,b^2x^2+1\right)e^{\left(-2\,b^2x^2\right)}}{4\,b^2} - \frac{3\,e^{\left(-2\,b^2x^2\right)}}{4\,b^2}}{2\,\pi b^2} - \frac{\left(3\,\pi - 4\,\pi b^4x^4\right)\operatorname{erf}\left(bx\right)^2 - 4\left(2\,\sqrt{\pi}\,b^3x^3 + 3\,\sqrt{\pi}\,bx\right)\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)}}{16\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erf(b*x)^2,x, algorithm="maxima")
```

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

mupad [B] time = 0.21, size = 101, normalized size = 0.80

$$\frac{x^4\,\mathrm{erf}\left(b\,x\right)^2}{4}+\frac{\frac{\mathrm{e}^{-2\,b^2\,x^2}}{2}-\frac{3\,\pi\,\mathrm{erf}(b\,x)^2}{16}+\frac{b^2\,x^2\,\mathrm{e}^{-2\,b^2\,x^2}}{4}+\frac{b^3\,x^3\,\sqrt{\pi}\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erf}(b\,x)}{2}+\frac{3\,b\,x\,\sqrt{\pi}\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erf}(b\,x)}{4}}{b^4\,\pi}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erf(b*x)^2,x)
```

```
[Out] (x^4*erf(b*x)^2)/4 + (exp(-2*b^2*x^2)/2 - (3*pi*erf(b*x)^2)/16 + (b^2*x^2*e
xp(-2*b^2*x^2))/4 + (b^3*x^3*pi^(1/2)*exp(-b^2*x^2)*erf(b*x))/2 + (3*b*x*pi
^(1/2)*exp(-b^2*x^2)*erf(b*x))/4)/(b^4*pi)
```

sympy [A] time = 1.97, size = 117, normalized size = 0.93

$$\begin{cases} \frac{x^4\,\mathrm{erf}^2\left(bx\right)}{4}+\frac{x^3e^{-b^2x^2}\,\mathrm{erf}\left(bx\right)}{2\sqrt{\pi}\,b}+\frac{x^2e^{-2b^2x^2}}{4\pi b^2}+\frac{3xe^{-b^2x^2}\,\mathrm{erf}\left(bx\right)}{4\sqrt{\pi}\,b^3}-\frac{3\,\mathrm{erf}^2\left(bx\right)}{16b^4}+\frac{e^{-2b^2x^2}}{2\pi b^4} & \text{for}\ b\neq 0\\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*erf(b*x)**2,x)
```

```
[Out] Piecewise((x**4*erf(b*x)**2/4 + x**3*exp(-b**2*x**2)*erf(b*x)/(2*sqrt(pi)*b
) + x**2*exp(-2*b**2*x**2)/(4*pi*b**2) + 3*x*exp(-b**2*x**2)*erf(b*x)/(4*sq
rt(pi)*b**3) - 3*erf(b*x)**2/(16*b**4) + exp(-2*b**2*x**2)/(2*pi*b**4), Ne(
b, 0)), (0, True))
```

3.24 $\int x\mathbf{erf}(bx)^2\,dx$

Optimal. Leaf size=71

$$\frac{xe^{-b^2x^2}\operatorname{erf}(bx)}{\sqrt{\pi}\,b}-\frac{\operatorname{erf}(bx)^2}{4b^2}+\frac{e^{-2b^2x^2}}{2\pi b^2}+\frac{1}{2}x^2\operatorname{erf}(bx)^2$$

```
[Out] 1/2/b^2/exp(2*b^2*x^2)/Pi-1/4*erf(b*x)^2/b^2+1/2*x^2*erf(b*x)^2+x*erf(b*x)/
b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 71, 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 = {6364, 6385, 6373, 30, 2209}

$$\frac{xe^{-b^2x^2}\operatorname{Erf}(bx)}{\sqrt{\pi}\,b}-\frac{\operatorname{Erf}(bx)^2}{4b^2}+\frac{e^{-2b^2x^2}}{2\pi b^2}+\frac{1}{2}x^2\operatorname{Erf}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x*Erf[b*x]^2,x]
```

```
[Out] 1/(2*b^2*E^(2*b^2*x^2)*Pi) + (x*Erf[b*x])/(b*E^(b^2*x^2)*Sqrt[Pi]) - Erf[b*
x]^2/(4*b^2) + (x^2*Erf[b*x]^2)/2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
```

```
x] && EqQ[d, -b^2]
```

Rule 6385

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

Rubi steps

$$\begin{aligned}
\int x\text{erf}(bx)^2\,dx &= \frac{1}{2}x^2\text{erf}(bx)^2 - \frac{(2b)\int e^{-b^2x^2}x^2\text{erf}(bx)\,dx}{\sqrt{\pi}}\\
&= \frac{e^{-b^2x^2}x\text{erf}(bx)}{b\sqrt{\pi}} + \frac{1}{2}x^2\text{erf}(bx)^2 - \frac{2\int e^{-2b^2x^2}x\,dx}{\pi} - \frac{\int e^{-b^2x^2}\text{erf}(bx)\,dx}{b\sqrt{\pi}}\\
&= \frac{e^{-2b^2x^2}}{2b^2\pi} + \frac{e^{-b^2x^2}x\text{erf}(bx)}{b\sqrt{\pi}} + \frac{1}{2}x^2\text{erf}(bx)^2 - \frac{\text{Subst}\left(\int x\,dx, x, \text{erf}(bx)\right)}{2b^2}\\
&= \frac{e^{-2b^2x^2}}{2b^2\pi} + \frac{e^{-b^2x^2}x\text{erf}(bx)}{b\sqrt{\pi}} - \frac{\text{erf}(bx)^2}{4b^2} + \frac{1}{2}x^2\text{erf}(bx)^2
\end{aligned}$$

Mathematica [A] time = 0.05, size = 64, normalized size = 0.90

$$\frac{\pi\left(2b^2x^2-1\right)\text{erf}(bx)^2+4\sqrt{\pi}\,bxe^{-b^2x^2}\text{erf}(bx)+2e^{-2b^2x^2}}{4\pi b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Erf[b*x]^2,x]
```

```
[Out] (2/E^(2*b^2*x^2) + (4*b*Sqrt[Pi]*x*Erf[b*x])/E^(b^2*x^2) + Pi*(-1 + 2*b^2*x
^2)*Erf[b*x]^2)/(4*b^2*Pi)
```

fricas [A] time = 0.45, size = 59, normalized size = 0.83

$$\frac{4\sqrt{\pi}\,bx\,\text{erf}\,(bx)\,e^{\left(-b^2x^2\right)}-\left(\pi-2\,\pi b^2x^2\right)\text{erf}\,(bx)^2+2\,e^{\left(-2\,b^2x^2\right)}}{4\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x)^2,x, algorithm="fricas")
```

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

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

$$\int x \operatorname{erf}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x*erf(b*x)^2, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int x \operatorname{erf}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erf(b*x)^2,x)
```

```
[Out] int(x*erf(b*x)^2,x)
```

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

$$-\frac{-\frac{e^{\left(-2\,b^2x^2\right)}}{2\,b^2}}{\pi} + \frac{4\,bx \operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)} + \left(2\,\sqrt{\pi}\,b^2x^2 - \sqrt{\pi}\right)\operatorname{erf}(bx)^2}{4\,\sqrt{\pi}\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x)^2,x, algorithm="maxima")
```

```
[Out] -2*integrate(x*e^(-2*b^2*x^2), x)/pi + 1/4*(4*b*x*erf(b*x)*e^(-b^2*x^2) + (
2*sqrt(pi)*b^2*x^2 - sqrt(pi))*erf(b*x)^2)/(sqrt(pi)*b^2)
```

mupad [B] time = 0.17, size = 67, normalized size = 0.94

$$\frac{\frac{e^{-2\,b^2\,x^2}}{2} + b\,x\,\sqrt{\pi}\,e^{-b^2\,x^2}\operatorname{erf}(b\,x)}{b^2\,\pi} - \frac{\frac{\operatorname{erf}(b\,x)^2}{4} - \frac{b^2\,x^2\operatorname{erf}(b\,x)^2}{2}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erf(b*x)^2,x)
```

```
[Out] (exp(-2*b^2*x^2)/2 + b*x*pi^(1/2)*exp(-b^2*x^2)*erf(b*x))/(b^2*pi) - (erf(b
*x)^2/4 - (b^2*x^2*erf(b*x)^2)/2)/b^2
```

sympy [**A**] time = 0.68, size = 65, normalized size = 0.92

$$\begin{cases} \frac{x^2 \operatorname{erf}^2(bx)}{2} + \frac{xe^{-b^2x^2} \operatorname{erf}(bx)}{\sqrt{\pi}\, b} - \frac{\operatorname{erf}^2(bx)}{4b^2} + \frac{e^{-2b^2x^2}}{2\pi b^2} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x)**2,x)
```

```
[Out] Piecewise((x**2*erf(b*x)**2/2 + x*exp(-b**2*x**2)*erf(b*x)/(sqrt(pi)*b) - e
rf(b*x)**2/(4*b**2) + exp(-2*b**2*x**2)/(2*pi*b**2), Ne(b, 0)), (0, True))
```

3.25 $\int \frac{\text{erf}(bx)^2}{x} dx$

Optimal. Leaf size=13

$$\text{Int}\left(\frac{\text{erf}(bx)^2}{x},x\right)$$

```
[Out] Unintegrable(erf(b*x)^2/x,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erf}(bx)^2}{x} dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[b*x]^2/x,x]
```

```
[Out] Defer[Int][Erf[b*x]^2/x, x]
```

Rubi steps

$$\int \frac{\text{erf}(bx)^2}{x} dx = \int \frac{\text{erf}(bx)^2}{x} dx$$

Mathematica [A] time = 0.03, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(bx)^2}{x} dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erf[b*x]^2/x,x]
```

```
[Out] Integrate[Erf[b*x]^2/x, x]
```

fricas [A] time = 0.46, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx)^2}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x,x, algorithm="fricas")
[Out] integral(erf(b*x)^2/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(bx)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(bx)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x,x)
[Out] int(erf(b*x)^2/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(bx)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x,x, algorithm="maxima")
[Out] integrate(erf(b*x)^2/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\text{erf}(b\,x)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x,x)
[Out] int(erf(b*x)^2/x, x)
```

<u>**sympy**</u> **[A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}^2(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)**2/x,x)
```

```
[Out] Integral(erf(b*x)**2/x, x)
```

3.26 $\int \frac{\mathbf{erf}(bx)^2}{x^3} \, dx$

Optimal. Leaf size=67

$$-\frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{\sqrt{\pi}\,x}+b^2\left(-\operatorname{erf}(bx)^2\right)+\frac{2b^2\operatorname{Ei}\left(-2b^2x^2\right)}{\pi}-\frac{\operatorname{erf}(bx)^2}{2x^2}$$

```
[Out] 2*b^2*Ei(-2*b^2*x^2)/Pi-b^2*erf(b*x)^2-1/2*erf(b*x)^2/x^2-2*b*erf(b*x)/exp(
b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.10, antiderivative size = 67, 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 = {6364, 6391, 6373, 30, 2210}

$$-\frac{2be^{-b^2x^2}\operatorname{Erf}(bx)}{\sqrt{\pi}\,x}+b^2\left(-\operatorname{Erf}(bx)^2\right)+\frac{2b^2\operatorname{Ei}\left(-2b^2x^2\right)}{\pi}-\frac{\operatorname{Erf}(bx)^2}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]^2/x^3,x]
```

```
[Out] (-2*b*Erf[b*x])/(E^(b^2*x^2)*Sqrt[Pi]*x) - b^2*Erf[b*x]^2 - Erf[b*x]^2/(2*x
^2) + (2*b^2*ExpIntegralEi[-2*b^2*x^2])/Pi
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
```

```
x] && EqQ[d, -b^2]
```

Rule 6391

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

Rubi steps

$$
\begin{aligned}
\int \frac{\operatorname{erf}(bx)^2}{x^3}\,dx &= -\frac{\operatorname{erf}(bx)^2}{2x^2} + \frac{(2b)\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x^2}\,dx}{\sqrt{\pi}} \\
&= -\frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{\sqrt{\pi}\,x} - \frac{\operatorname{erf}(bx)^2}{2x^2} + \frac{\left(4b^2\right)\int \frac{e^{-2b^2x^2}}{x}\,dx}{\pi} - \frac{\left(4b^3\right)\int e^{-b^2x^2}\operatorname{erf}(bx)\,dx}{\sqrt{\pi}} \\
&= -\frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{\sqrt{\pi}\,x} - \frac{\operatorname{erf}(bx)^2}{2x^2} + \frac{2b^2\operatorname{Ei}\left(-2b^2x^2\right)}{\pi} - \left(2b^2\right)\operatorname{Subst}\left(\int x\,dx, x, \operatorname{erf}(bx)\right) \\
&= -\frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{\sqrt{\pi}\,x} - b^2\operatorname{erf}(bx)^2 - \frac{\operatorname{erf}(bx)^2}{2x^2} + \frac{2b^2\operatorname{Ei}\left(-2b^2x^2\right)}{\pi}
\end{aligned}
$$

Mathematica [A] time = 0.03, size = 63, normalized size = 0.94

$$
-\frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{\sqrt{\pi}\,x} + \left(-b^2 - \frac{1}{2x^2}\right)\operatorname{erf}(bx)^2 + \frac{2b^2\operatorname{Ei}\left(-2b^2x^2\right)}{\pi}
$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]^2/x^3,x]
```

```
[Out] (-2*b*Erf[b*x])/(E^(b^2*x^2)*Sqrt[Pi]*x) + (-b^2 - 1/(2*x^2))*Erf[b*x]^2 +
(2*b^2*ExpIntegralEi[-2*b^2*x^2])/Pi
```

fricas [A] time = 0.45, size = 65, normalized size = 0.97

$$
\frac{4\,b^2x^2\operatorname{Ei}\left(-2\,b^2x^2\right) - 4\,\sqrt{\pi}\,bx\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)} - \left(\pi + 2\,\pi b^2x^2\right)\operatorname{erf}(bx)^2}{2\,\pi x^2}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^3,x, algorithm="fricas")
```

```
[Out] 1/2*(4*b^2*x^2*Ei(-2*b^2*x^2) - 4*sqrt(pi)*b*x*erf(b*x)*e^(-b^2*x^2) - (pi
+ 2*pi*b^2*x^2)*erf(b*x)^2)/(pi*x^2)
```

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

$$\int \frac{\operatorname{erf}(bx)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^3,x, algorithm="giac")
```

```
[Out] integrate(erf(b*x)^2/x^3, x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^3,x)
```

```
[Out] int(erf(b*x)^2/x^3,x)
```

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

$$\frac{2\,b\int \frac{\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{x^2}\,dx}{\sqrt{\pi}} - \frac{\operatorname{erf}(bx)^2}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^3,x, algorithm="maxima")
```

```
[Out] 2*b*integrate(erf(b*x)*e^(-b^2*x^2)/x^2, x)/sqrt(pi) - 1/2*erf(b*x)^2/x^2
```

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

$$\int \frac{\operatorname{erf}(b\,x)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^3,x)
```

```
[Out] int(erf(b*x)^2/x^3, x)
```

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

$$\int \frac{\operatorname{erf}^2(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)**2/x**3,x)
```

```
[Out] Integral(erf(b*x)**2/x**3, x)
```

3.27 $\int \frac{\mathbf{erf}(bx)^2}{x^5}\,dx$

Optimal. Leaf size=125

$$\frac{1}{3}b^4\text{erf}(bx)^2-\frac{be^{-b^2x^2}\text{erf}(bx)}{3\sqrt{\pi}\,x^3}-\frac{b^2e^{-2b^2x^2}}{3\pi x^2}-\frac{4b^4\text{Ei}\left(-2b^2x^2\right)}{3\pi}+\frac{2b^3e^{-b^2x^2}\text{erf}(bx)}{3\sqrt{\pi}\,x}-\frac{\text{erf}(bx)^2}{4x^4}$$

```
[Out] -1/3*b^2/exp(2*b^2*x^2)/Pi/x^2-4/3*b^4*Ei(-2*b^2*x^2)/Pi+1/3*b^4*erf(b*x)^2
-1/4*erf(b*x)^2/x^4-1/3*b*erf(b*x)/exp(b^2*x^2)/x^3/Pi^(1/2)+2/3*b^3*erf(b*
x)/exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.18, antiderivative size = 125, 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 = {6364, 6391, 6373, 30, 2210, 2214}

$$\frac{2b^3e^{-b^2x^2}\text{Erf}(bx)}{3\sqrt{\pi}\,x}-\frac{be^{-b^2x^2}\text{Erf}(bx)}{3\sqrt{\pi}\,x^3}+\frac{1}{3}b^4\text{Erf}(bx)^2-\frac{4b^4\text{Ei}\left(-2b^2x^2\right)}{3\pi}-\frac{b^2e^{-2b^2x^2}}{3\pi x^2}-\frac{\text{Erf}(bx)^2}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]^2/x^5,x]
```

```
[Out] -b^2/(3*E^(2*b^2*x^2)*Pi*x^2) - (b*Erf[b*x])/(3*E^(b^2*x^2)*Sqrt[Pi]*x^3) +
 (2*b^3*Erf[b*x])/(3*E^(b^2*x^2)*Sqrt[Pi]*x) + (b^4*Erf[b*x]^2)/3 - Erf[b*x
]^2/(4*x^4) - (4*b^4*ExpIntegralEi[-2*b^2*x^2])/(3*Pi)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
```

```
] && LeQ[-n, m + 1]))
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6391

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

Rubi steps

$$\int \frac{\operatorname{erf}(bx)^2}{x^5}\,dx = -\frac{\operatorname{erf}(bx)^2}{4x^4} + \frac{b\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x^4}\,dx}{\sqrt{\pi}}$$

$$= -\frac{be^{-b^2x^2}\operatorname{erf}(bx)}{3\sqrt{\pi}\,x^3} - \frac{\operatorname{erf}(bx)^2}{4x^4} + \frac{\left(2b^2\right)\int \frac{e^{-2b^2x^2}}{x^3}\,dx}{3\pi} - \frac{\left(2b^3\right)\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x^2}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{b^2e^{-2b^2x^2}}{3\pi x^2} - \frac{be^{-b^2x^2}\operatorname{erf}(bx)}{3\sqrt{\pi}\,x^3} + \frac{2b^3e^{-b^2x^2}\operatorname{erf}(bx)}{3\sqrt{\pi}\,x} - \frac{\operatorname{erf}(bx)^2}{4x^4} - 2\frac{\left(4b^4\right)\int \frac{e^{-2b^2x^2}}{x}\,dx}{3\pi} + \frac{\left(4b^5\right)\int e^{-b^2x^2}}{3\sqrt{\pi}}$$

$$= -\frac{b^2e^{-2b^2x^2}}{3\pi x^2} - \frac{be^{-b^2x^2}\operatorname{erf}(bx)}{3\sqrt{\pi}\,x^3} + \frac{2b^3e^{-b^2x^2}\operatorname{erf}(bx)}{3\sqrt{\pi}\,x} - \frac{\operatorname{erf}(bx)^2}{4x^4} - \frac{4b^4\operatorname{Ei}\left(-2b^2x^2\right)}{3\pi} + \frac{1}{3}\left(2b^4\right)\operatorname{Subst}(\int$$

$$= -\frac{b^2e^{-2b^2x^2}}{3\pi x^2} - \frac{be^{-b^2x^2}\operatorname{erf}(bx)}{3\sqrt{\pi}\,x^3} + \frac{2b^3e^{-b^2x^2}\operatorname{erf}(bx)}{3\sqrt{\pi}\,x} + \frac{1}{3}b^4\operatorname{erf}(bx)^2 - \frac{\operatorname{erf}(bx)^2}{4x^4} - \frac{4b^4\operatorname{Ei}\left(-2b^2x^2\right)}{3\pi}$$

Mathematica [A] time = 0.09, size = 97, normalized size = 0.78

$$\frac{\left(4b^4x^4-3\right)\operatorname{erf}(bx)^2+\frac{4bxe^{-b^2x^2}\left(2b^2x^2-1\right)\operatorname{erf}(bx)}{\sqrt{\pi}}-\frac{4b^2x^2\left(4b^2x^2\operatorname{Ei}\left(-2b^2x^2\right)+e^{-2b^2x^2}\right)}{\pi}}{12x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]^2/x^5,x]
```

```
[Out] ((4*b*x*(-1 + 2*b^2*x^2)*Erf[b*x])/(E^(b^2*x^2)*Sqrt[Pi]) + (-3 + 4*b^4*x^4
)*Erf[b*x]^2 - (4*b^2*x^2*(E^(-2*b^2*x^2) + 4*b^2*x^2*ExpIntegralEi[-2*b^2*
x^2]))/Pi)/(12*x^4)
```

fricas [A] time = 0.53, size = 94, normalized size = 0.75

$$-\frac{16\,b^4x^4\operatorname{Ei}\left(-2\,b^2x^2\right)+4\,b^2x^2e^{\left(-2\,b^2x^2\right)}-4\,\sqrt{\pi}\left(2\,b^3x^3-bx\right)\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)}+\left(3\,\pi-4\,\pi b^4x^4\right)\operatorname{erf}\left(bx\right)^2}{12\,\pi x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^5,x, algorithm="fricas")
```

```
[Out] -1/12*(16*b^4*x^4*Ei(-2*b^2*x^2) + 4*b^2*x^2*e^(-2*b^2*x^2) - 4*sqrt(pi)*(2
*b^3*x^3 - b*x)*erf(b*x)*e^(-b^2*x^2) + (3*pi - 4*pi*b^4*x^4)*erf(b*x)^2)/(
pi*x^4)
```

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

$$\int\frac{\operatorname{erf}\left(bx\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^5,x, algorithm="giac")
```

```
[Out] integrate(erf(b*x)^2/x^5, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int\frac{\operatorname{erf}\left(bx\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^5,x)
```

```
[Out] int(erf(b*x)^2/x^5,x)
```

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

$$\frac{b \int \frac{\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{x^4}\, dx}{\sqrt{\pi}} - \frac{\operatorname{erf}\left(bx\right)^2}{4\, x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^5,x, algorithm="maxima")
```

```
[Out] b*integrate(erf(b*x)*e^(-b^2*x^2)/x^4, x)/sqrt(pi) - 1/4*erf(b*x)^2/x^4
```

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

$$\int \frac{\operatorname{erf}\left(b\, x\right)^2}{x^5}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^5,x)
```

```
[Out] int(erf(b*x)^2/x^5, x)
```

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

$$\int \frac{\operatorname{erf}^{2}{\left(bx \right)}}{x^{5}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)**2/x**5,x)
```

```
[Out] Integral(erf(b*x)**2/x**5, x)
```

3.28 $\int \frac{\textbf{erf}(bx)^2}{x^7}\,dx$

Optimal. Leaf size=177

$$-\frac{4}{45}b^6\mathrm{erf}(bx)^2-\frac{2be^{-b^2x^2}\mathrm{erf}(bx)}{15\sqrt{\pi}\,x^5}-\frac{b^2e^{-2b^2x^2}}{15\pi x^4}+\frac{28b^6\mathrm{Ei}\left(-2b^2x^2\right)}{45\pi}-\frac{8b^5e^{-b^2x^2}\mathrm{erf}(bx)}{45\sqrt{\pi}\,x}+\frac{2b^4e^{-2b^2x^2}}{9\pi x^2}+\frac{4b^3e^{-b^2x^2}\mathrm{erf}(bx)}{45\sqrt{\pi}\,x^3}-$$

```
[Out] -1/15*b^2/exp(2*b^2*x^2)/Pi/x^4+2/9*b^4/exp(2*b^2*x^2)/Pi/x^2+28/45*b^6*Ei(
-2*b^2*x^2)/Pi-4/45*b^6*erf(b*x)^2-1/6*erf(b*x)^2/x^6-2/15*b*erf(b*x)/exp(b
^2*x^2)/x^5/Pi^(1/2)+4/45*b^3*erf(b*x)/exp(b^2*x^2)/x^3/Pi^(1/2)-8/45*b^5*e
rf(b*x)/exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.29, antiderivative size = 177, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {6364, 6391, 6373, 30, 2210, 2214}

$$-\frac{8b^5e^{-b^2x^2}\mathrm{Erf}(bx)}{45\sqrt{\pi}\,x}+\frac{4b^3e^{-b^2x^2}\mathrm{Erf}(bx)}{45\sqrt{\pi}\,x^3}-\frac{2be^{-b^2x^2}\mathrm{Erf}(bx)}{15\sqrt{\pi}\,x^5}-\frac{4}{45}b^6\mathrm{Erf}(bx)^2+\frac{28b^6\mathrm{Ei}\left(-2b^2x^2\right)}{45\pi}+\frac{2b^4e^{-2b^2x^2}}{9\pi x^2}-\frac{b^2e^{-2b^2x^2}}{15\pi x^4}-$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]^2/x^7,x]
```

```
[Out] -b^2/(15*E^(2*b^2*x^2)*Pi*x^4) + (2*b^4)/(9*E^(2*b^2*x^2)*Pi*x^2) - (2*b*Er
f[b*x])/(15*E^(b^2*x^2)*Sqrt[Pi]*x^5) + (4*b^3*Erf[b*x])/(45*E^(b^2*x^2)*Sq
rt[Pi]*x^3) - (8*b^5*Erf[b*x])/(45*E^(b^2*x^2)*Sqrt[Pi]*x) - (4*b^6*Erf[b*x
]^2)/45 - Erf[b*x]^2/(6*x^6) + (28*b^6*ExpIntegralEi[-2*b^2*x^2])/(45*Pi)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
```

```
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6391

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

Rubi steps

$$\int \frac{\operatorname{erf}(bx)^2}{x^7}\,dx = -\frac{\operatorname{erf}(bx)^2}{6x^6} + \frac{(2b)\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x^6}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{15\sqrt{\pi}\,x^5} - \frac{\operatorname{erf}(bx)^2}{6x^6} + \frac{\left(4b^2\right)\int \frac{e^{-2b^2x^2}}{x^5}\,dx}{15\pi} - \frac{\left(4b^3\right)\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x^4}\,dx}{15\sqrt{\pi}}$$

$$= -\frac{b^2e^{-2b^2x^2}}{15\pi x^4} - \frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{15\sqrt{\pi}\,x^5} + \frac{4b^3e^{-b^2x^2}\operatorname{erf}(bx)}{45\sqrt{\pi}\,x^3} - \frac{\operatorname{erf}(bx)^2}{6x^6} - \frac{\left(8b^4\right)\int \frac{e^{-2b^2x^2}}{x^3}\,dx}{45\pi} - \frac{\left(4b^4\right)\int \frac{e^{-2b^2}}{x^3}}{15\pi}$$

$$= -\frac{b^2e^{-2b^2x^2}}{15\pi x^4} + \frac{2b^4e^{-2b^2x^2}}{9\pi x^2} - \frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{15\sqrt{\pi}\,x^5} + \frac{4b^3e^{-b^2x^2}\operatorname{erf}(bx)}{45\sqrt{\pi}\,x^3} - \frac{8b^5e^{-b^2x^2}\operatorname{erf}(bx)}{45\sqrt{\pi}\,x} - \frac{\operatorname{erf}(bx)^2}{6x^6} +$$

$$= -\frac{b^2e^{-2b^2x^2}}{15\pi x^4} + \frac{2b^4e^{-2b^2x^2}}{9\pi x^2} - \frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{15\sqrt{\pi}\,x^5} + \frac{4b^3e^{-b^2x^2}\operatorname{erf}(bx)}{45\sqrt{\pi}\,x^3} - \frac{8b^5e^{-b^2x^2}\operatorname{erf}(bx)}{45\sqrt{\pi}\,x} - \frac{\operatorname{erf}(bx)^2}{6x^6} +$$

$$= -\frac{b^2e^{-2b^2x^2}}{15\pi x^4} + \frac{2b^4e^{-2b^2x^2}}{9\pi x^2} - \frac{2be^{-b^2x^2}\operatorname{erf}(bx)}{15\sqrt{\pi}\,x^5} + \frac{4b^3e^{-b^2x^2}\operatorname{erf}(bx)}{45\sqrt{\pi}\,x^3} - \frac{8b^5e^{-b^2x^2}\operatorname{erf}(bx)}{45\sqrt{\pi}\,x} - \frac{4}{45}b^6\operatorname{erf}(b$$

Mathematica [A] time = 0.05, size = 133, normalized size = 0.75

$$\frac{e^{-2b^2x^2}\left(20b^4x^4 - 6b^2x^2 - \pi e^{2b^2x^2}\left(8b^6x^6+15\right)\operatorname{erf}(bx)^2 + 56b^6x^6e^{2b^2x^2}\operatorname{Ei}\left(-2b^2x^2\right) - 4\sqrt{\pi}\,bxe^{b^2x^2}\left(4b^4x^4 - 2b^2x^2\right.\right.}{90\pi x^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]^2/x^7,x]
```

```
[Out] (-6*b^2*x^2 + 20*b^4*x^4 - 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(3 - 2*b^2*x^2 + 4*b^
4*x^4)*Erf[b*x] - E^(2*b^2*x^2)*Pi*(15 + 8*b^6*x^6)*Erf[b*x]^2 + 56*b^6*E^(
2*b^2*x^2)*x^6*ExpIntegralEi[-2*b^2*x^2])/(90*E^(2*b^2*x^2)*Pi*x^6)
```

fricas [A] time = 0.64, size = 114, normalized size = 0.64

$$\frac{56\,b^6x^6\operatorname{Ei}\left(-2\,b^2x^2\right) - 4\,\sqrt{\pi}\left(4\,b^5x^5 - 2\,b^3x^3 + 3\,bx\right)\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)} - \left(15\,\pi + 8\,\pi b^6x^6\right)\operatorname{erf}(bx)^2 + 2\left(10\,b^4x^4 - 3\right.}{90\,\pi x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^7,x, algorithm="fricas")
```

```
[Out] 1/90*(56*b^6*x^6*Ei(-2*b^2*x^2) - 4*sqrt(pi)*(4*b^5*x^5 - 2*b^3*x^3 + 3*b*x
)*erf(b*x)*e^(-b^2*x^2) - (15*pi + 8*pi*b^6*x^6)*erf(b*x)^2 + 2*(10*b^4*x^4
 - 3*b^2*x^2)*e^(-2*b^2*x^2))/(pi*x^6)
```

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

$$\int \frac{\operatorname{erf}(bx)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^7,x, algorithm="giac")
[Out] integrate(erf(b*x)^2/x^7, x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^7,x)
[Out] int(erf(b*x)^2/x^7,x)
```

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

$$\frac{2\,b\int \frac{\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{x^6}\,dx}{3\,\sqrt{\pi}} - \frac{\operatorname{erf}(bx)^2}{6\,x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^7,x, algorithm="maxima")
[Out] 2/3*b*integrate(erf(b*x)*e^(-b^2*x^2)/x^6, x)/sqrt(pi) - 1/6*erf(b*x)^2/x^6
```

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

$$\int \frac{\operatorname{erf}(b\,x)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^7,x)
[Out] int(erf(b*x)^2/x^7, x)
```

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

$$\int \frac{\operatorname{erf}^2(bx)}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)**2/x**7,x)
```

```
[Out] Integral(erf(b*x)**2/x**7, x)
```

3.29 $\int x^4 \mathbf{erf}(bx)^2 \, dx$

Optimal. Leaf size=165

$$-\frac{43\text{erf}\left(\sqrt{2}\,bx\right)}{40\sqrt{2\pi}\,b^5}+\frac{2x^4e^{-b^2x^2}\text{erf}(bx)}{5\sqrt{\pi}\,b}+\frac{x^3e^{-2b^2x^2}}{5\pi b^2}+\frac{4e^{-b^2x^2}\text{erf}(bx)}{5\sqrt{\pi}\,b^5}+\frac{11xe^{-2b^2x^2}}{20\pi b^4}+\frac{4x^2e^{-b^2x^2}\text{erf}(bx)}{5\sqrt{\pi}\,b^3}+\frac{1}{5}x^5\text{erf}(bx)^2$$

```
[Out] 11/20*x/b^4/exp(2*b^2*x^2)/Pi+1/5*x^3/b^2/exp(2*b^2*x^2)/Pi+1/5*x^5*erf(b*x
)^2+4/5*erf(b*x)/b^5/exp(b^2*x^2)/Pi^(1/2)+4/5*x^2*erf(b*x)/b^3/exp(b^2*x^2
)/Pi^(1/2)+2/5*x^4*erf(b*x)/b/exp(b^2*x^2)/Pi^(1/2)-43/80*erf(b*x*2^(1/2))/
b^5*2^(1/2)/Pi^(1/2)
```

Rubi [A] time = 0.25, antiderivative size = 165, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.500$, Rules used = {6364, 6385, 6382, 2205, 2212}

$$\frac{2x^4e^{-b^2x^2}\text{Erf}(bx)}{5\sqrt{\pi}\,b}+\frac{4x^2e^{-b^2x^2}\text{Erf}(bx)}{5\sqrt{\pi}\,b^3}+\frac{4e^{-b^2x^2}\text{Erf}(bx)}{5\sqrt{\pi}\,b^5}-\frac{43\text{Erf}\left(\sqrt{2}\,bx\right)}{40\sqrt{2\pi}\,b^5}+\frac{x^3e^{-2b^2x^2}}{5\pi b^2}+\frac{11xe^{-2b^2x^2}}{20\pi b^4}+\frac{1}{5}x^5\text{Erf}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^4*Erf[b*x]^2,x]
```

```
[Out] (11*x)/(20*b^4*E^(2*b^2*x^2)*Pi) + x^3/(5*b^2*E^(2*b^2*x^2)*Pi) + (4*Erf[b*
x])/(5*b^5*E^(b^2*x^2)*Sqrt[Pi]) + (4*x^2*Erf[b*x])/(5*b^3*E^(b^2*x^2)*Sqrt
[Pi]) + (2*x^4*Erf[b*x])/(5*b*E^(b^2*x^2)*Sqrt[Pi]) + (x^5*Erf[b*x]^2)/5 -
(43*Erf[Sqrt[2]*b*x])/(40*b^5*Sqrt[2*Pi])
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$
\begin{aligned}
\int x^4\text{erf}(bx)^2\,dx &= \frac{1}{5}x^5\text{erf}(bx)^2-\frac{(4b)\int e^{-b^2x^2}x^5\text{erf}(bx)\,dx}{5\sqrt{\pi}}\\
&= \frac{2e^{-b^2x^2}x^4\text{erf}(bx)}{5b\sqrt{\pi}}+\frac{1}{5}x^5\text{erf}(bx)^2-\frac{4\int e^{-2b^2x^2}x^4\,dx}{5\pi}-\frac{8\int e^{-b^2x^2}x^3\text{erf}(bx)\,dx}{5b\sqrt{\pi}}\\
&= \frac{e^{-2b^2x^2}x^3}{5b^2\pi}+\frac{4e^{-b^2x^2}x^2\text{erf}(bx)}{5b^3\sqrt{\pi}}+\frac{2e^{-b^2x^2}x^4\text{erf}(bx)}{5b\sqrt{\pi}}+\frac{1}{5}x^5\text{erf}(bx)^2-\frac{3\int e^{-2b^2x^2}x^2\,dx}{5b^2\pi}-\frac{8\int e^{-2b}}{5b}\\
&= \frac{11e^{-2b^2x^2}x}{20b^4\pi}+\frac{e^{-2b^2x^2}x^3}{5b^2\pi}+\frac{4e^{-b^2x^2}\text{erf}(bx)}{5b^5\sqrt{\pi}}+\frac{4e^{-b^2x^2}x^2\text{erf}(bx)}{5b^3\sqrt{\pi}}+\frac{2e^{-b^2x^2}x^4\text{erf}(bx)}{5b\sqrt{\pi}}+\frac{1}{5}x^5\text{erf}(bx)\\
&= \frac{11e^{-2b^2x^2}x}{20b^4\pi}+\frac{e^{-2b^2x^2}x^3}{5b^2\pi}+\frac{4e^{-b^2x^2}\text{erf}(bx)}{5b^5\sqrt{\pi}}+\frac{4e^{-b^2x^2}x^2\text{erf}(bx)}{5b^3\sqrt{\pi}}+\frac{2e^{-b^2x^2}x^4\text{erf}(bx)}{5b\sqrt{\pi}}+\frac{1}{5}x^5\text{erf}(bx)
\end{aligned}
$$

Mathematica [A] time = 0.11, size = 106, normalized size = 0.64

$$\frac{16\pi b^5x^5\text{erf}(bx)^2+4bxe^{-2b^2x^2}\left(4b^2x^2+11\right)+32\sqrt{\pi}\,e^{-b^2x^2}\left(b^4x^4+2b^2x^2+2\right)\text{erf}(bx)-43\sqrt{2\pi}\,\text{erf}\left(\sqrt{2}\,bx\right)}{80\pi b^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*Erf[b*x]^2,x]
```

```
[Out] ((4*b*x*(11 + 4*b^2*x^2))/E^(2*b^2*x^2) + (32*Sqrt[Pi]*(2 + 2*b^2*x^2 + b^4
*x^4)*Erf[b*x])/E^(b^2*x^2) + 16*b^5*Pi*x^5*Erf[b*x]^2 - 43*Sqrt[2*Pi]*Erf[
Sqrt[2]*b*x])/(80*b^5*Pi)
```

fricas [A] time = 0.85, size = 111, normalized size = 0.67

$$\frac{16\,\pi b^6x^5\operatorname{erf}(bx)^2 + 32\,\sqrt{\pi}\left(b^5x^4 + 2\,b^3x^2 + 2\,b\right)\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)} - 43\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,\operatorname{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right) + 4\left(4\,b^4x^3 + 11\right.}{80\,\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erf(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/80*(16*pi*b^6*x^5*erf(b*x)^2 + 32*sqrt(pi)*(b^5*x^4 + 2*b^3*x^2 + 2*b)*er
f(b*x)*e^(-b^2*x^2) - 43*sqrt(2)*sqrt(pi)*sqrt(b^2)*erf(sqrt(2)*sqrt(b^2)*x
) + 4*(4*b^4*x^3 + 11*b^2*x)*e^(-2*b^2*x^2))/(pi*b^6)
```

giac [A] time = 0.38, size = 170, normalized size = 1.03

$$\frac{1}{5}\,x^5\operatorname{erf}(bx)^2 + \frac{b\left(\frac{32\left(b^4x^4+2\,b^2x^2+2\right)\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{b^6} + \frac{b^4\left(\frac{4\left(4\,b^2x^3+3\,x\right)e^{\left(-2\,b^2x^2\right)}}{b^4} + \frac{3\,\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b^5}\right) + 8\,b^2\left(\frac{4\,xe^{\left(-2\,b^2x^2\right)}}{b^2} + \frac{\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b^3}\right) + }{\sqrt{\pi}\,b^5}\right.}{80\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erf(b*x)^2,x, algorithm="giac")
```

```
[Out] 1/5*x^5*erf(b*x)^2 + 1/80*b*(32*(b^4*x^4 + 2*b^2*x^2 + 2)*erf(b*x)*e^(-b^2*
x^2)/b^6 + (b^4*(4*(4*b^2*x^3 + 3*x)*e^(-2*b^2*x^2)/b^4 + 3*sqrt(2)*sqrt(pi
)*erf(-sqrt(2)*b*x)/b^5) + 8*b^2*(4*x*e^(-2*b^2*x^2)/b^2 + sqrt(2)*sqrt(pi)
*erf(-sqrt(2)*b*x)/b^3) + 32*sqrt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b)/(sqrt(pi
)*b^5))/sqrt(pi)
```

maple [A] time = 0.01, size = 131, normalized size = 0.79

$$\frac{\frac{b^5x^5\operatorname{erf}(bx)^2}{5} - \frac{4\operatorname{erf}(bx)\left(-\frac{e^{-b^2x^2}b^4x^4}{2} - e^{-b^2x^2}b^2x^2 - e^{-b^2x^2}\right)}{5\sqrt{\pi}} + \frac{-\frac{43\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(bx\sqrt{2}\right)}{80} + \frac{11\,e^{-2b^2x^2}bx}{20} + \frac{e^{-2b^2x^2}b^3x^3}{5}}{\pi}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erf(b*x)^2,x)
```

```
[Out] 1/b^5*(1/5*b^5*x^5*erf(b*x)^2-4/5*erf(b*x)/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^4*
x^4-1/exp(b^2*x^2)*b^2*x^2-1/exp(b^2*x^2))+4/5/Pi*(-43/64*2^(1/2)*Pi^(1/2)*
erf(b*x*2^(1/2))+11/16/exp(b^2*x^2)^2*b*x+1/4/exp(b^2*x^2)^2*b^3*x^3))
```

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

$$-\frac{-\frac{1}{16}\,b^4\left(\frac{4\left(4\,b^2x^3+3\,x\right)e^{\left(-2\,b^2x^2\right)}}{b^4}-\frac{3\,\sqrt{2}\,\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{2}\,bx\right)}{b^5}\right)-\frac{1}{2}\,b^2\left(\frac{4\,xe^{\left(-2\,b^2x^2\right)}}{b^2}-\frac{\sqrt{2}\,\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{2}\,bx\right)}{b^3}\right)+\frac{2\,\sqrt{2}\,\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{2}\,bx\right)}{b}}{5\,\pi b^4}+\frac{\sqrt{\pi}\,b^5x^5}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erf(b*x)^2,x, algorithm="maxima")
```

```
[Out] -1/5*integrate(4*(b^4*x^4 + 2*b^2*x^2 + 2)*e^(-2*b^2*x^2), x)/(pi*b^4) + 1/
5*(sqrt(pi)*b^5*x^5*erf(b*x)^2 + 2*(b^4*x^4 + 2*b^2*x^2 + 2)*erf(b*x)*e^(-b
^2*x^2))/(sqrt(pi)*b^5)
```

mupad [B] time = 0.21, size = 131, normalized size = 0.79

$$\frac{x^5\,\mathrm{erf}\left(b\,x\right)^2}{5}+\frac{\frac{4\,\sqrt{\pi }\,{\mathrm{e}}^{-b^2\,x^2}\,\mathrm{erf}\left(b\,x\right)}{5}+\frac{b^3\,x^3\,{\mathrm{e}}^{-2\,b^2\,x^2}}{5}-\frac{43\,\sqrt{2}\,\sqrt{\pi }\,\mathrm{erf}\left(\sqrt{2}\,b\,x\right)}{80}+\frac{11\,b\,x\,{\mathrm{e}}^{-2\,b^2\,x^2}}{20}+\frac{4\,b^2\,x^2\,\sqrt{\pi }\,{\mathrm{e}}^{-b^2\,x^2}\,\mathrm{erf}\left(b\,x\right)}{5}+\frac{2\,b^4\,x^4\,\sqrt{\pi}}{}}{b^5\,\pi }$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erf(b*x)^2,x)
```

```
[Out] (x^5*erf(b*x)^2)/5 + ((4*pi^(1/2)*exp(-b^2*x^2)*erf(b*x))/5 + (b^3*x^3*exp(
-2*b^2*x^2))/5 - (43*2^(1/2)*pi^(1/2)*erf(2^(1/2)*b*x))/80 + (11*b*x*exp(-2
*b^2*x^2))/20 + (4*b^2*x^2*pi^(1/2)*exp(-b^2*x^2)*erf(b*x))/5 + (2*b^4*x^4*
pi^(1/2)*exp(-b^2*x^2)*erf(b*x))/5)/(b^5*pi)
```

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

$$\int x^4\,\mathrm{erf}^2\,(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*erf(b*x)**2,x)
```

```
[Out] Integral(x**4*erf(b*x)**2, x)
```

3.30 $\int x^2 \mathbf{erf}(bx)^2 \, dx$

Optimal. Leaf size=113

$$-\frac{5\operatorname{erf}\left(\sqrt{2}\,bx\right)}{6\sqrt{2\pi}\,b^3}+\frac{2x^2e^{-b^2x^2}\operatorname{erf}(bx)}{3\sqrt{\pi}\,b}+\frac{xe^{-2b^2x^2}}{3\pi b^2}+\frac{2e^{-b^2x^2}\operatorname{erf}(bx)}{3\sqrt{\pi}\,b^3}+\frac{1}{3}x^3\operatorname{erf}(bx)^2$$

```
[Out] 1/3*x/b^2/exp(2*b^2*x^2)/Pi+1/3*x^3*erf(b*x)^2+2/3*erf(b*x)/b^3/exp(b^2*x^2
)/Pi^(1/2)+2/3*x^2*erf(b*x)/b/exp(b^2*x^2)/Pi^(1/2)-5/12*erf(b*x*2^(1/2))/b
^3*2^(1/2)/Pi^(1/2)
```

Rubi [A] time = 0.14, antiderivative size = 113, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6364, 6385, 6382, 2205, 2212}

$$\frac{2x^2e^{-b^2x^2}\operatorname{Erf}(bx)}{3\sqrt{\pi}\,b}+\frac{2e^{-b^2x^2}\operatorname{Erf}(bx)}{3\sqrt{\pi}\,b^3}-\frac{5\operatorname{Erf}\left(\sqrt{2}\,bx\right)}{6\sqrt{2\pi}\,b^3}+\frac{xe^{-2b^2x^2}}{3\pi b^2}+\frac{1}{3}x^3\operatorname{Erf}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Erf[b*x]^2,x]
```

```
[Out] x/(3*b^2*E^(2*b^2*x^2)*Pi) + (2*Erf[b*x])/(3*b^3*E^(b^2*x^2)*Sqrt[Pi]) + (2
*x^2*Erf[b*x])/(3*b*E^(b^2*x^2)*Sqrt[Pi]) + (x^3*Erf[b*x]^2)/3 - (5*Erf[Sqr
t[2]*b*x])/(6*b^3*Sqrt[2*Pi])
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
```

```
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\begin{aligned}
\int x^2\text{erf}(bx)^2\,dx &= \frac{1}{3}x^3\text{erf}(bx)^2 - \frac{(4b)\int e^{-b^2x^2}x^3\text{erf}(bx)\,dx}{3\sqrt{\pi}}\\
&= \frac{2e^{-b^2x^2}x^2\text{erf}(bx)}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erf}(bx)^2 - \frac{4\int e^{-2b^2x^2}x^2\,dx}{3\pi} - \frac{4\int e^{-b^2x^2}x\text{erf}(bx)\,dx}{3b\sqrt{\pi}}\\
&= \frac{e^{-2b^2x^2}x}{3b^2\pi} + \frac{2e^{-b^2x^2}\text{erf}(bx)}{3b^3\sqrt{\pi}} + \frac{2e^{-b^2x^2}x^2\text{erf}(bx)}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erf}(bx)^2 - \frac{\int e^{-2b^2x^2}\,dx}{3b^2\pi} - \frac{4\int e^{-2b^2x^2}\,dx}{3b^2\pi}\\
&= \frac{e^{-2b^2x^2}x}{3b^2\pi} + \frac{2e^{-b^2x^2}\text{erf}(bx)}{3b^3\sqrt{\pi}} + \frac{2e^{-b^2x^2}x^2\text{erf}(bx)}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erf}(bx)^2 - \frac{\sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,bx\right)}{3b^3} - \frac{\text{erf}\left(\sqrt{2}\,bx\right)}{6b^3\sqrt{2\pi}}
\end{aligned}$$

Mathematica [A] time = 0.07, size = 88, normalized size = 0.78

$$\frac{4\pi b^3x^3\text{erf}(bx)^2 + 8\sqrt{\pi}\,e^{-b^2x^2}\left(b^2x^2+1\right)\text{erf}(bx) + 4bxe^{-2b^2x^2} - 5\sqrt{2\pi}\,\text{erf}\left(\sqrt{2}\,bx\right)}{12\pi b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*Erf[b*x]^2,x]
```

```
[Out] ((4*b*x)/E^(2*b^2*x^2) + (8*Sqrt[Pi]*(1 + b^2*x^2)*Erf[b*x])/E^(b^2*x^2) +
4*b^3*Pi*x^3*Erf[b*x]^2 - 5*Sqrt[2*Pi]*Erf[Sqrt[2]*b*x])/(12*b^3*Pi)
```

fricas [A] time = 1.11, size = 90, normalized size = 0.80

$$\frac{4\,\pi b^4x^3\,\mathrm{erf}\,(bx)^2+4\,b^2xe^{\left(-2\,b^2x^2\right)}+8\,\sqrt{\pi}\left(b^3x^2+b\right)\mathrm{erf}\,(bx)\,e^{\left(-b^2x^2\right)}-5\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,\,\mathrm{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)}{12\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erf(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/12*(4*pi*b^4*x^3*erf(b*x)^2 + 4*b^2*x*e^(-2*b^2*x^2) + 8*sqrt(pi)*(b^3*x^
2 + b)*erf(b*x)*e^(-b^2*x^2) - 5*sqrt(2)*sqrt(pi)*sqrt(b^2)*erf(sqrt(2)*sqr
t(b^2)*x))/(pi*b^4)
```

giac [A] time = 0.23, size = 111, normalized size = 0.98

$$\frac{1}{3}\,x^3\,\mathrm{erf}\,(bx)^2+\frac{b\left(\frac{8\left(b^2x^2+1\right)\mathrm{erf}(bx)e^{\left(-b^2x^2\right)}}{b^4}+\frac{b^2\left(\frac{4\,xe^{\left(-2\,b^2x^2\right)}}{b^2}+\frac{\sqrt{2}\,\sqrt{\pi}\,\mathrm{erf}\left(-\sqrt{2}\,bx\right)}{b^3}\right)+\frac{4\,\sqrt{2}\,\sqrt{\pi}\,\mathrm{erf}\left(-\sqrt{2}\,bx\right)}{b}}{\sqrt{\pi}\,b^3}\right)}{12\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erf(b*x)^2,x, algorithm="giac")
```

```
[Out] 1/3*x^3*erf(b*x)^2 + 1/12*b*(8*(b^2*x^2 + 1)*erf(b*x)*e^(-b^2*x^2)/b^4 + (b
^2*(4*x*e^(-2*b^2*x^2)/b^2 + sqrt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b^3) + 4*sq
rt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b)/(sqrt(pi)*b^3))/sqrt(pi)
```

maple [A] time = 0.00, size = 95, normalized size = 0.84

$$\frac{\frac{b^3x^3\,\mathrm{erf}(bx)^2}{3}-\frac{4\,\mathrm{erf}(bx)\left(-\frac{\mathrm{e}^{-b^2x^2}b^2x^2}{2}-\frac{\mathrm{e}^{-b^2x^2}}{2}\right)}{3\sqrt{\pi}}+\frac{-\frac{5\sqrt{2}\,\sqrt{\pi}\,\mathrm{erf}\left(bx\sqrt{2}\right)}{12}+\frac{\mathrm{e}^{-2b^2x^2}bx}{3}}{\pi}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erf(b*x)^2,x)
```

```
[Out] 1/b^3*(1/3*b^3*x^3*erf(b*x)^2-4/3*erf(b*x)/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^2*
x^2-1/2/exp(b^2*x^2))+4/3/Pi*(-5/16*2^(1/2)*Pi^(1/2)*erf(b*x*2^(1/2))+1/4/e
xp(b^2*x^2)^2*b*x))
```

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

$$-\frac{-\frac{1}{4}\,b^2\left(\frac{4\,xe^{\left(-2\,b^2x^2\right)}}{b^2}-\frac{\sqrt{2}\,\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{2}\,bx\right)}{b^3}\right)+\frac{\sqrt{2}\,\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{2}\,bx\right)}{b}}{3\,\pi b^2}+\frac{\pi b^3x^3\,\mathrm{erf}\,(bx)^2+2\left(\sqrt{\pi}\,b^2x^2+\sqrt{\pi}\right)\mathrm{erf}\,(bx)\,e^{\left(-b^2x^2\right)}}{3\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erf(b*x)^2,x, algorithm="maxima")
```

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

mupad [B] time = 0.17, size = 90, normalized size = 0.80

$$\frac{x^3\,\mathrm{erf}\left(b\,x\right)^2}{3}+\frac{\frac{2\,\sqrt{\pi}\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erf}(b\,x)}{3}-\frac{5\,\sqrt{2}\,\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{2}\,b\,x\right)}{12}+\frac{b\,x\,\mathrm{e}^{-2\,b^2\,x^2}}{3}+\frac{2\,b^2\,x^2\,\sqrt{\pi}\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erf}(b\,x)}{3}}{b^3\,\pi}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erf(b*x)^2,x)
```

```
[Out] (x^3*erf(b*x)^2)/3 + ((2*pi^(1/2)*exp(-b^2*x^2)*erf(b*x))/3 - (5*2^(1/2)*pi
^(1/2)*erf(2^(1/2)*b*x))/12 + (b*x*exp(-2*b^2*x^2))/3 + (2*b^2*x^2*pi^(1/2)
*exp(-b^2*x^2)*erf(b*x))/3)/(b^3*pi)
```

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

$$\int x^{2}\,\mathrm{erf}^{2}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erf(b*x)**2,x)
```

```
[Out] Integral(x**2*erf(b*x)**2, x)
```

3.31 $\int \text{erf}(bx)^2\, dx$

Optimal. Leaf size=56

$$\frac{2e^{-b^2x^2}\text{erf}(bx)}{\sqrt{\pi}\, b}+x\text{erf}(bx)^2-\frac{\sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\, bx\right)}{b}$$

[Out] x*erf(b*x)^2-erf(b*x*2^(1/2))*2^(1/2)/Pi^(1/2)/b+2*erf(b*x)/b/exp(b^2*x^2)/Pi^(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 = 4, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {6352, 12, 6382, 2205}

$$\frac{2e^{-b^2x^2}\text{Erf}(bx)}{\sqrt{\pi}\, b}+x\text{Erf}(bx)^2-\frac{\sqrt{\frac{2}{\pi}}\,\text{Erf}\left(\sqrt{2}\, bx\right)}{b}$$

Antiderivative was successfully verified.

[In] Int[Erf[b*x]^2,x]

[Out] (2*Erf[b*x])/(b*E^(b^2*x^2)*Sqrt[Pi]) + x*Erf[b*x]^2 - (Sqrt[2/Pi]*Erf[Sqrt[2]*b*x])/b

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] && !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 6352

```
Int[Erf[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erf[a + b*x]^2)
/b, x] - Dist[4/Sqrt[Pi], Int[((a + b*x)*Erf[a + b*x])/E^(a + b*x)^2, x], x
] /; FreeQ[{a, b}, x]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
```

```
+ c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erf}(bx)^2\,dx &= x\operatorname{erf}(bx)^2-\frac{4\int be^{-b^2x^2}x\operatorname{erf}(bx)\,dx}{\sqrt{\pi}}\\ &= x\operatorname{erf}(bx)^2-\frac{(4b)\int e^{-b^2x^2}x\operatorname{erf}(bx)\,dx}{\sqrt{\pi}}\\ &= \frac{2e^{-b^2x^2}\operatorname{erf}(bx)}{b\sqrt{\pi}}+x\operatorname{erf}(bx)^2-\frac{4\int e^{-2b^2x^2}\,dx}{\pi}\\ &= \frac{2e^{-b^2x^2}\operatorname{erf}(bx)}{b\sqrt{\pi}}+x\operatorname{erf}(bx)^2-\frac{\sqrt{\frac{2}{\pi}}\operatorname{erf}\left(\sqrt{2}\,bx\right)}{b}\end{aligned}$$

Mathematica [A] time = 0.03, size = 56, normalized size = 1.00

$$\frac{2e^{-b^2x^2}\operatorname{erf}(bx)}{\sqrt{\pi}\,b}+x\operatorname{erf}(bx)^2-\frac{\sqrt{\frac{2}{\pi}}\operatorname{erf}\left(\sqrt{2}\,bx\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]^2,x]
```

```
[Out] (2*Erf[b*x])/(b*E^(b^2*x^2)*Sqrt[Pi]) + x*Erf[b*x]^2 - (Sqrt[2/Pi]*Erf[Sqrt
[2]*b*x])/b
```

fricas [A] time = 0.82, size = 63, normalized size = 1.12

$$\frac{\pi b^2 x\operatorname{erf}(bx)^2+2\sqrt{\pi}\,b\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)}-\sqrt{2}\sqrt{\pi}\sqrt{b^2}\operatorname{erf}\left(\sqrt{2}\sqrt{b^2}\,x\right)}{\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2,x, algorithm="fricas")
```

```
[Out] (pi*b^2*x*erf(b*x)^2 + 2*sqrt(pi)*b*erf(b*x)*e^(-b^2*x^2) - sqrt(2)*sqrt(pi
)*sqrt(b^2)*erf(sqrt(2)*sqrt(b^2)*x))/(pi*b^2)
```

giac [A] time = 0.30, size = 48, normalized size = 0.86

$$x \operatorname{erf}(bx)^2 + \frac{b\left(\frac{2 \operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{b^2} + \frac{\sqrt{2} \operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b^2}\right)}{\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2,x, algorithm="giac")
```

```
[Out] x*erf(b*x)^2 + b*(2*erf(b*x)*e^(-b^2*x^2)/b^2 + sqrt(2)*erf(-sqrt(2)*b*x)/b
^2)/sqrt(pi)
```

maple [A] time = 0.01, size = 48, normalized size = 0.86

$$\frac{bx \operatorname{erf}(bx)^2 + \frac{2 \operatorname{erf}(bx)e^{-b^2x^2}}{\sqrt{\pi}} - \frac{\sqrt{2} \operatorname{erf}\left(bx\sqrt{2}\right)}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2,x)
```

```
[Out] 1/b*(b*x*erf(b*x)^2+2*erf(b*x)/Pi^(1/2)*exp(-b^2*x^2)-1/Pi^(1/2)*2^(1/2)*er
f(b*x*2^(1/2)))
```

maxima [A] time = 0.58, size = 62, normalized size = 1.11

$$\frac{\left(\sqrt{\pi}\,bx \operatorname{erf}(bx)^2 e^{\left(b^2x^2\right)} + 2 \operatorname{erf}(bx)\right)e^{\left(-b^2x^2\right)}}{\sqrt{\pi}\,b} - \frac{\sqrt{2} \operatorname{erf}\left(\sqrt{2}\,bx\right)}{\sqrt{\pi}\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2,x, algorithm="maxima")
```

```
[Out] (sqrt(pi)*b*x*erf(b*x)^2*e^(b^2*x^2) + 2*erf(b*x))*e^(-b^2*x^2)/(sqrt(pi)*b
) - sqrt(2)*erf(sqrt(2)*b*x)/(sqrt(pi)*b)
```

mupad [B] time = 0.16, size = 44, normalized size = 0.79

$$x \operatorname{erf}(b\,x)^2 + \frac{2\,e^{-b^2\,x^2} \operatorname{erf}(b\,x) - \sqrt{2} \operatorname{erf}\left(\sqrt{2}\,b\,x\right)}{b\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2,x)
```

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

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

$$\int \operatorname{erf}^2(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)**2,x)
```

```
[Out] Integral(erf(b*x)**2, x)
```

3.32 $\int \frac{\text{erf}(bx)^2}{x^2} \, dx$

Optimal. Leaf size=13

$$\text{Int}\left(\frac{\text{erf}(bx)^2}{x^2}, x\right)$$

```
[Out] Unintegrable(erf(b*x)^2/x^2,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erf}(bx)^2}{x^2} \, dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[b*x]^2/x^2,x]
```

```
[Out] Defer[Int][Erf[b*x]^2/x^2, x]
```

Rubi steps

$$\int \frac{\text{erf}(bx)^2}{x^2} \, dx = \int \frac{\text{erf}(bx)^2}{x^2} \, dx$$

Mathematica [A] time = 0.04, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(bx)^2}{x^2} \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erf[b*x]^2/x^2,x]
```

```
[Out] Integrate[Erf[b*x]^2/x^2, x]
```

fricas [A] time = 0.64, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx)^2}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^2,x, algorithm="fricas")
[Out] integral(erf(b*x)^2/x^2, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^2,x)
[Out] int(erf(b*x)^2/x^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{4\,b\int \frac{\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{x}\,dx}{\sqrt{\pi}} - \frac{\operatorname{erf}(bx)^2}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^2,x, algorithm="maxima")
[Out] 4*b*integrate(erf(b*x)*e^(-b^2*x^2)/x, x)/sqrt(pi) - erf(b*x)^2/x
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erf}(b\,x)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^2,x)
[Out] int(erf(b*x)^2/x^2, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}^2(bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)**2/x**2,x)
```

```
[Out] Integral(erf(b*x)**2/x**2, x)
```

3.33 $\int \frac{\mathrm{erf}(bx)^2}{x^4}\,dx$

Optimal. Leaf size=13

$$\mathrm{Int}\left(\frac{\mathrm{erf}(bx)^2}{x^4},x\right)$$

```
[Out] Unintegrable(erf(b*x)^2/x^4,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\mathrm{Erf}(bx)^2}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[b*x]^2/x^4,x]
[Out] Defer[Int][Erf[b*x]^2/x^4, x]
```

Rubi steps

$$\int \frac{\mathrm{erf}(bx)^2}{x^4}\,dx = \int \frac{\mathrm{erf}(bx)^2}{x^4}\,dx$$

Mathematica [A] time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erf}(bx)^2}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erf[b*x]^2/x^4,x]
[Out] Integrate[Erf[b*x]^2/x^4, x]
```

fricas [A] time = 0.65, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{erf}\,(bx)^2}{x^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^4,x, algorithm="fricas")
[Out] integral(erf(b*x)^2/x^4, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^4,x, algorithm="giac")
[Out] integrate(erf(b*x)^2/x^4, x)
```

maple [A] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^4,x)
[Out] int(erf(b*x)^2/x^4,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{4\,b\int \frac{\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{x^3}\,dx}{3\,\sqrt{\pi}} - \frac{\operatorname{erf}(bx)^2}{3\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^4,x, algorithm="maxima")
[Out] 4/3*b*integrate(erf(b*x)*e^(-b^2*x^2)/x^3, x)/sqrt(pi) - 1/3*erf(b*x)^2/x^3
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erf}(b\,x)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^4,x)
[Out] int(erf(b*x)^2/x^4, x)
```

<u>**sympy**</u> **[A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}^2(bx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)**2/x**4,x)
```

```
[Out] Integral(erf(b*x)**2/x**4, x)
```

3.34 $\int \frac{\operatorname{erf}(bx)^2}{x^6}\,dx$

Optimal. Leaf size=13

$$\operatorname{Int}\left(\frac{\operatorname{erf}(bx)^2}{x^6},x\right)$$

```
[Out] Unintegrable(erf(b*x)^2/x^6,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\operatorname{Erf}(bx)^2}{x^6}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[b*x]^2/x^6,x]
```

```
[Out] Defer[Int][Erf[b*x]^2/x^6, x]
```

Rubi steps

$$\int \frac{\operatorname{erf}(bx)^2}{x^6}\,dx = \int \frac{\operatorname{erf}(bx)^2}{x^6}\,dx$$

Mathematica [A] time = 0.04, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)^2}{x^6}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erf[b*x]^2/x^6,x]
```

```
[Out] Integrate[Erf[b*x]^2/x^6, x]
```

fricas [A] time = 0.62, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erf}(bx)^2}{x^6},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^6,x, algorithm="fricas")
[Out] integral(erf(b*x)^2/x^6, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^6,x, algorithm="giac")
[Out] integrate(erf(b*x)^2/x^6, x)
```

maple [A] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^6,x)
[Out] int(erf(b*x)^2/x^6,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{4\,b\int \frac{\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{x^5}\,dx}{5\,\sqrt{\pi}} - \frac{\operatorname{erf}(bx)^2}{5\,x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)^2/x^6,x, algorithm="maxima")
[Out] 4/5*b*integrate(erf(b*x)*e^(-b^2*x^2)/x^5, x)/sqrt(pi) - 1/5*erf(b*x)^2/x^5
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erf}(b\,x)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)^2/x^6,x)
[Out] int(erf(b*x)^2/x^6, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}^2(bx)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)**2/x**6,x)
```

```
[Out] Integral(erf(b*x)**2/x**6, x)
```

3.35 $\int (c+dx)^2 \mathbf{erf}(a+bx)^2\, dx$

Optimal. Leaf size=375

$$\frac{d(a+bx)^2(bc-ad)\text{erf}(a+bx)^2}{b^3}+\frac{(a+bx)(bc-ad)^2\text{erf}(a+bx)^2}{b^3}+\frac{2de^{-(a+bx)^2}(a+bx)(bc-ad)\text{erf}(a+bx)}{\sqrt{\pi}\,b^3}-\frac{d(bc-$$

```
[Out] d*(-a*d+b*c)/b^3/exp(2*(b*x+a)^2)/Pi+1/3*d^2*(b*x+a)/b^3/exp(2*(b*x+a)^2)/P
i-1/2*d*(-a*d+b*c)*erf(b*x+a)^2/b^3+(-a*d+b*c)^2*(b*x+a)*erf(b*x+a)^2/b^3+d
*(-a*d+b*c)*(b*x+a)^2*erf(b*x+a)^2/b^3+1/3*d^2*(b*x+a)^3*erf(b*x+a)^2/b^3-(
-a*d+b*c)^2*erf((b*x+a)*2^(1/2))*2^(1/2)/Pi^(1/2)/b^3+2/3*d^2*erf(b*x+a)/b^
3/exp((b*x+a)^2)/Pi^(1/2)+2*(-a*d+b*c)^2*erf(b*x+a)/b^3/exp((b*x+a)^2)/Pi^(
1/2)+2*d*(-a*d+b*c)*(b*x+a)*erf(b*x+a)/b^3/exp((b*x+a)^2)/Pi^(1/2)+2/3*d^2*
(b*x+a)^2*erf(b*x+a)/b^3/exp((b*x+a)^2)/Pi^(1/2)-5/12*d^2*erf((b*x+a)*2^(1/
2))/b^3*2^(1/2)/Pi^(1/2)
```

Rubi [A] time = 0.42, antiderivative size = 375, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 10, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {6367, 6352, 6382, 2205, 6364, 6385, 6373, 30, 2209, 2212}

$$\frac{d(a+bx)^2(bc-ad)\text{Erf}(a+bx)^2}{b^3}+\frac{(a+bx)(bc-ad)^2\text{Erf}(a+bx)^2}{b^3}+\frac{2de^{-(a+bx)^2}(a+bx)(bc-ad)\text{Erf}(a+bx)}{\sqrt{\pi}\,b^3}-\frac{d(bc$$

Antiderivative was successfully verified.

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

```
[Out] (d*(b*c - a*d))/(b^3*E^(2*(a + b*x)^2)*Pi) + (d^2*(a + b*x))/(3*b^3*E^(2*(a
 + b*x)^2)*Pi) + (2*d^2*Erf[a + b*x])/(3*b^3*E^(a + b*x)^2*Sqrt[Pi]) + (2*(
b*c - a*d)^2*Erf[a + b*x])/(b^3*E^(a + b*x)^2*Sqrt[Pi]) + (2*d*(b*c - a*d)*
(a + b*x)*Erf[a + b*x])/(b^3*E^(a + b*x)^2*Sqrt[Pi]) + (2*d^2*(a + b*x)^2*E
rf[a + b*x])/(3*b^3*E^(a + b*x)^2*Sqrt[Pi]) - (d*(b*c - a*d)*Erf[a + b*x]^2
)/(2*b^3) + ((b*c - a*d)^2*(a + b*x)*Erf[a + b*x]^2)/b^3 + (d*(b*c - a*d)*(
a + b*x)^2*Erf[a + b*x]^2)/b^3 + (d^2*(a + b*x)^3*Erf[a + b*x]^2)/(3*b^3) -
 ((b*c - a*d)^2*Sqrt[2/Pi]*Erf[Sqrt[2]*(a + b*x)])/b^3 - (5*d^2*Erf[Sqrt[2]
*(a + b*x)])/(6*b^3*Sqrt[2*Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6352

```
Int[Erf[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erf[a + b*x]^2)
/b, x] - Dist[4/Sqrt[Pi], Int[((a + b*x)*Erf[a + b*x])/E^(a + b*x)^2, x], x
] /; FreeQ[{a, b}, x]
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6367

```
Int[Erf[(a_) + (b_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Dist[
1/b^(m + 1), Subst[Int[ExpandIntegrand[Erf[x]^2, (b*c - a*d + d*x)^m, x], x
], x, a + b*x], x] /; FreeQ[{a, b, c, d}, x] && IGtQ[m, 0]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\int (c+dx)^2\operatorname{erf}(a+bx)^2\,dx = \frac{\operatorname{Subst}\left(\int \left(b^2c^2\left(1+\frac{ad(-2bc+ad)}{b^2c^2}\right)\operatorname{erf}(x)^2+2bcd\left(1-\frac{ad}{bc}\right)x\operatorname{erf}(x)^2+d^2x^2\operatorname{erf}(x)^2\right)\,dx$$

$$\qquad\qquad = \frac{d^2\operatorname{Subst}\left(\int x^2\operatorname{erf}(x)^2\,dx,x,a+bx\right)}{b^3}+\frac{(2d(bc-ad))\operatorname{Subst}\left(\int x\operatorname{erf}(x)^2\,dx,x,a+b\right.}{b^3}$$

$$\qquad\qquad = \frac{(bc-ad)^2(a+bx)\operatorname{erf}(a+bx)^2}{b^3}+\frac{d(bc-ad)(a+bx)^2\operatorname{erf}(a+bx)^2}{b^3}+\frac{d^2(a+bx)^3\operatorname{er}}{3b^3}$$

$$\qquad\qquad = \frac{2(bc-ad)^2e^{-(a+bx)^2}\operatorname{erf}(a+bx)}{b^3\sqrt{\pi}}+\frac{2d(bc-ad)e^{-(a+bx)^2}(a+bx)\operatorname{erf}(a+bx)}{b^3\sqrt{\pi}}+\frac{2d^2e^{-(}}{}$$

$$\qquad\qquad = \frac{d(bc-ad)e^{-2(a+bx)^2}}{b^3\pi}+\frac{d^2e^{-2(a+bx)^2}(a+bx)}{3b^3\pi}+\frac{2d^2e^{-(a+bx)^2}\operatorname{erf}(a+bx)}{3b^3\sqrt{\pi}}+\frac{2(bc-ad)^2}{}$$

$$\qquad\qquad = \frac{d(bc-ad)e^{-2(a+bx)^2}}{b^3\pi}+\frac{d^2e^{-2(a+bx)^2}(a+bx)}{3b^3\pi}+\frac{2d^2e^{-(a+bx)^2}\operatorname{erf}(a+bx)}{3b^3\sqrt{\pi}}+\frac{2(bc-ad)^2}{}$$

Mathematica [A] time = 1.10, size = 226, normalized size = 0.60

$$\frac{\frac{8e^{-(a+bx)^2}\operatorname{erf}(a+bx)\left(\left(a^2+1\right)d^2-abd(3c+dx)+b^2\left(3c^2+3cdx+d^2x^2\right)\right)}{\sqrt{\pi}}-\sqrt{\frac{2}{\pi}}\left(\left(12a^2+5\right)d^2-24abcd+12b^2c^2\right)\operatorname{erf}\left(\sqrt{2}\,(a+bx)\right)+}{12b}$$

Antiderivative was successfully verified.

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

```
[Out] ((4*d*(3*b*c - 2*a*d + b*d*x))/(E^(2*(a + b*x)^2)*Pi) + (8*((1 + a^2)*d^2 -
 a*b*d*(3*c + d*x) + b^2*(3*c^2 + 3*c*d*x + d^2*x^2))*Erf[a + b*x])/(E^(a +
 b*x)^2*Sqrt[Pi]) + 2*(-3*b*c*d - 6*a^2*b*c*d + 2*a^3*d^2 + 3*a*(2*b^2*c^2
+ d^2) + 2*b^3*x*(3*c^2 + 3*c*d*x + d^2*x^2))*Erf[a + b*x]^2 - (12*b^2*c^2
- 24*a*b*c*d + (5 + 12*a^2)*d^2)*Sqrt[2/Pi]*Erf[Sqrt[2]*(a + b*x)])/(12*b^3
)
```

fricas [A] time = 0.86, size = 281, normalized size = 0.75

$$-\frac{\sqrt{2}\,\sqrt{\pi}\left(12\,b^{2}c^{2}-24\,abcd+\left(12\,a^{2}+5\right)d^{2}\right)\sqrt{b^{2}}\,\operatorname{erf}\left(\frac{\sqrt{2}\,\sqrt{b^{2}}\,(bx+a)}{b}\right)-8\,\sqrt{\pi}\left(b^{3}d^{2}x^{2}+3\,b^{3}c^{2}-3\,ab^{2}cd+\left(a^{2}+1\right)b\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/12*(sqrt(2)*sqrt(pi)*(12*b^2*c^2 - 24*a*b*c*d + (12*a^2 + 5)*d^2)*sqrt(b
^2)*erf(sqrt(2)*sqrt(b^2)*(b*x + a)/b) - 8*sqrt(pi)*(b^3*d^2*x^2 + 3*b^3*c^
2 - 3*a*b^2*c*d + (a^2 + 1)*b*d^2 + (3*b^3*c*d - a*b^2*d^2)*x)*erf(b*x + a)
*e^(-b^2*x^2 - 2*a*b*x - a^2) - 2*(2*pi*b^4*d^2*x^3 + 6*pi*b^4*c*d*x^2 + 6*
pi*b^4*c^2*x + pi*(6*a*b^3*c^2 - 3*(2*a^2 + 1)*b^2*c*d + (2*a^3 + 3*a)*b*d^
2))*erf(b*x + a)^2 - 4*(b^2*d^2*x + 3*b^2*c*d - 2*a*b*d^2)*e^(-2*b^2*x^2 -
4*a*b*x - 2*a^2))/(pi*b^4)
```

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

$$\int (dx+c)^{2} \operatorname{erf}(bx+a)^{2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int (dx+c)^{2} \operatorname{erf}(bx+a)^{2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\frac{1}{3}\left(d^2x^3 + 3\,cdx^2 + 3\,c^2x\right)\operatorname{erf}\left(bx + a\right)^2 - \frac{4\int\left(bd^2x^3 + 3\,bcdx^2 + 3\,bc^2x\right)\operatorname{erf}\left(bx + a\right)e^{\left(-b^2x^2 - 2\,abx - a^2\right)}\,dx}{3\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 0.44, size = 359, normalized size = 0.96

$$\frac{\operatorname{erf}\left(a + b\,x\right)^2\,\left(\frac{a\,d^2}{2} - b\,\left(c\,d\,a^2 + \frac{c\,d}{2}\right) + \frac{a^3\,d^2}{3} + a\,b^2\,c^2\right)}{b^3} + c^2\,x\operatorname{erf}\left(a + b\,x\right)^2 + \frac{d^2\,x^3\operatorname{erf}\left(a + b\,x\right)^2}{3} - \frac{\mathrm{e}^{-2\,a^2 - 4\,a\,b\,x - 2\,b^2\,x^2}}{3\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (erf(a + b*x)^2*((a*d^2)/2 - b*((c*d)/2 + a^2*c*d) + (a^3*d^2)/3 + a*b^2*c^
2))/b^3 + c^2*x*erf(a + b*x)^2 + (d^2*x^3*erf(a + b*x)^2)/3 - (exp(- 2*a^2
- 2*b^2*x^2 - 4*a*b*x)*(2*a*d^2 - 3*b*c*d))/(3*b^3*pi) + c*d*x^2*erf(a + b*
x)^2 + (2*erf(a + b*x)*exp(- a^2 - b^2*x^2 - 2*a*b*x)*(d^2 + a^2*d^2 + 3*b^
2*c^2 - 3*a*b*c*d))/(3*b^3*pi^(1/2)) - (2^(1/2)*erf(2^(1/2)*(a + b*x))*(5*d
^2 + 12*a^2*d^2 + 12*b^2*c^2 - 24*a*b*c*d))/(12*b^3*pi^(1/2)) + (d^2*x*exp(
- 2*a^2 - 2*b^2*x^2 - 4*a*b*x))/(3*b^2*pi) + (2*d^2*x^2*erf(a + b*x)*exp(-
a^2 - b^2*x^2 - 2*a*b*x))/(3*b*pi^(1/2)) - (2*x*erf(a + b*x)*exp(- a^2 - b^
2*x^2 - 2*a*b*x)*(a*d^2 - 3*b*c*d))/(3*b^2*pi^(1/2))
```

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

$$\int\left(c + dx\right)^2\operatorname{erf}^2\left(a + bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.36 $\int (c + dx)\mathbf{erf}(a + bx)^2\, dx$

Optimal. Leaf size=188

$$\frac{(a+bx)(bc-ad)\text{erf}(a+bx)^2}{b^2}+\frac{2e^{-(a+bx)^2}(bc-ad)\text{erf}(a+bx)}{\sqrt{\pi}\,b^2}-\frac{\sqrt{\frac{2}{\pi}}\,(bc-ad)\text{erf}\left(\sqrt{2}\,(a+bx)\right)}{b^2}+\frac{d(a+bx)^2\text{erf}(a+}{2b^2}$$

```
[Out] 1/2*d/b^2/exp(2*(b*x+a)^2)/Pi-1/4*d*erf(b*x+a)^2/b^2+(-a*d+b*c)*(b*x+a)*erf
(b*x+a)^2/b^2+1/2*d*(b*x+a)^2*erf(b*x+a)^2/b^2-(-a*d+b*c)*erf((b*x+a)*2^(1/
2))*2^(1/2)/Pi^(1/2)/b^2+2*(-a*d+b*c)*erf(b*x+a)/b^2/exp((b*x+a)^2)/Pi^(1/2
)+d*(b*x+a)*erf(b*x+a)/b^2/exp((b*x+a)^2)/Pi^(1/2)
```

Rubi [A] time = 0.18, antiderivative size = 188, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 9, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.643, Rules used = {6367, 6352, 6382, 2205, 6364, 6385, 6373, 30, 2209}

$$\frac{(a+bx)(bc-ad)\text{Erf}(a+bx)^2}{b^2}+\frac{2e^{-(a+bx)^2}(bc-ad)\text{Erf}(a+bx)}{\sqrt{\pi}\,b^2}-\frac{\sqrt{\frac{2}{\pi}}\,(bc-ad)\text{Erf}\left(\sqrt{2}\,(a+bx)\right)}{b^2}+\frac{d(a+bx)^2\text{Erf}(a-}{2b^2}$$

Antiderivative was successfully verified.

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

```
[Out] d/(2*b^2*E^(2*(a + b*x)^2)*Pi) + (2*(b*c - a*d)*Erf[a + b*x])/(b^2*E^(a + b
*x)^2*Sqrt[Pi]) + (d*(a + b*x)*Erf[a + b*x])/(b^2*E^(a + b*x)^2*Sqrt[Pi]) -
 (d*Erf[a + b*x]^2)/(4*b^2) + ((b*c - a*d)*(a + b*x)*Erf[a + b*x]^2)/b^2 +
(d*(a + b*x)^2*Erf[a + b*x]^2)/(2*b^2) - ((b*c - a*d)*Sqrt[2/Pi]*Erf[Sqrt[2
]*(a + b*x)])/b^2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
```

```
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 6352

```
Int[Erf[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erf[a + b*x]^2)
/b, x] - Dist[4/Sqrt[Pi], Int[((a + b*x)*Erf[a + b*x])/E^(a + b*x)^2, x], x
] /; FreeQ[{a, b}, x]
```

Rule 6364

```
Int[Erf[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erf[b*x]^2)/
(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erf[b*x])/E^(b^
2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6367

```
Int[Erf[(a_) + (b_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Dist[
1/b^(m + 1), Subst[Int[ExpandIntegrand[Erf[x]^2, (b*c - a*d + d*x)^m, x], x
], x, a + b*x], x] /; FreeQ[{a, b, c, d}, x] && IGtQ[m, 0]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\int (c+dx)\text{erf}(a+bx)^2\,dx = \frac{\text{Subst}\left(\int \left(bc\left(1-\frac{ad}{bc}\right)\text{erf}(x)^2 + dx\text{erf}(x)^2\right)dx, x, a+bx\right)}{b^2}$$
$$= \frac{d\,\text{Subst}\left(\int x\text{erf}(x)^2\,dx, x, a+bx\right)}{b^2} + \frac{(bc-ad)\,\text{Subst}\left(\int \text{erf}(x)^2\,dx, x, a+bx\right)}{b^2}$$
$$= \frac{(bc-ad)(a+bx)\text{erf}(a+bx)^2}{b^2} + \frac{d(a+bx)^2\text{erf}(a+bx)^2}{2b^2} - \frac{(2d)\,\text{Subst}\left(\int e^{-x^2}x^2\text{erf}(x)\right.}{b^2\sqrt{\pi}}$$
$$= \frac{2(bc-ad)e^{-(a+bx)^2}\text{erf}(a+bx)}{b^2\sqrt{\pi}} + \frac{de^{-(a+bx)^2}(a+bx)\text{erf}(a+bx)}{b^2\sqrt{\pi}} + \frac{(bc-ad)(a+bx)\text{erf}}{b^2}$$
$$= \frac{de^{-2(a+bx)^2}}{2b^2\pi} + \frac{2(bc-ad)e^{-(a+bx)^2}\text{erf}(a+bx)}{b^2\sqrt{\pi}} + \frac{de^{-(a+bx)^2}(a+bx)\text{erf}(a+bx)}{b^2\sqrt{\pi}} + \frac{(bc-a}{}$$
$$= \frac{de^{-2(a+bx)^2}}{2b^2\pi} + \frac{2(bc-ad)e^{-(a+bx)^2}\text{erf}(a+bx)}{b^2\sqrt{\pi}} + \frac{de^{-(a+bx)^2}(a+bx)\text{erf}(a+bx)}{b^2\sqrt{\pi}} - \frac{d\text{erf}(a}{4b}$$

Mathematica [A] time = 0.40, size = 132, normalized size = 0.70

$$\frac{\pi\text{erf}(a+bx)^2\left(-2a^2d+4abc+4b^2cx+2b^2dx^2-d\right)+4\sqrt{\pi}\,e^{-(a+bx)^2}\text{erf}(a+bx)(-ad+2bc+bdx)+4\sqrt{2\pi}\,(ad-b}{4\pi b^2}$$

Antiderivative was successfully verified.

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

```
[Out] ((2*d)/E^(2*(a + b*x)^2) + (4*Sqrt[Pi]*(2*b*c - a*d + b*d*x)*Erf[a + b*x])/
E^(a + b*x)^2 + Pi*(4*a*b*c - d - 2*a^2*d + 4*b^2*c*x + 2*b^2*d*x^2)*Erf[a
+ b*x]^2 + 4*(-(b*c) + a*d)*Sqrt[2*Pi]*Erf[Sqrt[2]*(a + b*x)])/(4*b^2*Pi)
```

fricas [A] time = 0.50, size = 171, normalized size = 0.91

$$-\frac{4\sqrt{2}\sqrt{\pi}\sqrt{b^2}\,(bc-ad)\,\text{erf}\left(\frac{\sqrt{2}\sqrt{b^2}\,(bx+a)}{b}\right)-4\sqrt{\pi}\left(b^2dx+2\,b^2c-abd\right)\text{erf}\,(bx+a)\,e^{\left(-b^2x^2-2\,abx-a^2\right)}-\left(2\,\pi b^3dx^2+\right.}{4\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/4*(4*sqrt(2)*sqrt(pi)*sqrt(b^2)*(b*c - a*d)*erf(sqrt(2)*sqrt(b^2)*(b*x +
 a)/b) - 4*sqrt(pi)*(b^2*d*x + 2*b^2*c - a*b*d)*erf(b*x + a)*e^(-b^2*x^2 -
```

```
2*a*b*x - a^2) - (2*pi*b^3*d*x^2 + 4*pi*b^3*c*x + pi*(4*a*b^2*c - (2*a^2 +
1)*b*d))*erf(b*x + a)^2 - 2*b*d*e^(-2*b^2*x^2 - 4*a*b*x - 2*a^2))/(pi*b^3)
```

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

$$\int (dx+c)\operatorname{erf}(bx+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int (dx+c)\operatorname{erf}(bx+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

$$\frac{1}{2}\left(dx^2+2\,cx\right)\operatorname{erf}(bx+a)^2-\frac{2\int\left(bdx^2+2\,bcx\right)\operatorname{erf}(bx+a)\,e^{\left(-b^2x^2-2\,abx-a^2\right)}\,dx}{\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)*erf(b*x+a)^2,x, algorithm="maxima")
[Out] 1/2*(d*x^2 + 2*c*x)*erf(b*x + a)^2 - integrate(2*(b*d*x^2 + 2*b*c*x)*erf(b*
x + a)*e^(-b^2*x^2 - 2*a*b*x - a^2), x)/sqrt(pi)
```

mupad [B] time = 0.26, size = 186, normalized size = 0.99

$$\frac{d\,x^2\operatorname{erf}(a+b\,x)^2}{2}-\frac{\operatorname{erf}(a+b\,x)^2\,\left(2\,d\,a^2-4\,b\,c\,a+d\right)}{4\,b^2}+c\,x\operatorname{erf}(a+b\,x)^2+\frac{d\,\mathrm{e}^{-2\,a^2-4\,a\,b\,x-2\,b^2\,x^2}}{2\,b^2\,\pi}-\frac{\operatorname{erf}(a+b\,x)\,\mathrm{e}^{-a^2-}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(a + b*x)^2*(c + d*x),x)
[Out] (d*x^2*erf(a + b*x)^2)/2 - (erf(a + b*x)^2*(d + 2*a^2*d - 4*a*b*c))/(4*b^2)
 + c*x*erf(a + b*x)^2 + (d*exp(- 2*a^2 - 2*b^2*x^2 - 4*a*b*x))/(2*b^2*pi) -
```

```
(erf(a + b*x)*exp(- a^2 - b^2*x^2 - 2*a*b*x)*(a*d - 2*b*c))/(b^2*pi^(1/2))
+ (2^(1/2)*erf(2^(1/2)*(a + b*x))*(a*d - b*c))/(b^2*pi^(1/2)) + (d*x*erf(a
+ b*x)*exp(- a^2 - b^2*x^2 - 2*a*b*x))/(b*pi^(1/2))
```

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

$$\int (c + dx) \operatorname{erf}^2 (a + bx) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.37 $\int \operatorname{erf}(a+bx)^2\,dx$

Optimal. Leaf size=71

$$\frac{(a+bx)\operatorname{erf}(a+bx)^2}{b}+\frac{2e^{-(a+bx)^2}\operatorname{erf}(a+bx)}{\sqrt{\pi}\,b}-\frac{\sqrt{\frac{2}{\pi}}\operatorname{erf}\left(\sqrt{2}\,(a+bx)\right)}{b}$$

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

Rubi [A] time = 0.18, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6352, 6382, 2205}

$$\frac{(a+bx)\operatorname{Erf}(a+bx)^2}{b}+\frac{2e^{-(a+bx)^2}\operatorname{Erf}(a+bx)}{\sqrt{\pi}\,b}-\frac{\sqrt{\frac{2}{\pi}}\operatorname{Erf}\left(\sqrt{2}\,(a+bx)\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[a + b*x]^2,x]
```

```
[Out] (2*Erf[a + b*x])/(b*E^(a + b*x)^2*Sqrt[Pi]) + ((a + b*x)*Erf[a + b*x]^2)/b
- (Sqrt[2/Pi]*Erf[Sqrt[2]*(a + b*x)])/b
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 6352

```
Int[Erf[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erf[a + b*x]^2)
/b, x] - Dist[4/Sqrt[Pi], Int[((a + b*x)*Erf[a + b*x])/E^(a + b*x)^2, x], x
] /; FreeQ[{a, b}, x]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int \operatorname{erf}(a+bx)^2\,dx = \frac{(a+bx)\operatorname{erf}(a+bx)^2}{b} - \frac{4\int e^{-(a+bx)^2}(a+bx)\operatorname{erf}(a+bx)\,dx}{\sqrt{\pi}}$$
$$= \frac{(a+bx)\operatorname{erf}(a+bx)^2}{b} - \frac{4\,\text{Subst}\left(\int e^{-x^2}x\operatorname{erf}(x)\,dx, x, a+bx\right)}{b\sqrt{\pi}}$$
$$= \frac{2e^{-(a+bx)^2}\operatorname{erf}(a+bx)}{b\sqrt{\pi}} + \frac{(a+bx)\operatorname{erf}(a+bx)^2}{b} - \frac{4\,\text{Subst}\left(\int e^{-2x^2}\,dx, x, a+bx\right)}{b\pi}$$
$$= \frac{2e^{-(a+bx)^2}\operatorname{erf}(a+bx)}{b\sqrt{\pi}} + \frac{(a+bx)\operatorname{erf}(a+bx)^2}{b} - \frac{\sqrt{\frac{2}{\pi}}\operatorname{erf}\left(\sqrt{2}(a+bx)\right)}{b}$$

Mathematica [A] time = 0.01, size = 66, normalized size = 0.93

$$\frac{(a+bx)\operatorname{erf}(a+bx)^2 + \frac{2e^{-(a+bx)^2}\operatorname{erf}(a+bx)}{\sqrt{\pi}} - \sqrt{\frac{2}{\pi}}\operatorname{erf}\left(\sqrt{2}(a+bx)\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[a + b*x]^2,x]
```

```
[Out] ((2*Erf[a + b*x])/(E^(a + b*x)^2*Sqrt[Pi]) + (a + b*x)*Erf[a + b*x]^2 - Sqr
t[2/Pi]*Erf[Sqrt[2]*(a + b*x)])/b
```

fricas [A] time = 0.47, size = 91, normalized size = 1.28

$$\frac{2\sqrt{\pi}\,b\operatorname{erf}(bx+a)\,e^{\left(-b^2x^2-2\,abx-a^2\right)} + \left(\pi b^2x + \pi ab\right)\operatorname{erf}(bx+a)^2 - \sqrt{2}\sqrt{\pi}\sqrt{b^2}\operatorname{erf}\left(\frac{\sqrt{2}\sqrt{b^2}(bx+a)}{b}\right)}{\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \operatorname{erf}(bx+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.00, size = 59, normalized size = 0.83

$$\frac{(bx+a)\operatorname{erf}(bx+a)^2+\frac{2\operatorname{erf}(bx+a)e^{-(bx+a)^2}}{\sqrt{\pi}}-\frac{\sqrt{2}\,\operatorname{erf}\left((bx+a)\sqrt{2}\right)}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x+a)^2,x)
[Out] 1/b*((b*x+a)*erf(b*x+a)^2+2*erf(b*x+a)/Pi^(1/2)*exp(-(b*x+a)^2)-1/Pi^(1/2)*
2^(1/2)*erf((b*x+a)*2^(1/2)))
```

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

$$x\operatorname{erf}(bx+a)^2-\frac{4\,be^{\left(-a^2\right)}\int x\operatorname{erf}(bx+a)\,e^{\left(-b^2x^2-2\,abx\right)}\,dx}{\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x+a)^2,x, algorithm="maxima")
[Out] x*erf(b*x + a)^2 - 4*b*integrate(x*erf(b*x + a)*e^(-b^2*x^2 - 2*a*b*x - a^2
), x)/sqrt(pi)
```

mupad [B] time = 0.13, size = 79, normalized size = 1.11

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(a + b*x)^2,x)
[Out] x*erf(a + b*x)^2 + (a*erf(a + b*x)^2)/b - (2^(1/2)*erf(2^(1/2)*(a + b*x)))/
(b*pi^(1/2)) + (2*erf(a + b*x)*exp(- a^2 - b^2*x^2 - 2*a*b*x))/(b*pi^(1/2))
```

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

$$\int \operatorname{erf}^2(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.38 $\int \frac{\mathbf{erf}(a+bx)^2}{c+dx}\,dx$

Optimal. Leaf size=19

$$\mathrm{Int}\left(\frac{\mathrm{erf}(a+bx)^2}{c+dx},x\right)$$

```
[Out] Unintegrable(erf(b*x+a)^2/(d*x+c),x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\mathrm{Erf}(a+bx)^2}{c+dx}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[a + b*x]^2/(c + d*x),x]
[Out] Defer[Int][Erf[a + b*x]^2/(c + d*x), x]
```

Rubi steps

$$\int \frac{\mathrm{erf}(a+bx)^2}{c+dx}\,dx = \int \frac{\mathrm{erf}(a+bx)^2}{c+dx}\,dx$$

Mathematica [A] time = 0.06, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erf}(a+bx)^2}{c+dx}\,dx$$

Verification is Not applicable to the result.

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

fricas [A] time = 0.50, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{erf}\left(bx+a\right)^2}{dx+c},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)^2}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.07, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)^2}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)^2}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{erf}(a+b\,x)^2}{c+d\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}^2(a+bx)}{c+dx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(erf(a + b*x)**2/(c + d*x), x)
```

3.39 $\int \frac{\text{erf}(a+bx)^2}{(c+dx)^2} \, dx$

Optimal. Leaf size=19

$$\text{Int}\left(\frac{\text{erf}(a+bx)^2}{(c+dx)^2},x\right)$$

```
[Out] Unintegrable(erf(b*x+a)^2/(d*x+c)^2,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erf}(a+bx)^2}{(c+dx)^2} \, dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[a + b*x]^2/(c + d*x)^2,x]
[Out] Defer[Int][Erf[a + b*x]^2/(c + d*x)^2, x]
```

Rubi steps

$$\int \frac{\text{erf}(a+bx)^2}{(c+dx)^2} \, dx = \int \frac{\text{erf}(a+bx)^2}{(c+dx)^2} \, dx$$

Mathematica [A] time = 0.12, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(a+bx)^2}{(c+dx)^2} \, dx$$

Verification is Not applicable to the result.

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

fricas [A] time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\left(bx+a\right)^2}{d^2x^2+2\,cdx+c^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(bx+a)^2}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}(bx+a)^2}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$4\,b\int \frac{\text{erf}(bx+a)\,e^{\left(-b^2x^2-2\,abx\right)}}{\sqrt{\pi}\,d^2xe^{\left(a^2\right)}+\sqrt{\pi}\,cde^{\left(a^2\right)}}\,dx-\frac{\text{erf}(bx+a)^2}{d^2x+cd}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x+a)^2/(d*x+c)^2,x, algorithm="maxima")
[Out] 4*b*integrate(erf(b*x + a)*e^(-b^2*x^2 - 2*a*b*x)/(sqrt(pi)*d^2*x*e^(a^2) +
 sqrt(pi)*c*d*e^(a^2)), x) - erf(b*x + a)^2/(d^2*x + c*d)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\text{erf}\left(a+b\,x\right)^2}{\left(c+d\,x\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}^2(a + bx)}{(c + dx)^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(erf(a + b*x)**2/(c + d*x)**2, x)
```

3.40 $\int x^2 \mathbf{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)dx$

Optimal. Leaf size=102

$$\frac{1}{3}x^3\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{1}{3}x^3\left(cx^n\right)^{-3/n}e^{\frac{9-12abd^2n}{4b^2d^2n^2}}\text{erf}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)-\frac{3}{n}}{2bd}\right)$$

```
[Out] 1/3*x^3*erf(d*(a+b*ln(c*x^n)))-1/3*exp(1/4*(-12*a*b*d^2*n+9)/b^2/d^2/n^2)*x
^3*erf(1/2*(2*a*b*d^2-3/n+2*b^2*d^2*ln(c*x^n))/b/d)/((c*x^n)^(3/n))
```

Rubi [A] time = 0.23, antiderivative size = 102, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.412, Rules used = {6401, 2278, 2274, 15, 2276, 2234, 2205}

$$\frac{1}{3}x^3\text{Erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{1}{3}x^3\left(cx^n\right)^{-3/n}e^{\frac{9-12abd^2n}{4b^2d^2n^2}}\text{Erf}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)-\frac{3}{n}}{2bd}\right)$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Erf[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (x^3*Erf[d*(a + b*Log[c*x^n])])/3 - (E^((9 - 12*a*b*d^2*n)/(4*b^2*d^2*n^2))
*x^3*Erf[(2*a*b*d^2 - 3/n + 2*b^2*d^2*Log[c*x^n])/(2*b*d)])/(3*(c*x^n)^(3/n
))
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6401

```
Int[Erf[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x_
Symbol] :> Simp[((e*x)^(m + 1)*Erf[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x] -
 Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^2,
 x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x^2\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx = \frac{1}{3}x^3\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int e^{-d^2\left(a+b\log(cx^n)\right)^2}x^2\,dx}{3\sqrt{\pi}}$$

$$= \frac{1}{3}x^3\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int\exp\left(-a^2d^2-2abd^2\log\left(cx^n\right)-b^2d^2 \cdots\right.}{3\sqrt{\pi}}$$

$$= \frac{1}{3}x^3\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x^2\left(cx^n\right)^{-2abd^2}\,dx}{3\sqrt{\pi}}$$

$$= \frac{1}{3}x^3\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x \cdots}{3\sqrt{\pi}}$$

$$= \frac{1}{3}x^3\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bdx^3\left(cx^n\right)^{-2abd^2-\frac{3-2abd^2n}{n}}\right)\text{Subst}\left(\int\exp\left(-a^2 \cdots\right.\right.}{3\sqrt{\pi \cdots}}$$

$$= \frac{1}{3}x^3\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bde^{\frac{9-12abd^2n}{4b^2d^2n^2}}x^3\left(cx^n\right)^{-2abd^2-\frac{3-2abd^2n}{n}}\right)\text{Subst}\left(\int e \cdots\right.}{3\sqrt{\pi}}$$

$$= \frac{1}{3}x^3\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{1}{3}e^{\frac{9-12abd^2n}{4b^2d^2n^2}}x^3\left(cx^n\right)^{-3/n}\text{erf}\left(\frac{2abd^2-\frac{3}{n}+2b^2d^2 \cdots}{2bd \cdots}\right.$$

Mathematica [A] time = 0.35, size = 88, normalized size = 0.86

$$\frac{1}{3}\left(x^3\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x^3\text{erf}\left(ad+bd\log\left(cx^n\right)-\frac{3}{2bdn}\right)\exp\left(-\frac{3\left(\frac{4abn-\frac{3}{d^2}}{b^2}+4n\log\left(cx^n\right)\right)}{4n^2}\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*Erf[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (x^3*Erf[d*(a + b*Log[c*x^n])] - (x^3*Erf[a*d - 3/(2*b*d*n) + b*d*Log[c*x^n
]])/E^((3*((-3/d^2 + 4*a*b*n)/b^2 + 4*n*Log[c*x^n]))/(4*n^2)))/3
```

fricas [A] time = 0.65, size = 125, normalized size = 1.23

$$\frac{1}{3}\,x^3\,\text{erf}\left(bd\log\left(cx^n\right)+ad\right)-\frac{1}{3}\,\sqrt{b^2d^2n^2}\,\text{erf}\left(\frac{\left(2\,b^2d^2n^2\log(x)+2\,b^2d^2n\log(c)+2\,abd^2n-3\right)\sqrt{b^2d^2n^2}}{2\,b^2d^2n^2}\right)e^{\left(-\frac{3\left(4b^2 \cdots\right.}{\cdots}\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.71, size = 85, normalized size = 0.83

$$\frac{1}{3}\,x^{3}\operatorname{erf}\left(bdn\log\left(x\right)+bd\log\left(c\right)+ad\right)+\frac{\operatorname{erf}\left(-bdn\log\left(x\right)-bd\log\left(c\right)-ad+\frac{3}{2\,bdn}\right)e^{\left(-\frac{3\,a}{bn}+\frac{9}{4\,b^{2}d^{2}n^{2}}\right)}}{3\,c^{\frac{3}{n}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/3*x^3*erf(b*d*n*log(x) + b*d*log(c) + a*d) + 1/3*erf(-b*d*n*log(x) - b*d*
log(c) - a*d + 3/2/(b*d*n))*e^(-3*a/(b*n) + 9/4/(b^2*d^2*n^2))/c^(3/n)
```

maple [F] time = 0.21, size = 0, normalized size = 0.00

$$\int x^{2}\operatorname{erf}\left(d\left(a+b\ln\left(c\,x^{n}\right)\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erf(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int(x^2*erf(d*(a+b*ln(c*x^n))),x)
```

maxima [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Timed out
```

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

$$\int x^{2}\operatorname{erf}\left(d\,\left(a+b\,\ln\left(c\,x^{n}\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erf(d*(a + b*log(c*x^n))),x)
```

```
[Out] int(x^2*erf(d*(a + b*log(c*x^n))), x)
```

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

$$\int x^2 \operatorname{erf}\left(ad + bd \log\left(cx^n\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erf(d*(a+b*ln(c*x**n))),x)
```

```
[Out] Integral(x**2*erf(a*d + b*d*log(c*x**n)), x)
```

3.41 $\int x\,\mathbf{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=94

$$\frac{1}{2}x^2\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{1}{2}x^2\left(cx^n\right)^{-2/n}e^{\frac{1-2abd^2n}{b^2d^2n^2}}\text{erf}\left(\frac{abd^2+b^2d^2\log\left(cx^n\right)-\frac{1}{n}}{bd}\right)$$

```
[Out] 1/2*x^2*erf(d*(a+b*ln(c*x^n)))-1/2*exp((-2*a*b*d^2*n+1)/b^2/d^2/n^2)*x^2*er
f((a*b*d^2-1/n+b^2*d^2*ln(c*x^n))/b/d)/((c*x^n)^(2/n))
```

Rubi [A] time = 0.18, antiderivative size = 94, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.467, Rules used = {6401, 2278, 2274, 15, 2276, 2234, 2205}

$$\frac{1}{2}x^2\text{Erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{1}{2}x^2\left(cx^n\right)^{-2/n}e^{\frac{1-2abd^2n}{b^2d^2n^2}}\text{Erf}\left(\frac{abd^2+b^2d^2\log\left(cx^n\right)-\frac{1}{n}}{bd}\right)$$

Antiderivative was successfully verified.

```
[In] Int[x*Erf[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (x^2*Erf[d*(a + b*Log[c*x^n])])/2 - (E^((1 - 2*a*b*d^2*n)/(b^2*d^2*n^2))*x^
2*Erf[(a*b*d^2 - n^(-1) + b^2*d^2*Log[c*x^n])/(b*d)])/(2*(c*x^n)^(2/n))
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6401

```
Int[Erf[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x_
Symbol] :> Simp[((e*x)^(m + 1)*Erf[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x] -
 Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^2,
 x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x\,\mathrm{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx=\frac{1}{2}x^2\mathrm{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{(bdn)\int e^{-d^2\left(a+b\log\left(cx^n\right)\right)^2}x\,dx}{\sqrt{\pi}}$$

$$=\frac{1}{2}x^2\mathrm{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{(bdn)\int\exp\left(-a^2d^2-2abd^2\log\left(cx^n\right)-b^2d^2\log^2\right.}{\sqrt{\pi}}$$

$$=\frac{1}{2}x^2\mathrm{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{(bdn)\int e^{-a^2d^2-b^2d^2\log^2\left(cx^n\right)}x\left(cx^n\right)^{-2abd^2}\,dx}{\sqrt{\pi}}$$

$$=\frac{1}{2}x^2\mathrm{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{\left(bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2\left(cx^n\right)}x^{1-2a}}{\sqrt{\pi}}$$

$$=\frac{1}{2}x^2\mathrm{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{\left(bdx^2\left(cx^n\right)^{-2abd^2-\frac{2-2abd^2n}{n}}\right)\mathrm{Subst}\left(\int\exp\left(-a^2d^2\right.\right.}{\sqrt{\pi}}$$

$$=\frac{1}{2}x^2\mathrm{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{\left(bde^{\frac{1-2abd^2n}{b^2d^2n^2}}x^2\left(cx^n\right)^{-2abd^2-\frac{2-2abd^2n}{n}}\right)\mathrm{Subst}\left(\int\exp\right.}{\sqrt{\pi}}$$

$$=\frac{1}{2}x^2\mathrm{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{1}{2}e^{\frac{1-2abd^2n}{b^2d^2n^2}}x^2\left(cx^n\right)^{-2/n}\mathrm{erf}\left(\frac{abd^2-\frac{1}{n}+b^2d^2\log\left(c\right.}{bd}\right.$$

Mathematica [A] time = 0.30, size = 84, normalized size = 0.89

$$\frac{1}{2}\left(x^2\mathrm{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x^2e^{-\frac{\frac{2abn-\frac{1}{d^2}}{b^2}+2n\log\left(cx^n\right)}{n^2}}\mathrm{erf}\left(ad+bd\log\left(cx^n\right)-\frac{1}{bdn}\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Erf[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (x^2*Erf[d*(a + b*Log[c*x^n])] - (x^2*Erf[a*d - 1/(b*d*n) + b*d*Log[c*x^n]]
)/E^(((-d^(-2) + 2*a*b*n)/b^2 + 2*n*Log[c*x^n])/n^2))/2
```

fricas [A] time = 0.55, size = 121, normalized size = 1.29

$$\frac{1}{2}x^2\,\mathrm{erf}\left(bd\log\left(cx^n\right)+ad\right)-\frac{1}{2}\sqrt{b^2d^2n^2}\,\mathrm{erf}\left(\frac{\left(b^2d^2n^2\log(x)+b^2d^2n\log(c)+abd^2n-1\right)\sqrt{b^2d^2n^2}}{b^2d^2n^2}\right)e^{\left(-\frac{2b^2d^2n\log(c)+2}{b^2d^2n^2}\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

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

giac [A] time = 0.61, size = 83, normalized size = 0.88

$$\frac{1}{2}\,x^2\,\mathrm{erf}\left(bdn\log(x)+bd\log(c)+ad\right)+\frac{\mathrm{erf}\left(-bdn\log(x)-bd\log(c)-ad+\frac{1}{bdn}\right)e^{\left(-\frac{2\,a}{bn}+\frac{1}{b^2d^2n^2}\right)}}{2\,c^{\frac{2}{n}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] 1/2*x^2*erf(b*d*n*log(x) + b*d*log(c) + a*d) + 1/2*erf(-b*d*n*log(x) - b*d*
log(c) - a*d + 1/(b*d*n))*e^(-2*a/(b*n) + 1/(b^2*d^2*n^2))/c^(2/n)
```

maple [F] time = 0.10, size = 0, normalized size = 0.00

$$\int x\,\mathrm{erf}\left(d\left(a+b\ln\left(c\,x^n\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erf(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int(x*erf(d*(a+b*ln(c*x^n))),x)
```

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

$$\frac{1}{2}\,x^2\,\mathrm{erf}\left(bd\log\left(x^n\right)+\left(b\log(c)+a\right)d\right)-\frac{bdne^{\left(-b^2d^2\log(c)^2-a^2d^2\right)}\int\frac{xe^{\left(-2\,b^2d^2\log(c)\log\left(x^n\right)-b^2d^2\log\left(x^n\right)^2\right)}}{\left(x^n\right)^{2\,abd^2}}\,dx}{\sqrt{\pi}\,c^{2\,abd^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*erf(b*d*log(x^n) + (b*log(c) + a)*d) - b*d*n*integrate(x*e^(-b^2*d^
2*log(c)^2 - 2*b^2*d^2*log(c)*log(x^n) - b^2*d^2*log(x^n)^2 - 2*a*b*d^2*log
(x^n) - a^2*d^2), x)/(sqrt(pi)*c^(2*a*b*d^2))
```

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

$$\int x \operatorname{erf}\left(d\ \left(a+b\ \ln\left(c\, x^n\right)\right)\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erf(d*(a + b*log(c*x^n))),x)
[Out] int(x*erf(d*(a + b*log(c*x^n))), x)
```

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

$$\int x \operatorname{erf}\left(ad + bd\log\left(cx^n\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(d*(a+b*ln(c*x**n))),x)
[Out] Integral(x*erf(a*d + b*d*log(c*x**n)), x)
```

3.42 $\int \text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=93

$$x\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x\left(cx^n\right)^{-1/n}e^{\frac{1-4abd^2n}{4b^2d^2n^2}}\text{erf}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)-\frac{1}{n}}{2bd}\right)$$

```
[Out] x*erf(d*(a+b*ln(c*x^n)))-exp(1/4*(-4*a*b*d^2*n+1)/b^2/d^2/n^2)*x*erf(1/2*(2
*a*b*d^2-1/n+2*b^2*d^2*ln(c*x^n))/b/d)/((c*x^n)^(1/n))
```

Rubi [A] time = 0.13, antiderivative size = 93, 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 = {6397, 2277, 2274, 15, 2276, 2234, 2205}

$$x\text{Erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x\left(cx^n\right)^{-1/n}e^{\frac{1-4abd^2n}{4b^2d^2n^2}}\text{Erf}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)-\frac{1}{n}}{2bd}\right)$$

Antiderivative was successfully verified.

```
[In] Int[Erf[d*(a + b*Log[c*x^n])],x]
```

```
[Out] x*Erf[d*(a + b*Log[c*x^n])] - (E^((1 - 4*a*b*d^2*n)/(4*b^2*d^2*n^2))*x*Erf[
(2*a*b*d^2 - n^(-1) + 2*b^2*d^2*Log[c*x^n])/(2*b*d)])/(c*x^n)^n^(-1)
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2277

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.)), x_Symbol] :> Int[
F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]^2), x] /; FreeQ[{F, a, b,
c, d, n}, x]
```

Rule 6397

```
Int[Erf[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)], x_Symbol] :> Simp[x*E
rf[d*(a + b*Log[c*x^n])], x] - Dist[(2*b*d*n)/Sqrt[Pi], Int[1/E^(d*(a + b*L
og[c*x^n]))^2, x], x] /; FreeQ[{a, b, c, d, n}, x]
```

Rubi steps

$$\int \operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx = x\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int e^{-d^2\left(a+b\log(cx^n)\right)^2}\,dx}{\sqrt{\pi}}$$

$$= x\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int \exp\left(-a^2d^2-2abd^2\log\left(cx^n\right)-b^2d^2\log^2$$

$$= x\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}\left(cx^n\right)^{-2abd^2}\,dx}{\sqrt{\pi}}$$

$$= x\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x^{-2abd}$$

$$= x\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bdx\left(cx^n\right)^{-2abd^2-\frac{1-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\left(-a^2d^2+\right.\right.$$

$$= x\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bde^{\frac{1-4abd^2n}{4b^2d^2n^2}}x\left(cx^n\right)^{-2abd^2-\frac{1-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\left(-\right.\right.$$

$$= x\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - e^{\frac{1-4abd^2n}{4b^2d^2n^2}}x\left(cx^n\right)^{-1/n}\operatorname{erf}\left(\frac{2abd^2-\frac{1}{n}+2b^2d^2\log\left(cx^n\right)}{2bd}\right.$$

Mathematica [A] time = 0.26, size = 80, normalized size = 0.86

$$x\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - x\operatorname{erf}\left(ad+bd\log\left(cx^n\right)-\frac{1}{2bdn}\right)\exp\left(-\frac{\frac{4abn-\frac{1}{d^2}}{b^2}+4n\log\left(cx^n\right)}{4n^2}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[d*(a + b*Log[c*x^n])],x]
```

```
[Out] x*Erf[d*(a + b*Log[c*x^n])] - (x*Erf[a*d - 1/(2*b*d*n) + b*d*Log[c*x^n]])/E
^(((-d^(-2) + 4*a*b*n)/b^2 + 4*n*Log[c*x^n])/(4*n^2))
```

fricas [A] time = 0.48, size = 122, normalized size = 1.31

$$-\sqrt{b^2d^2n^2}\operatorname{erf}\left(\frac{\left(2\,b^2d^2n^2\log(x)+2\,b^2d^2n\log(c)+2\,abd^2n-1\right)\sqrt{b^2d^2n^2}}{2\,b^2d^2n^2}\right)e^{\left(-\frac{4\,b^2d^2n\log(c)+4\,abd^2n-1}{4\,b^2d^2n^2}\right)}+x\operatorname{erf}\left(bd\log\left(\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

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

giac [A] time = 0.62, size = 79, normalized size = 0.85

$$x \operatorname{erf}\left(bdn\log(x) + bd\log(c) + ad\right) + \frac{\operatorname{erf}\left(-bdn\log(x) - bd\log(c) - ad + \frac{1}{2\,bdn}\right)e^{\left(-\frac{a}{bn} + \frac{1}{4\,b^2d^2n^2}\right)}}{c^{\left(\frac{1}{n}\right)}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] x*erf(b*d*n*log(x) + b*d*log(c) + a*d) + erf(-b*d*n*log(x) - b*d*log(c) - a
*d + 1/2/(b*d*n))*e^(-a/(b*n) + 1/4/(b^2*d^2*n^2))/c^(1/n)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int \operatorname{erf}\left(d\left(a + b\ln\left(c\,x^n\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int(erf(d*(a+b*ln(c*x^n))),x)
```

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

$$-\frac{2\,bdne^{\left(-b^2d^2\log(c)^2 - a^2d^2\right)}\int \frac{e^{\left(-2\,b^2d^2\log(c)\log\left(x^n\right) - b^2d^2\log\left(x^n\right)^2\right)}}{\left(x^n\right)^{2\,abd^2}}\,dx}{\sqrt{\pi}\,c^{2\,abd^2}} + x\operatorname{erf}\left(bd\log\left(x^n\right) + \left(b\log(c) + a\right)d\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] -2*b*d*n*integrate(e^(-b^2*d^2*log(c)^2 - 2*b^2*d^2*log(c)*log(x^n) - b^2*d
^2*log(x^n)^2 - 2*a*b*d^2*log(x^n) - a^2*d^2), x)/(sqrt(pi)*c^(2*a*b*d^2))
+ x*erf(b*d*log(x^n) + (b*log(c) + a)*d)
```

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

$$\int \operatorname{erf}\left(d\ \left(a+b\ \ln\left(c\,x^n\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(d*(a + b*log(c*x^n))),x)
[Out] int(erf(d*(a + b*log(c*x^n))), x)
```

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

$$\int \operatorname{erf}\left(d\left(a+b\log\left(cx^{n}\right)\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*ln(c*x**n))),x)
[Out] Integral(erf(d*(a + b*log(c*x**n))), x)
```

3.43 $\int \frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}\,dx$

Optimal. Leaf size=65

$$\frac{e^{-d^2\left(a+b\log\left(cx^n\right)\right)^2}}{\sqrt{\pi}\,bdn}+\frac{\left(a+b\log\left(cx^n\right)\right)\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{bn}$$

```
[Out] erf(d*(a+b*ln(c*x^n)))*(a+b*ln(c*x^n))/b/n+1/b/d/exp(d^2*(a+b*ln(c*x^n))^2)
/n/Pi^(1/2)
```

Rubi [A] time = 0.05, antiderivative size = 65, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 1, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.059, Rules used = {6349}

$$\frac{e^{-d^2\left(a+b\log\left(cx^n\right)\right)^2}}{\sqrt{\pi}\,bdn}+\frac{\left(a+b\log\left(cx^n\right)\right)\operatorname{Erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{bn}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[d*(a + b*Log[c*x^n])]/x,x]
```

```
[Out] 1/(b*d*E^(d^2*(a + b*Log[c*x^n])^2)*n*Sqrt[Pi]) + (Erf[d*(a + b*Log[c*x^n])
]*(a + b*Log[c*x^n]))/(b*n)
```

Rule 6349

```
Int[Erf[(a_.) + (b_.)*(x_)], x_Symbol] :> Simp[((a + b*x)*Erf[a + b*x])/b,
x] + Simp[1/(b*Sqrt[Pi]*E^(a + b*x)^2), x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\begin{aligned}
\int \frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}\,dx &= \frac{\operatorname{Subst}\left(\int \operatorname{erf}(d(a+bx))\,dx,x,\log\left(cx^n\right)\right)}{n}\\
&= \frac{\operatorname{Subst}\left(\int \operatorname{erf}(x)\,dx,x,ad+bd\log\left(cx^n\right)\right)}{bdn}\\
&= \frac{e^{-\left(ad+bd\log\left(cx^n\right)\right)^2}}{bdn\sqrt{\pi}}+\frac{\operatorname{erf}\left(ad+bd\log\left(cx^n\right)\right)\left(a+b\log\left(cx^n\right)\right)}{bn}
\end{aligned}$$

Mathematica [A] time = 0.15, size = 79, normalized size = 1.22

$$\frac{\frac{(cx^n)^{-2abd^2}e^{-d^2\left(a^2+b^2\log^2(cx^n)\right)}}{\sqrt{\pi}bd}+\left(\frac{a}{b}+\log\left(cx^n\right)\right)\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{n}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[d*(a + b*Log[c*x^n])]/x,x]
```

```
[Out] (1/(b*d*E^(d^2*(a^2 + b^2*Log[c*x^n]^2))*Sqrt[Pi]*(c*x^n)^(2*a*b*d^2)) + Er
f[d*(a + b*Log[c*x^n])]*(a/b + Log[c*x^n]))/n
```

fricas [A] time = 0.53, size = 119, normalized size = 1.83

$$\frac{\left(\pi bdn\log(x)+\pi bd\log(c)+\pi ad\right)\operatorname{erf}\left(bd\log\left(cx^n\right)+ad\right)+\sqrt{\pi}\,e^{\left(-b^2d^2n^2\log(x)^2-b^2d^2\log(c)^2-2\,abd^2\log(c)-a^2d^2-2\,\left(b^2d^2n\log\right.\right.}}{\pi bdn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*log(c*x^n)))/x,x, algorithm="fricas")
```

```
[Out] ((pi*b*d*n*log(x) + pi*b*d*log(c) + pi*a*d)*erf(b*d*log(c*x^n) + a*d) + sqr
t(pi)*e^(-b^2*d^2*n^2*log(x)^2 - b^2*d^2*log(c)^2 - 2*a*b*d^2*log(c) - a^2*
d^2 - 2*(b^2*d^2*n*log(c) + a*b*d^2*n)*log(x)))/(pi*b*d*n)
```

giac [A] time = 0.52, size = 67, normalized size = 1.03

$$\frac{\left(bdn\log(x)+bd\log(c)+ad\right)\operatorname{erf}\left(bdn\log(x)+bd\log(c)+ad\right)+\frac{e^{\left(-\left(bdn\log(x)+bd\log(c)+ad\right)^2\right)}}{\sqrt{\pi}}}{bdn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*log(c*x^n)))/x,x, algorithm="giac")
```

```
[Out] ((b*d*n*log(x) + b*d*log(c) + a*d)*erf(b*d*n*log(x) + b*d*log(c) + a*d) + e
^(-(b*d*n*log(x) + b*d*log(c) + a*d)^2)/sqrt(pi))/(b*d*n)
```

maple [A] time = 0.07, size = 79, normalized size = 1.22

$$\frac{\ln\left(c\,x^n\right)\operatorname{erf}\left(ad+bd\ln\left(c\,x^n\right)\right)}{n}+\frac{\operatorname{erf}\left(ad+bd\ln\left(c\,x^n\right)\right)a}{nb}+\frac{\mathrm{e}^{-\left(ad+bd\ln\left(c\,x^n\right)\right)^2}}{nbd\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(d*(a+b*ln(c*x^n)))/x,x)
```

```
[Out] 1/n*ln(c*x^n)*erf(a*d+b*d*ln(c*x^n))+1/n/b*erf(a*d+b*d*ln(c*x^n))*a+1/n/b/d
/Pi^(1/2)*exp(-(a*d+b*d*ln(c*x^n))^2)
```

maxima [A] time = 0.54, size = 58, normalized size = 0.89

$$\frac{\left(b\log\left(cx^{n}\right)+a\right)d\,\mathrm{erf}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)+\frac{e^{\left(-\left(b\log\left(cx^{n}\right)+a\right)^{2}d^{2}\right)}}{\sqrt{\pi}}}{bdn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*log(c*x^n)))/x,x, algorithm="maxima")
```

```
[Out] ((b*log(c*x^n) + a)*d*erf((b*log(c*x^n) + a)*d) + e^(-(b*log(c*x^n) + a)^2*
d^2)/sqrt(pi))/(b*d*n)
```

mupad [B] time = 0.48, size = 121, normalized size = 1.86

$$\frac{\ln\left(c\,x^{n}\right)\,\mathrm{erf}\left(a\,d+b\,d\,\ln\left(c\,x^{n}\right)\right)}{n}+\frac{a\,d\,\mathrm{erfi}\left(a\,\sqrt{-d^{2}}+b\,\ln\left(c\,x^{n}\right)\,\sqrt{-d^{2}}\right)}{b\,n\,\sqrt{-d^{2}}}+\frac{\mathrm{e}^{-b^{2}\,d^{2}\,\ln\left(c\,x^{n}\right)^{2}}\,\mathrm{e}^{-a^{2}\,d^{2}}}{b\,d\,n\,\sqrt{\pi}\,{\left(c\,x^{n}\right)}^{2\,a\,b\,d^{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(d*(a + b*log(c*x^n)))/x,x)
```

```
[Out] (log(c*x^n)*erf(a*d + b*d*log(c*x^n)))/n + (a*d*erfi(a*(-d^2)^(1/2) + b*log
(c*x^n)*(-d^2)^(1/2)))/(b*n*(-d^2)^(1/2)) + (exp(-b^2*d^2*log(c*x^n)^2)*exp
(-a^2*d^2))/(b*d*n*pi^(1/2)*(c*x^n)^(2*a*b*d^2))
```

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

$$\int\frac{\mathrm{erf}\left(ad+bd\log\left(cx^{n}\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*ln(c*x**n)))/x,x)
```

```
[Out] Integral(erf(a*d + b*d*log(c*x**n))/x, x)
```

3.44 $\int \frac{\operatorname{erf}\left(d\left(a+b\log(cx^n)\right)\right)}{x^2}\,dx$

Optimal. Leaf size=92

$$\frac{(cx^n)^{\frac{1}{n}} e^{\frac{a}{bn}+\frac{1}{4b^2d^2n^2}} \operatorname{erf}\left(\frac{2abd^2+2b^2d^2\log(cx^n)+\frac{1}{n}}{2bd}\right)}{x} - \frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

```
[Out] -erf(d*(a+b*ln(c*x^n)))/x+exp(1/4/b^2/d^2/n^2+a/b/n)*(c*x^n)^(1/n)*erf(1/2*
(2*a*b*d^2+1/n+2*b^2*d^2*ln(c*x^n))/b/d)/x
```

Rubi [A] time = 0.21, antiderivative size = 92, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.412, Rules used = {6401, 2278, 2274, 15, 2276, 2234, 2205}

$$\frac{(cx^n)^{\frac{1}{n}} e^{\frac{a}{bn}+\frac{1}{4b^2d^2n^2}} \operatorname{Erf}\left(\frac{2abd^2+2b^2d^2\log(cx^n)+\frac{1}{n}}{2bd}\right)}{x} - \frac{\operatorname{Erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[d*(a + b*Log[c*x^n])]/x^2,x]
```

```
[Out] -(Erf[d*(a + b*Log[c*x^n])]/x) + (E^(1/(4*b^2*d^2*n^2) + a/(b*n))*(c*x^n)^n
^(-1)*Erf[(2*a*b*d^2 + n^(-1) + 2*b^2*d^2*Log[c*x^n])/(2*b*d)])/x
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6401

```
Int[Erf[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x_
Symbol] :> Simp[((e*x)^(m + 1)*Erf[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x] -
 Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^2,
 x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x^2}\,dx = -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} + \frac{(2bdn)\int \frac{e^{-d^2\left(a+b\log\left(cx^n\right)\right)^2}}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} + \frac{(2bdn)\int \frac{\exp\left(-a^2d^2-2abd^2\log\left(cx^n\right)-b^2d^2\log^2\left(cx^n\right)\right)}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} + \frac{(2bdn)\int \frac{e^{-a^2d^2-b^2d^2\log^2\left(cx^n\right)}\left(cx^n\right)^{-2abd^2}}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} + \frac{\left(2bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2\left(cx^n\right)}x^{-2-2\cdots}}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} + \frac{\left(2bd\left(cx^n\right)^{-2abd^2-\frac{-1-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\left(-a^2d^2+\cdots\right.\right.}{\sqrt{\pi}\,x}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} + \frac{\left(2bde^{\frac{1}{4b^2d^2n^2}+\frac{a}{bn}}\left(cx^n\right)^{-2abd^2-\frac{-1-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\cdots\right.}{\sqrt{\pi}\,x}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} + \frac{e^{\frac{1}{4b^2d^2n^2}+\frac{a}{bn}}\left(cx^n\right)^{\frac{1}{n}}\operatorname{erf}\left(\frac{2abd^2+\frac{1}{n}+2b^2d^2\log\left(cx^n\right)}{2bd}\right)}{x}$$

Mathematica [A] time = 0.29, size = 80, normalized size = 0.87

$$\frac{e^{\frac{\frac{4abn+\frac{1}{d^2}}{b^2}+4n\log\left(cx^n\right)}{4n^2}}\operatorname{erf}\left(ad+bd\log\left(cx^n\right)+\frac{1}{2bdn}\right)-\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[d*(a + b*Log[c*x^n])]/x^2,x]
```

```
[Out] (-Erf[d*(a + b*Log[c*x^n])] + E^(((d^(-2) + 4*a*b*n)/b^2 + 4*n*Log[c*x^n])/
(4*n^2))*Erf[a*d + 1/(2*b*d*n) + b*d*Log[c*x^n]])/x
```

fricas [A] time = 0.50, size = 126, normalized size = 1.37

$$\frac{\sqrt{b^2d^2n^2}\,x\,\mathrm{erf}\left(\frac{\left(2\,b^2d^2n^2\log(x)+2\,b^2d^2n\log(c)+2\,abd^2n+1\right)\sqrt{b^2d^2n^2}}{2\,b^2d^2n^2}\right)e^{\left(\frac{4\,b^2d^2n\log(c)+4\,abd^2n+1}{4\,b^2d^2n^2}\right)}-\mathrm{erf}\left(bd\log\left(cx^n\right)+ad\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\mathrm{erf}\left(\left(b\log\left(cx^n\right)+a\right)d\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erf((b*log(c*x^n) + a)*d)/x^2, x)
```

maple [F] time = 0.20, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erf}\left(d\left(a+b\ln\left(c\,x^n\right)\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(d*(a+b*ln(c*x^n)))/x^2,x)
```

```
[Out] int(erf(d*(a+b*ln(c*x^n)))/x^2,x)
```

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

$$\frac{2\,bdne^{\left(-b^2d^2\log(c)^2-a^2d^2\right)}\int\frac{e^{\left(-2\,b^2d^2\log(c)\log\left(x^n\right)-b^2d^2\log\left(x^n\right)^2\right)}}{x^2\left(x^n\right)^{2\,abd^2}}\,dx}{\sqrt{\pi}\,c^{2\,abd^2}}-\frac{\mathrm{erf}\left(bd\log\left(x^n\right)+\left(b\log(c)+a\right)d\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 2*b*d*n*integrate(e^(-b^2*d^2*log(c)^2 - 2*b^2*d^2*log(c)*log(x^n) - b^2*d^
2*log(x^n)^2 - 2*a*b*d^2*log(x^n) - a^2*d^2)/x^2, x)/(sqrt(pi)*c^(2*a*b*d^2
)) - erf(b*d*log(x^n) + (b*log(c) + a)*d)/x
```

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

$$\int \frac{\mathrm{erf}\left(d\ \left(a+b\ \ln\left(c\,x^n\right)\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(d*(a + b*log(c*x^n)))/x^2,x)
```

```
[Out] int(erf(d*(a + b*log(c*x^n)))/x^2, x)
```

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

$$\int \frac{\mathrm{erf}\left(ad+bd\log\left(cx^n\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*ln(c*x**n)))/x**2,x)
```

```
[Out] Integral(erf(a*d + b*d*log(c*x**n))/x**2, x)
```

3.45 $\int \frac{\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x^3}\,dx$

Optimal. Leaf size=95

$$\frac{\left(cx^n\right)^{2/n} e^{\frac{2abd^2n+1}{b^2d^2n^2}} \text{erf}\left(\frac{abd^2n+b^2d^2n\log(cx^n)+1}{bdn}\right)}{2x^2} - \frac{\text{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

```
[Out] -1/2*erf(d*(a+b*ln(c*x^n)))/x^2+1/2*exp((2*a*b*d^2*n+1)/b^2/d^2/n^2)*(c*x^n
)^(2/n)*erf((1+a*b*d^2*n+b^2*d^2*n*ln(c*x^n))/b/d/n)/x^2
```

Rubi [A] time = 0.21, antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.412, Rules used = {6401, 2278, 2274, 15, 2276, 2234, 2205}

$$\frac{\left(cx^n\right)^{2/n} e^{\frac{2abd^2n+1}{b^2d^2n^2}} \text{Erf}\left(\frac{abd^2n+b^2d^2n\log(cx^n)+1}{bdn}\right)}{2x^2} - \frac{\text{Erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[d*(a + b*Log[c*x^n])]/x^3,x]
```

```
[Out] -Erf[d*(a + b*Log[c*x^n])]/(2*x^2) + (E^((1 + 2*a*b*d^2*n)/(b^2*d^2*n^2))*(
c*x^n)^(2/n)*Erf[(1 + a*b*d^2*n + b^2*d^2*n*Log[c*x^n])/(b*d*n)])/(2*x^2)
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 &&  !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6401

```
Int[Erf[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x_
Symbol] :> Simp[((e*x)^(m + 1)*Erf[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x] -
 Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^2,
 x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x^3}\,dx = -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{(bdn)\int \frac{e^{-d^2\left(a+b\log\left(cx^n\right)\right)^2}}{x^3}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{(bdn)\int \frac{\exp\left(-a^2d^2-2abd^2\log(cx^n)-b^2d^2\log^2(cx^n)\right)}{x^3}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{(bdn)\int \frac{e^{-a^2d^2-b^2d^2\log^2\left(cx^n\right)}(cx^n)^{-2abd^2}}{x^3}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{\left(bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x^{-3-2aba}}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{\left(bd\left(cx^n\right)^{-2abd^2-\frac{-2-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\left(-a^2d^2+\frac{(-2}{}\right.\right.}{\sqrt{\pi}\,x^2}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{\left(bde^{\frac{1+2abd^2n}{b^2d^2n^2}}\left(cx^n\right)^{-2abd^2-\frac{-2-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\left(-\frac{(-}{}\right.\right.}{\sqrt{\pi}\,x^2}$$

$$= -\frac{\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{e^{\frac{1+2abd^2n}{b^2d^2n^2}}\left(cx^n\right)^{2/n}\operatorname{erf}\left(\frac{1+abd^2n+b^2d^2n\log(cx^n)}{bdn}\right)}{2x^2}$$

Mathematica [A] time = 0.26, size = 77, normalized size = 0.81

$$\frac{e^{\frac{\frac{2abn+\frac{1}{d^2}}{b^2}+2n\log\left(cx^n\right)}{n^2}}\operatorname{erf}\left(ad+bd\log\left(cx^n\right)+\frac{1}{bdn}\right)-\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[d*(a + b*Log[c*x^n])]/x^3,x]
```

```
[Out] (-Erf[d*(a + b*Log[c*x^n])] + E^(((d^(-2) + 2*a*b*n)/b^2 + 2*n*Log[c*x^n])/
n^2)*Erf[a*d + 1/(b*d*n) + b*d*Log[c*x^n]])/(2*x^2)
```

fricas [A] time = 0.56, size = 124, normalized size = 1.31

$$\frac{\sqrt{b^2d^2n^2}\,x^2\,\mathrm{erf}\left(\frac{\left(b^2d^2n^2\log(x)+b^2d^2n\log(c)+abd^2n+1\right)\sqrt{b^2d^2n^2}}{b^2d^2n^2}\right)e^{\left(\frac{2\,b^2d^2n\log(c)+2\,abd^2n+1}{b^2d^2n^2}\right)}-\mathrm{erf}\left(bd\log\left(cx^n\right)+ad\right)}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\mathrm{erf}\left(\left(b\log\left(cx^n\right)+a\right)d\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erf((b*log(c*x^n) + a)*d)/x^3, x)
```

maple [F] time = 0.19, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erf}\left(d\left(a+b\ln\left(c\,x^n\right)\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(d*(a+b*ln(c*x^n)))/x^3,x)
```

```
[Out] int(erf(d*(a+b*ln(c*x^n)))/x^3,x)
```

maxima [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Timed out
```

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

$$\int \frac{\mathrm{erf}\left(d\,\left(a+b\,\ln\left(c\,x^n\right)\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(d*(a + b*log(c*x^n)))/x^3,x)
```

```
[Out] int(erf(d*(a + b*log(c*x^n)))/x^3, x)
```

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

$$\int \frac{\operatorname{erf}\left(ad + bd\log\left(cx^{n}\right)\right)}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(d*(a+b*ln(c*x**n)))/x**3,x)
```

```
[Out] Integral(erf(a*d + b*d*log(c*x**n))/x**3, x)
```

3.46 $\int (ex)^m \mathbf{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right) dx$

Optimal. Leaf size=125

$$\frac{x(ex)^m \left(cx^n\right)^{-\frac{m+1}{n}} \exp\left(\frac{(m+1)\left(-4abd^2n+m+1\right)}{4b^2d^2n^2}\right) \operatorname{erf}\left(\frac{-2abd^2n-2b^2d^2n\log(cx^n)+m+1}{2bdn}\right)}{m+1}+\frac{(ex)^{m+1}\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(m+1)}$$

```
[Out] (e*x)^(1+m)*erf(d*(a+b*ln(c*x^n)))/e/(1+m)+exp(1/4*(1+m)*(-4*a*b*d^2*n+m+1)
/b^2/d^2/n^2)*x*(e*x)^m*erf(1/2*(1+m-2*a*b*d^2*n-2*b^2*d^2*n*ln(c*x^n))/b/d
/n)/(1+m)/((c*x^n)^((1+m)/n))
```

Rubi [A] time = 0.31, antiderivative size = 125, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.421, Rules used = {6401, 2278, 2274, 15, 20, 2276, 2234, 2205}

$$\frac{x(ex)^m \left(cx^n\right)^{-\frac{m+1}{n}} \exp\left(\frac{(m+1)\left(-4abd^2n+m+1\right)}{4b^2d^2n^2}\right) \operatorname{Erf}\left(\frac{-2abd^2n-2b^2d^2n\log(cx^n)+m+1}{2bdn}\right)}{m+1}+\frac{(ex)^{m+1}\operatorname{Erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(m+1)}$$

Antiderivative was successfully verified.

```
[In] Int[(e*x)^m*Erf[d*(a + b*Log[c*x^n])],x]
```

```
[Out] ((e*x)^(1 + m)*Erf[d*(a + b*Log[c*x^n])])/(e*(1 + m)) + (E^(((1 + m)*(1 + m
 - 4*a*b*d^2*n))/(4*b^2*d^2*n^2))*x*(e*x)^m*Erf[(1 + m - 2*a*b*d^2*n - 2*b^
2*d^2*n*Log[c*x^n])/(2*b*d*n)])/((1 + m)*(c*x^n)^((1 + m)/n))
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 20

```
Int[(u_.)*((a_.)*(v_))^(m_)*((b_.)*(v_))^(n_), x_Symbol] :> Dist[(b^IntPart
[n]*(b*v)^FracPart[n])/(a^IntPart[n]*(a*v)^FracPart[n]), Int[u*(a*v)^(m + n
), x], x] /; FreeQ[{a, b, m, n}, x] && !IntegerQ[m] && !IntegerQ[n] && !
IntegerQ[m + n]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
```

```
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6401

```
Int[Erf[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x_
Symbol] :> Simp[((e*x)^(m + 1)*Erf[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x] -
 Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^2,
 x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (ex)^m \operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx = \frac{(ex)^{1+m}\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{(2bdn)\int e^{-d^2\left(a+b\log(cx^n)\right)^2}(ex)^m\,dx}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{(2bdn)\int \exp\left(-a^2d^2-2abd^2\log\left(cx^n\right)\right.}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{(2bdn)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}(ex)^m\left(cx^n\right)^{-}}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{\left(2bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\,\mathrm{lo}}}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{\left(2bdnx^{-m+2abd^2n}(ex)^m\left(cx^n\right)^{-2abd^2}\right)\int e^{-}}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{\left(2bdx(ex)^m\left(cx^n\right)^{-2abd^2-\frac{1+m-2abd^2n}{n}}\right)\mathrm{Subs}}{}$$

$$= \frac{(ex)^{1+m}\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{\left(2bd\exp\left(\frac{(1+m)\left(1+m-4abd^2n\right)}{4b^2d^2n^2}\right)x(ex)^m\left(cx\right.\right.}{}$$

$$= \frac{(ex)^{1+m}\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} + \frac{\exp\left(\frac{(1+m)\left(1+m-4abd^2n\right)}{4b^2d^2n^2}\right)x(ex)^m\left(cx^n\right)^{-\frac{1+}{n}}}{1+m}$$

Mathematica [A] time = 0.56, size = 127, normalized size = 1.02

$$\frac{(ex)^m\left(x\operatorname{erf}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x^{-m}\operatorname{erf}\left(ad-\frac{-2b^2d^2n\log(cx^n)+m+1}{2bdn}\right)\exp\left(\frac{(m+1)\left(-4abd^2n-4b^2d^2n\log(cx^n)+4b^2d^2n^2\log(x)\right.}{4b^2d^2n^2}\right.\right.}{m+1}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e*x)^m*Erf[d*(a + b*Log[c*x^n])],x]
```

```
[Out] ((e*x)^m*(x*Erf[d*(a + b*Log[c*x^n])] - (E^(((1 + m)*(1 + m - 4*a*b*d^2*n +
 4*b^2*d^2*n^2*Log[x] - 4*b^2*d^2*n*Log[c*x^n]))/(4*b^2*d^2*n^2))*Erf[a*d -
 (1 + m - 2*b^2*d^2*n*Log[c*x^n])/(2*b*d*n)])/x^m))/(1 + m)
```

fricas [A] time = 0.61, size = 180, normalized size = 1.44

$$\frac{x\,\mathrm{erf}\left(bd\log\left(cx^{n}\right)+ad\right)e^{\left(m\log(e)+m\log(x)\right)}-\sqrt{b^{2}d^{2}n^{2}}\,\mathrm{erf}\left(\frac{\left(2\,b^{2}d^{2}n^{2}\log(x)+2\,b^{2}d^{2}n\log(c)+2\,abd^{2}n-m-1\right)\sqrt{b^{2}d^{2}n^{2}}}{2\,b^{2}d^{2}n^{2}}\right)e^{\left(\frac{4\,b^{2}d^{2}mn^{2}\log\cdots}{\cdots}\right)}}{m+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)^m*erf(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

```
[Out] (x*erf(b*d*log(c*x^n) + a*d)*e^(m*log(e) + m*log(x)) - sqrt(b^2*d^2*n^2)*er
f(1/2*(2*b^2*d^2*n^2*log(x) + 2*b^2*d^2*n*log(c) + 2*a*b*d^2*n - m - 1)*sqr
t(b^2*d^2*n^2)/(b^2*d^2*n^2))*e^(1/4*(4*b^2*d^2*m*n^2*log(e) - 4*(b^2*d^2*m
 + b^2*d^2)*n*log(c) + m^2 - 4*(a*b*d^2*m + a*b*d^2)*n + 2*m + 1)/(b^2*d^2*
n^2)))/(m + 1)
```

giac [A] time = 0.74, size = 156, normalized size = 1.25

$$\frac{x^{m+1}\,\mathrm{erf}\left(bdn\log(x)+bd\log(c)+ad\right)e^{m}}{m+1}+\frac{\pi\,\mathrm{erf}\left(-bdn\log(x)-bd\log(c)-ad+\frac{m}{2\,bdn}+\frac{1}{2\,bdn}\right)e^{\left(m-\frac{am}{bn}-\frac{a}{bn}+\frac{m^{2}}{4\,b^{2}d^{2}n^{2}}+\cdots\right)}}{(\pi+\pi m)c^{\frac{m}{n}}c^{\left(\frac{1}{n}\right)}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)^m*erf(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] x^(m + 1)*erf(b*d*n*log(x) + b*d*log(c) + a*d)*e^m/(m + 1) + pi*erf(-b*d*n*
log(x) - b*d*log(c) - a*d + 1/2*m/(b*d*n) + 1/2/(b*d*n))*e^(m - a*m/(b*n) -
 a/(b*n) + 1/4*m^2/(b^2*d^2*n^2) + 1/2*m/(b^2*d^2*n^2) + 1/4/(b^2*d^2*n^2))
/((pi + pi*m)*c^(m/n)*c^(1/n))
```

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

$$\int (ex)^{m}\,\mathrm{erf}\left(d\left(a+b\ln\left(c\,x^{n}\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x)^m*erf(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int((e*x)^m*erf(d*(a+b*ln(c*x^n))),x)
```

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

$$\frac{e^{m}xx^{m}\,\mathrm{erf}\left(bd\log\left(x^{n}\right)+\left(b\log(c)+a\right)d\right)}{m+1}-\frac{-\frac{\sqrt{\pi}\,c^{2\,abd^{2}}e^{m}\,\mathrm{erf}\left(-bdn\log(x)-bd\log(c)-ad+\frac{m}{2\,bdn}+\frac{1}{2\,bdn}\right)e^{\left(-\frac{am}{bn}-\frac{a}{bn}+\frac{m^{2}}{4\,b^{2}d^{2}n^{2}}+\frac{m}{2\,b^{2}d^{2}n^{2}}+\cdots\right)}}{c^{\frac{m}{n}}c^{\left(\frac{1}{n}\right)}}}{\sqrt{\pi}\,c^{2\,abd^{2}}(m+1)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)^m*erf(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] e^m*x*x^m*erf(b*d*log(x^n) + (b*log(c) + a)*d)/(m + 1) - 2*b*d*e^m*n*integr
ate(e^(-b^2*d^2*log(c)^2 - 2*b^2*d^2*log(c)*log(x^n) - b^2*d^2*log(x^n)^2 -
 2*a*b*d^2*log(x^n) - a^2*d^2 + m*log(x)), x)/(sqrt(pi)*c^(2*a*b*d^2)*(m +
1))
```

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

$$\int \mathrm{erf}\left(d\ \left(a+b\ \ln\left(c\,x^n\right)\right)\right)\ \left(e\,x\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(d*(a + b*log(c*x^n)))*(e*x)^m,x)
```

```
[Out] int(erf(d*(a + b*log(c*x^n)))*(e*x)^m, x)
```

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

$$\int (ex)^m \operatorname{erf}\left(ad+bd\log\left(cx^n\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)**m*erf(d*(a+b*ln(c*x**n))),x)
```

```
[Out] Integral((e*x)**m*erf(a*d + b*d*log(c*x**n)), x)
```

3.47 $\int e^{c-b^2x^2}\mathbf{erf}(bx)^2\,dx$

Optimal. Leaf size=21

$$\frac{\sqrt{\pi}\,e^c\text{erf}(bx)^3}{6b}$$

```
[Out] 1/6*exp(c)*erf(b*x)^3*Pi^(1/2)/b
```

Rubi [A] time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6373, 30}

$$\frac{\sqrt{\pi}\,e^c\text{Erf}(bx)^3}{6b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)*Erf[b*x]^2,x]
```

```
[Out] (E^c*Sqrt[Pi]*Erf[b*x]^3)/(6*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c-b^2x^2}\text{erf}(bx)^2\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int x^2\,dx, x, \text{erf}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}\,\text{erf}(bx)^3}{6b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c\text{erf}(bx)^3}{6b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)*Erf[b*x]^2,x]
[Out] (E^c*Sqrt[Pi]*Erf[b*x]^3)/(6*b)
```

fricas [A] time = 0.60, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\ \operatorname{erf}\left(bx\right)^{3} e^{c}}{6\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erf(b*x)^2,x, algorithm="fricas")
[Out] 1/6*sqrt(pi)*erf(b*x)^3*e^c/b
```

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

$$\int \operatorname{erf}\left(bx\right)^{2} e^{\left(-b^{2} x^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erf(b*x)^2,x, algorithm="giac")
[Out] integrate(erf(b*x)^2*e^(-b^2*x^2 + c), x)
```

maple [A] time = 0.01, size = 17, normalized size = 0.81

$$\frac{\mathrm{e}^{c} \operatorname{erf}\left(bx\right)^{3} \sqrt{\pi}}{6b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)*erf(b*x)^2,x)
[Out] 1/6*exp(c)*erf(b*x)^3*Pi^(1/2)/b
```

maxima [A] time = 0.32, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\ \operatorname{erf}\left(bx\right)^{3} e^{c}}{6\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erf(b*x)^2,x, algorithm="maxima")
[Out] 1/6*sqrt(pi)*erf(b*x)^3*e^c/b
```

mupad [B] time = 0.11, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\ \mathrm{e}^{c}\ \mathrm{erf}\left(b\,x\right)^{3}}{6\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)*erf(b*x)^2,x)
```

```
[Out] (pi^(1/2)*exp(c)*erf(b*x)^3)/(6*b)
```

sympy [A] time = 1.74, size = 19, normalized size = 0.90

$$\begin{cases} \frac{\sqrt{\pi}\, e^{c} \operatorname{erf}^{3}{\left(bx \right)}}{6b} & \text{for}\: b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)*erf(b*x)**2,x)
```

```
[Out] Piecewise((sqrt(pi)*exp(c)*erf(b*x)**3/(6*b), Ne(b, 0)), (0, True))
```

3.48 $\int e^{c-b^2x^2}\textbf{erf}(bx)\,dx$

Optimal. Leaf size=21

$$\frac{\sqrt{\pi}\,e^c\text{erf}(bx)^2}{4b}$$

```
[Out] 1/4*exp(c)*erf(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.02, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {6373, 30}

$$\frac{\sqrt{\pi}\,e^c\text{Erf}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)*Erf[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erf[b*x]^2)/(4*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c-b^2x^2}\text{erf}(bx)\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int x\,dx,x,\text{erf}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}\,\text{erf}(bx)^2}{4b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c\text{erf}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)*Erf[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erf[b*x]^2)/(4*b)
```

fricas [A] time = 0.49, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\,\operatorname{erf}\left(bx\right)^{2} e^{c}}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erf(b*x),x, algorithm="fricas")
```

```
[Out] 1/4*sqrt(pi)*erf(b*x)^2*e^c/b
```

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

$$\int \operatorname{erf}\left(bx\right) e^{\left(-b^{2} x^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erf(b*x),x, algorithm="giac")
```

```
[Out] integrate(erf(b*x)*e^(-b^2*x^2 + c), x)
```

maple [A] time = 0.06, size = 17, normalized size = 0.81

$$\frac{\mathrm{e}^{c} \operatorname{erf}\left(bx\right)^{2} \sqrt{\pi}}{4b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)*erf(b*x),x)
```

```
[Out] 1/4*exp(c)*erf(b*x)^2*Pi^(1/2)/b
```

maxima [A] time = 0.34, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\,\operatorname{erf}\left(bx\right)^{2} e^{c}}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erf(b*x),x, algorithm="maxima")
```

```
[Out] 1/4*sqrt(pi)*erf(b*x)^2*e^c/b
```

mupad [B] time = 0.42, size = 93, normalized size = 4.43

$$\frac{\sqrt{\pi}\,\mathrm{erf}\left(x\sqrt{b^2}\right)^2 e^c}{4\,b}-\frac{\sqrt{\pi}\,e^c\,\mathrm{erfi}\left(\frac{b^2\,x}{\sqrt{-b^2}}\right)\mathrm{erf}\,(b\,x)}{2\sqrt{-b^2}}+\frac{b\sqrt{\pi}\,\mathrm{erf}\left(x\sqrt{b^2}\right)e^c\,\mathrm{erfi}\left(\frac{b^2\,x}{\sqrt{-b^2}}\right)}{2\sqrt{b^2}\sqrt{-b^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)*erf(b*x),x)
```

```
[Out] (pi^(1/2)*erf(x*(b^2)^(1/2))^2*exp(c))/(4*b) - (pi^(1/2)*exp(c)*erfi((b^2*x
)/(-b^2)^(1/2))*erf(b*x))/(2*(-b^2)^(1/2)) + (b*pi^(1/2)*erf(x*(b^2)^(1/2))
*exp(c)*erfi((b^2*x)/(-b^2)^(1/2)))/(2*(b^2)^(1/2)*(-b^2)^(1/2))
```

sympy [A] time = 0.63, size = 19, normalized size = 0.90

$$\begin{cases}\frac{\sqrt{\pi}e^c\,\mathrm{erf}^2\,(bx)}{4b} & \text{for } b\neq 0\\ 0 & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)*erf(b*x),x)
```

```
[Out] Piecewise((sqrt(pi)*exp(c)*erf(b*x)**2/(4*b), Ne(b, 0)), (0, True))
```

3.49 $\int \frac{e^{c-b^2x^2}}{\mathbf{erf}(bx)}\,dx$

Optimal. Leaf size=20

$$\frac{\sqrt{\pi}\,e^c\log(\mathrm{erf}(bx))}{2b}$$

```
[Out] 1/2*exp(c)*ln(erf(b*x))*Pi^(1/2)/b
```

Rubi [A] time = 0.03, antiderivative size = 20, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6373, 29}

$$\frac{\sqrt{\pi}\,e^c\log(\mathrm{Erf}(bx))}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)/Erf[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Log[Erf[b*x]])/(2*b)
```

Rule 29

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

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c-b^2x^2}}{\mathrm{erf}(bx)}\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\mathrm{Subst}\left(\int \frac{1}{x}\,dx, x, \mathrm{erf}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}\,\log(\mathrm{erf}(bx))}{2b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 20, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c\log(\mathrm{erf}(bx))}{2b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)/Erf[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Log[Erf[b*x]])/(2*b)
```

fricas [A] time = 0.50, size = 15, normalized size = 0.75

$$\frac{\sqrt{\pi}\, e^{c} \log\left(\operatorname{erf}\left(bx\right)\right)}{2\, b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*sqrt(pi)*e^c*log(erf(b*x))/b
```

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

$$\int \frac{e^{\left(-b^{2} x^{2}+c\right)}}{\operatorname{erf}\left(bx\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(e^(-b^2*x^2 + c)/erf(b*x), x)
```

maple [F(-2)] time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{-b^{2} x^{2}+c}}{\operatorname{erf}\left(bx\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)/erf(b*x),x)
```

```
[Out] int(exp(-b^2*x^2+c)/erf(b*x),x)
```

maxima [A] time = 0.32, size = 15, normalized size = 0.75

$$\frac{\sqrt{\pi}\, e^{c} \log\left(\operatorname{erf}\left(bx\right)\right)}{2\, b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*sqrt(pi)*e^c*log(erf(b*x))/b
```

mupad [B] time = 0.16, size = 15, normalized size = 0.75

$$\frac{\sqrt{\pi}\ \ln\left(\mathrm{erf}\left(b\,x\right)\right)\ \mathrm{e}^{c}}{2\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)/erf(b*x),x)
```

```
[Out] (pi^(1/2)*log(erf(b*x))*exp(c))/(2*b)
```

sympy [A] time = 0.41, size = 17, normalized size = 0.85

$$\frac{\sqrt{\pi} e^{c} \log\left(\mathrm{erf}\left(bx\right)\right)}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)/erf(b*x),x)
```

```
[Out] sqrt(pi)*exp(c)*log(erf(b*x))/(2*b)
```

3.50 $\int \frac{e^{c-b^2x^2}}{\mathbf{erf}(bx)^2}\,dx$

Optimal. Leaf size=21

$$-\frac{\sqrt{\pi}\,e^c}{2b\operatorname{erf}(bx)}$$

```
[Out] -1/2*exp(c)*Pi^(1/2)/b/erf(b*x)
```

Rubi [A] time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6373, 30}

$$-\frac{\sqrt{\pi}\,e^c}{2b\operatorname{Erf}(bx)}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)/Erf[b*x]^2,x]
```

```
[Out] -(E^c*Sqrt[Pi])/(2*b*Erf[b*x])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c-b^2x^2}}{\operatorname{erf}(bx)^2}\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\operatorname{Subst}\left(\int \frac{1}{x^2}\,dx, x, \operatorname{erf}(bx)\right)}{2b}\\ &= -\frac{e^c\sqrt{\pi}}{2b\operatorname{erf}(bx)}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$-\frac{\sqrt{\pi}\,e^c}{2b\operatorname{erf}(bx)}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)/Erf[b*x]^2,x]
```

```
[Out] -1/2*(E^c*Sqrt[Pi])/(b*Erf[b*x])
```

fricas [A] time = 0.57, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\, e^{c}}{2\, b \operatorname{erf}\left(bx\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/2*sqrt(pi)*e^c/(b*erf(b*x))
```

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

$$\int \frac{e^{\left(-b^{2}x^{2}+c\right)}}{\operatorname{erf}\left(bx\right)^{2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(e^(-b^2*x^2 + c)/erf(b*x)^2, x)
```

maple [A] time = 0.00, size = 17, normalized size = 0.81

$$-\frac{\mathrm{e}^{c}\sqrt{\pi}}{2b \operatorname{erf}\left(bx\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)/erf(b*x)^2,x)
```

```
[Out] -1/2*exp(c)*Pi^(1/2)/b/erf(b*x)
```

maxima [A] time = 0.53, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\, e^{c}}{2\, b \operatorname{erf}\left(bx\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/2*sqrt(pi)*e^c/(b*erf(b*x))
```

mupad [B] time = 0.14, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\,\mathrm{e}^{c}}{2\,b\,\mathrm{erf}\left(b\,x\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)/erf(b*x)^2,x)
[Out] -(pi^(1/2)*exp(c))/(2*b*erf(b*x))
```

sympy [A] time = 0.69, size = 17, normalized size = 0.81

$$-\frac{\sqrt{\pi}e^{c}}{2b\,\mathrm{erf}\left(bx\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)/erf(b*x)**2,x)
[Out] -sqrt(pi)*exp(c)/(2*b*erf(b*x))
```

3.51 $\int \frac{e^{c-b^2x^2}}{\text{erf}(bx)^3}\, dx$

Optimal. Leaf size=21

$$-\frac{\sqrt{\pi}\, e^c}{4b\text{erf}(bx)^2}$$

```
[Out] -1/4*exp(c)*Pi^(1/2)/b/erf(b*x)^2
```

Rubi [A] time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6373, 30}

$$-\frac{\sqrt{\pi}\, e^c}{4b\text{Erf}(bx)^2}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)/Erf[b*x]^3,x]
```

```
[Out] -(E^c*Sqrt[Pi])/(4*b*Erf[b*x]^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c-b^2x^2}}{\text{erf}(bx)^3}\, dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int \frac{1}{x^3}\, dx, x, \text{erf}(bx)\right)}{2b}\\ &= -\frac{e^c\sqrt{\pi}}{4b\text{erf}(bx)^2}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$-\frac{\sqrt{\pi}\, e^c}{4b\text{erf}(bx)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)/Erf[b*x]^3,x]
[Out] -1/4*(E^c*Sqrt[Pi])/(b*Erf[b*x]^2)
```

fricas [A] time = 0.57, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\,e^{c}}{4\,b\,\mathrm{erf}\,(bx)^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)/erf(b*x)^3,x, algorithm="fricas")
[Out] -1/4*sqrt(pi)*e^c/(b*erf(b*x)^2)
```

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

$$\int \frac{e^{\left(-b^{2}x^{2}+c\right)}}{\mathrm{erf}\,(bx)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)/erf(b*x)^3,x, algorithm="giac")
[Out] integrate(e^(-b^2*x^2 + c)/erf(b*x)^3, x)
```

maple [A] time = 0.00, size = 17, normalized size = 0.81

$$-\frac{\mathrm{e}^{c}\sqrt{\pi}}{4b\,\mathrm{erf}\,(bx)^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)/erf(b*x)^3,x)
[Out] -1/4*exp(c)*Pi^(1/2)/b/erf(b*x)^2
```

maxima [A] time = 0.48, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\,e^{c}}{4\,b\,\mathrm{erf}\,(bx)^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)/erf(b*x)^3,x, algorithm="maxima")
```

```
[Out] -1/4*sqrt(pi)*e^c/(b*erf(b*x)^2)
```

mupad [B] time = 0.12, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\ \mathrm{e}^{c}}{4\,b\,\mathrm{erf}\left(b\,x\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)/erf(b*x)^3,x)
[Out] -(pi^(1/2)*exp(c))/(4*b*erf(b*x)^2)
```

sympy [A] time = 1.30, size = 19, normalized size = 0.90

$$-\frac{\sqrt{\pi}e^{c}}{4b\,\mathrm{erf}^{2}\left(bx\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)/erf(b*x)**3,x)
[Out] -sqrt(pi)*exp(c)/(4*b*erf(b*x)**2)
```

3.52 $\int e^{c-b^2x^2}\mathbf{erf}(bx)^n\,dx$

Optimal. Leaf size=28

$$\frac{\sqrt{\pi}\,e^c\text{erf}(bx)^{n+1}}{2b(n+1)}$$

```
[Out] 1/2*exp(c)*erf(b*x)^(1+n)*Pi^(1/2)/b/(1+n)
```

Rubi [A] time = 0.04, antiderivative size = 28, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6373, 30}

$$\frac{\sqrt{\pi}\,e^c\text{Erf}(bx)^{n+1}}{2b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)*Erf[b*x]^n,x]
```

```
[Out] (E^c*Sqrt[Pi]*Erf[b*x]^(1 + n))/(2*b*(1 + n))
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c-b^2x^2}\text{erf}(bx)^n\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int x^n\,dx, x, \text{erf}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}\,\text{erf}(bx)^{1+n}}{2b(1+n)}\end{aligned}$$

Mathematica [A] time = 0.01, size = 28, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c\text{erf}(bx)^{n+1}}{2b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)*Erf[b*x]^n,x]
```

```
[Out] (E^c*Sqrt[Pi]*Erf[b*x]^(1 + n))/(2*b*(1 + n))
```

fricas [A] time = 0.68, size = 24, normalized size = 0.86

$$\frac{\sqrt{\pi}\,\operatorname{erf}(bx)^n\operatorname{erf}(bx)\,e^c}{2\,(bn+b)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erf(b*x)^n,x, algorithm="fricas")
```

```
[Out] 1/2*sqrt(pi)*erf(b*x)^n*erf(b*x)*e^c/(b*n + b)
```

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

$$\int \operatorname{erf}(bx)^n\,e^{\left(-b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erf(b*x)^n,x, algorithm="giac")
```

```
[Out] integrate(erf(b*x)^n*e^(-b^2*x^2 + c), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{-b^2x^2+c}\operatorname{erf}(bx)^n\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)*erf(b*x)^n,x)
```

```
[Out] int(exp(-b^2*x^2+c)*erf(b*x)^n,x)
```

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

$$\int \operatorname{erf}(bx)^n\,e^{\left(-b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erf(b*x)^n,x, algorithm="maxima")
```

```
[Out] integrate(erf(b*x)^n*e^(-b^2*x^2 + c), x)
```

mupad [B] time = 0.16, size = 23, normalized size = 0.82

$$\frac{\sqrt{\pi}\ \mathrm{e}^{c}\,\mathrm{erf}\left(b\,x\right)^{n+1}}{2\,b\,\left(n+1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)*erf(b*x)^n,x)
```

```
[Out] (pi^(1/2)*exp(c)*erf(b*x)^(n + 1))/(2*b*(n + 1))
```

sympy [A] time = 5.60, size = 63, normalized size = 2.25

$$\begin{cases} \tilde{\infty} x e^{c} & \text{for}\: b = 0 \wedge n = -1 \\ 0^{n} x e^{c} & \text{for}\: b = 0 \\ \frac{\sqrt{\pi} e^{c} \log{\left(\operatorname{erf}{\left(b x \right)} \right)}}{2 b} & \text{for}\: n = -1 \\ \frac{\sqrt{\pi} e^{c} \operatorname{erf}{\left(b x \right)} \operatorname{erf}^{n}{\left(b x \right)}}{2 b n + 2 b} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)*erf(b*x)**n,x)
```

```
[Out] Piecewise((zoo*x*exp(c), Eq(b, 0) & Eq(n, -1)), (0**n*x*exp(c), Eq(b, 0)),
(sqrt(pi)*exp(c)*log(erf(b*x))/(2*b), Eq(n, -1)), (sqrt(pi)*exp(c)*erf(b*x)
*erf(b*x)**n/(2*b*n + 2*b), True))
```

3.53 $\int e^{c+dx^2} x^5 \mathbf{erf}(bx)\,dx$

Optimal. Leaf size=285

$$-\frac{be^c\operatorname{erf}\left(x\sqrt{b^2-d}\right)}{d^3\sqrt{b^2-d}}+\frac{be^c\operatorname{erf}\left(x\sqrt{b^2-d}\right)}{2d^2\left(b^2-d\right)^{3/2}}-\frac{bxe^{c-x^2\left(b^2-d\right)}}{\sqrt{\pi}\,d^2\left(b^2-d\right)}-\frac{3be^c\operatorname{erf}\left(x\sqrt{b^2-d}\right)}{8d\left(b^2-d\right)^{5/2}}+\frac{3bxe^{c-x^2\left(b^2-d\right)}}{4\sqrt{\pi}\,d\left(b^2-d\right)^2}+\frac{bx^3e^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}$$

```
[Out] exp(d*x^2+c)*erf(b*x)/d^3-exp(d*x^2+c)*x^2*erf(b*x)/d^2+1/2*exp(d*x^2+c)*x^
4*erf(b*x)/d+1/2*b*exp(c)*erf(x*(b^2-d)^(1/2))/(b^2-d)^(3/2)/d^2-3/8*b*exp(
c)*erf(x*(b^2-d)^(1/2))/(b^2-d)^(5/2)/d-b*exp(c)*erf(x*(b^2-d)^(1/2))/d^3/(
b^2-d)^(1/2)-b*exp(c-(b^2-d)*x^2)*x/(b^2-d)/d^2/Pi^(1/2)+3/4*b*exp(c-(b^2-d
)*x^2)*x/(b^2-d)^2/d/Pi^(1/2)+1/2*b*exp(c-(b^2-d)*x^2)*x^3/(b^2-d)/d/Pi^(1/
2)
```

Rubi [A] time = 0.44, antiderivative size = 285, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.235, Rules used = {6385, 6382, 2205, 2212}

$$\frac{be^c\operatorname{Erf}\left(x\sqrt{b^2-d}\right)}{2d^2\left(b^2-d\right)^{3/2}}-\frac{be^c\operatorname{Erf}\left(x\sqrt{b^2-d}\right)}{d^3\sqrt{b^2-d}}-\frac{bxe^{c-x^2\left(b^2-d\right)}}{\sqrt{\pi}\,d^2\left(b^2-d\right)}-\frac{3be^c\operatorname{Erf}\left(x\sqrt{b^2-d}\right)}{8d\left(b^2-d\right)^{5/2}}+\frac{bx^3e^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}+\frac{3bxe^{c-x^2\left(b^2-d\right)}}{4\sqrt{\pi}\,d\left(b^2-d\right)^2}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x^5*Erf[b*x],x]
```

```
[Out] -((b*E^(c - (b^2 - d)*x^2)*x)/((b^2 - d)*d^2*Sqrt[Pi])) + (3*b*E^(c - (b^2
- d)*x^2)*x)/(4*(b^2 - d)^2*d*Sqrt[Pi]) + (b*E^(c - (b^2 - d)*x^2)*x^3)/(2*
(b^2 - d)*d*Sqrt[Pi]) + (E^(c + d*x^2)*Erf[b*x])/d^3 - (E^(c + d*x^2)*x^2*E
rf[b*x])/d^2 + (E^(c + d*x^2)*x^4*Erf[b*x])/(2*d) - (b*E^c*Erf[Sqrt[b^2 - d
]*x])/(Sqrt[b^2 - d]*d^3) + (b*E^c*Erf[Sqrt[b^2 - d]*x])/(2*(b^2 - d)^(3/2)
*d^2) - (3*b*E^c*Erf[Sqrt[b^2 - d]*x])/(8*(b^2 - d)^(5/2)*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
```

```
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\int e^{c+dx^2}x^5\text{erf}(bx)\,dx = \frac{e^{c+dx^2}x^4\text{erf}(bx)}{2d} - \frac{2\int e^{c+dx^2}x^3\text{erf}(bx)\,dx}{d} - \frac{b\int e^{c-\left(b^2-d\right)x^2}x^4\,dx}{d\sqrt{\pi}}$$

$$= \frac{be^{c-\left(b^2-d\right)x^2}x^3}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}x^2\text{erf}(bx)}{d^2} + \frac{e^{c+dx^2}x^4\text{erf}(bx)}{2d} + \frac{2\int e^{c+dx^2}x\text{erf}(bx)\,dx}{d^2} + \frac{(2b)\int e^{c}}{d}$$

$$= -\frac{be^{c-\left(b^2-d\right)x^2}x}{\left(b^2-d\right)d^2\sqrt{\pi}} + \frac{3be^{c-\left(b^2-d\right)x^2}x}{4\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{be^{c-\left(b^2-d\right)x^2}x^3}{2\left(b^2-d\right)d\sqrt{\pi}} + \frac{e^{c+dx^2}\text{erf}(bx)}{d^3} - \frac{e^{c+dx^2}x^2\text{erf}(bx)}{d^2}$$

$$= -\frac{be^{c-\left(b^2-d\right)x^2}x}{\left(b^2-d\right)d^2\sqrt{\pi}} + \frac{3be^{c-\left(b^2-d\right)x^2}x}{4\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{be^{c-\left(b^2-d\right)x^2}x^3}{2\left(b^2-d\right)d\sqrt{\pi}} + \frac{e^{c+dx^2}\text{erf}(bx)}{d^3} - \frac{e^{c+dx^2}x^2\text{erf}(bx)}{d^2}$$

Mathematica [A] time = 0.47, size = 138, normalized size = 0.48

$$\frac{e^c\left(\frac{2bdxe^{x^2(d-b^2)}\left(2b^2\left(dx^2-2\right)+d\left(7-2dx^2\right)\right)}{\sqrt{\pi}\left(b^2-d\right)^2} + \frac{b\left(-8b^4+20b^2d-15d^2\right)\text{erfi}\left(x\sqrt{d-b^2}\right)}{\left(d-b^2\right)^{5/2}} + 4e^{dx^2}\left(d^2x^4-2dx^2+2\right)\text{erf}(bx)\right)}{8d^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x^5*Erf[b*x],x]
```

```
[Out] (E^c*((2*b*d*E^((-b^2 + d)*x^2)*x*(d*(7 - 2*d*x^2) + 2*b^2*(-2 + d*x^2)))/(
(b^2 - d)^2*Sqrt[Pi]) + 4*E^(d*x^2)*(2 - 2*d*x^2 + d^2*x^4)*Erf[b*x] + (b*(
-8*b^4 + 20*b^2*d - 15*d^2)*Erfi[Sqrt[-b^2 + d]*x])/(-b^2 + d)^(5/2)))/(8*d
^3)
```

fricas [A] time = 0.55, size = 260, normalized size = 0.91

$$-\frac{\pi\left(8\,b^5-20\,b^3d+15\,bd^2\right)\sqrt{b^2-d}\,\operatorname{erf}\left(\sqrt{b^2-d}\,x\right)e^c-4\left(\pi\left(b^6d^2-3\,b^4d^3+3\,b^2d^4-d^5\right)x^4-2\,\pi\left(b^6d-3\,b^4d^2+\cdots\right.\right.}{8\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^5*erf(b*x),x, algorithm="fricas")
```

```
[Out] -1/8*(pi*(8*b^5 - 20*b^3*d + 15*b*d^2)*sqrt(b^2 - d)*erf(sqrt(b^2 - d)*x)*e
^c - 4*(pi*(b^6*d^2 - 3*b^4*d^3 + 3*b^2*d^4 - d^5)*x^4 - 2*pi*(b^6*d - 3*b^
4*d^2 + 3*b^2*d^3 - d^4)*x^2 + 2*pi*(b^6 - 3*b^4*d + 3*b^2*d^2 - d^3))*erf(
b*x)*e^(d*x^2 + c) - 2*sqrt(pi)*(2*(b^5*d^2 - 2*b^3*d^3 + b*d^4)*x^3 - (4*b
^5*d - 11*b^3*d^2 + 7*b*d^3)*x)*e^(-b^2*x^2 + d*x^2 + c))/(pi*(b^6*d^3 - 3*
b^4*d^4 + 3*b^2*d^5 - d^6))
```

giac [A] time = 0.30, size = 257, normalized size = 0.90

$$-\frac{\left(2\,dx^2-\left(dx^2+c\right)^2+2\,\left(dx^2+c\right)c-c^2-2\right)\operatorname{erf}\left(bx\right)e^{\left(dx^2+c\right)}}{2\,d^3}+\frac{\sqrt{\pi}\,bd^2\left(\frac{2\,\left(2\,b^2x^3-2\,dx^3+3\,x\right)e^{\left(-b^2x^2+dx^2+c\right)}}{b^4-2\,b^2d+d^2}+\frac{3\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{b^2\cdots}\right.}{\left(b^4-2\,b^2d+d^2\right)\cdots}\right.}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^5*erf(b*x),x, algorithm="giac")
```

```
[Out] -1/2*(2*d*x^2 - (d*x^2 + c)^2 + 2*(d*x^2 + c)*c - c^2 - 2)*erf(b*x)*e^(d*x^
2 + c)/d^3 + 1/8*(sqrt(pi)*b*d^2*(2*(2*b^2*x^3 - 2*d*x^3 + 3*x)*e^(-b^2*x^2
 + d*x^2 + c)/(b^4 - 2*b^2*d + d^2) + 3*sqrt(pi)*erf(-sqrt(b^2 - d)*x)*e^c/
((b^4 - 2*b^2*d + d^2)*sqrt(b^2 - d))) - 4*sqrt(pi)*b*d*(2*x*e^(-b^2*x^2 +
d*x^2 + c)/(b^2 - d) + sqrt(pi)*erf(-sqrt(b^2 - d)*x)*e^c/(b^2 - d)^(3/2))
+ 8*pi*b*erf(-sqrt(b^2 - d)*x)*e^c/sqrt(b^2 - d))/(pi*d^3)
```

maple [A] time = 0.10, size = 312, normalized size = 1.09

$$\frac{\frac{\mathrm{erf}(bx)\mathrm{e}^{c}\left(\frac{\mathrm{e}^{d\,x^2}b^6x^4}{2d}-\frac{2b^2\left(\frac{b^4x^2\mathrm{e}^{d\,x^2}}{2d}-\frac{b^4\mathrm{e}^{d\,x^2}}{2d^2}\right)}{d}\right)}{b^5}-\frac{\mathrm{e}^{c}\left(\frac{b^2\left(\frac{b^3x^3\mathrm{e}^{\left(-1+\frac{d}{b^2}\right)b^2x^2}}{-2+\frac{2d}{b^2}}-\frac{3\left(\frac{bx\,\mathrm{e}^{\left(-1+\frac{d}{b^2}\right)b^2x^2}}{-2+\frac{2d}{b^2}}-\frac{\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{1-\frac{d}{b^2}}\,bx\right)}{4\left(-1+\frac{d}{b^2}\right)\sqrt{1-\frac{d}{b^2}}}\right)}{2\left(-1+\frac{d}{b^2}\right)}\right)}{d}+\frac{b^6\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{1-\frac{d}{b^2}}\,bx\right)}{d^3\sqrt{1-\frac{d}{b^2}}}-\frac{2b^4\left(\frac{bx\,\mathrm{e}^{\left(-\cdots\right)}}{\cdots}\cdots\right)}{\cdots}\right)}{\sqrt{\pi}\,b^5}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^5*erf(b*x),x)
```

```
[Out] (erf(b*x)/b^5*exp(c)*(1/2*exp(d*x^2)*b^6*x^4/d-2/d*b^2*(1/2/d*b^4*x^2*exp(d
*x^2)-1/2/d^2*b^4*exp(d*x^2)))-1/Pi^(1/2)/b^5*exp(c)*(1/d*b^2*(1/2/(-1+d/b^
2)*b^3*x^3*exp((-1+d/b^2)*b^2*x^2)-3/2/(-1+d/b^2)*(1/2/(-1+d/b^2)*b*x*exp((
-1+d/b^2)*b^2*x^2)-1/4/(-1+d/b^2)*Pi^(1/2)/(1-d/b^2)^(1/2)*erf((1-d/b^2)^(1
/2)*b*x)))+1/d^3*b^6*Pi^(1/2)/(1-d/b^2)^(1/2)*erf((1-d/b^2)^(1/2)*b*x)-2/d^
2*b^4*(1/2/(-1+d/b^2)*b*x*exp((-1+d/b^2)*b^2*x^2)-1/4/(-1+d/b^2)*Pi^(1/2)/(
1-d/b^2)^(1/2)*erf((1-d/b^2)^(1/2)*b*x))))/b
```

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

$$\frac{\left(d^2x^4e^c-2\,dx^2e^c+2\,e^c\right)\mathrm{erf}\left(bx\right)e^{\left(dx^2\right)}}{2\,d^3}-\frac{-\frac{bd^2x^5e^c\Gamma\left(\frac{5}{2},\left(b^2-d\right)x^2\right)}{2\left(\left(b^2-d\right)x^2\right)^{\frac{5}{2}}}+\frac{bdx^3e^c\Gamma\left(\frac{3}{2},\left(b^2-d\right)x^2\right)}{\left(\left(b^2-d\right)x^2\right)^{\frac{3}{2}}}+\frac{\sqrt{\pi}\,b\,\mathrm{erf}\left(\sqrt{b^2-d}\,x\right)e^c}{\sqrt{b^2-d}}}{\sqrt{\pi}\,d^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^5*erf(b*x),x, algorithm="maxima")
```

```
[Out] 1/2*(d^2*x^4*e^c - 2*d*x^2*e^c + 2*e^c)*erf(b*x)*e^(d*x^2)/d^3 - integrate(
(b*d^2*x^4*e^c - 2*b*d*x^2*e^c + 2*b*e^c)*e^(-b^2*x^2 + d*x^2), x)/(sqrt(pi
)*d^3)
```

mupad [B] time = 0.77, size = 244, normalized size = 0.86

$$\operatorname{erf}(b\,x)\left(\frac{e^{d\,x^2+c}}{d^3}-\frac{x^2\,e^{d\,x^2+c}}{d^2}+\frac{x^4\,e^{d\,x^2+c}}{2\,d}\right)-\frac{b\,e^c\operatorname{erf}\left(x\,\sqrt{b^2-d}\right)}{d^3\,\sqrt{b^2-d}}-\frac{b\,e^c\operatorname{erfi}\left(x\,\sqrt{d-b^2}\right)}{2\,d^2\,\left(d-b^2\right)^{3/2}}+\frac{b\,x\,e^{-b^2\,x^2+d\,x^2+c}}{d^2\,\sqrt{\pi}\,\left(d-b^2\right)}+\frac{b\,x^5\,e^c\,\left(\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*exp(c + d*x^2)*erf(b*x),x)
```

```
[Out] erf(b*x)*(exp(c + d*x^2)/d^3 - (x^2*exp(c + d*x^2))/d^2 + (x^4*exp(c + d*x^
2))/(2*d)) - (b*exp(c)*erf(x*(b^2 - d)^(1/2)))/(d^3*(b^2 - d)^(1/2)) - (b*e
xp(c)*erfi(x*(d - b^2)^(1/2)))/(2*d^2*(d - b^2)^(3/2)) + (b*x*exp(c + d*x^2
 - b^2*x^2))/(d^2*pi^(1/2)*(d - b^2)) + (b*x^5*exp(c)*(exp(d*x^2 - b^2*x^2)
*((3*(-x^2*(d - b^2))^(1/2))/2 + (-x^2*(d - b^2))^(3/2)) - (3*pi^(1/2))/4 +
 (3*pi^(1/2)*erfc((-x^2*(d - b^2))^(1/2)))/4))/(2*d*pi^(1/2)*(-x^2*(d - b^2
))^(5/2))
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**5*erf(b*x),x)
```

```
[Out] Timed out
```

3.54 $\int e^{c+dx^2}x^3\operatorname{erf}(bx)\,dx$

Optimal. Leaf size=155

$$\frac{be^c\operatorname{erf}\left(x\sqrt{b^2-d}\right)}{2d^2\sqrt{b^2-d}}-\frac{be^c\operatorname{erf}\left(x\sqrt{b^2-d}\right)}{4d\left(b^2-d\right)^{3/2}}+\frac{bxe^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}-\frac{\operatorname{erf}(bx)e^{c+dx^2}}{2d^2}+\frac{x^2\operatorname{erf}(bx)e^{c+dx^2}}{2d}$$

```
[Out] -1/2*exp(d*x^2+c)*erf(b*x)/d^2+1/2*exp(d*x^2+c)*x^2*erf(b*x)/d-1/4*b*exp(c)
*erf(x*(b^2-d)^(1/2))/(b^2-d)^(3/2)/d+1/2*b*exp(c)*erf(x*(b^2-d)^(1/2))/d^2
/(b^2-d)^(1/2)+1/2*b*exp(c-(b^2-d)*x^2)*x/(b^2-d)/d/Pi^(1/2)
```

Rubi [A] time = 0.16, antiderivative size = 155, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.235, Rules used = {6385, 6382, 2205, 2212}

$$\frac{be^c\operatorname{Erf}\left(x\sqrt{b^2-d}\right)}{2d^2\sqrt{b^2-d}}-\frac{be^c\operatorname{Erf}\left(x\sqrt{b^2-d}\right)}{4d\left(b^2-d\right)^{3/2}}+\frac{bxe^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}-\frac{\operatorname{Erf}(bx)e^{c+dx^2}}{2d^2}+\frac{x^2\operatorname{Erf}(bx)e^{c+dx^2}}{2d}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x^3*Erf[b*x],x]
```

```
[Out] (b*E^(c - (b^2 - d)*x^2)*x)/(2*(b^2 - d)*d*Sqrt[Pi]) - (E^(c + d*x^2)*Erf[b
*x])/(2*d^2) + (E^(c + d*x^2)*x^2*Erf[b*x])/(2*d) + (b*E^c*Erf[Sqrt[b^2 - d
]*x])/(2*Sqrt[b^2 - d]*d^2) - (b*E^c*Erf[Sqrt[b^2 - d]*x])/(4*(b^2 - d)^(3/
2)*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\int e^{c+dx^2}x^3\text{erf}(bx)\,dx = \frac{e^{c+dx^2}x^2\text{erf}(bx)}{2d} - \frac{\int e^{c+dx^2}x\text{erf}(bx)\,dx}{d} - \frac{b\int e^{c-\left(b^2-d\right)x^2}x^2\,dx}{d\sqrt{\pi}}$$
$$= \frac{be^{c-\left(b^2-d\right)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erf}(bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erf}(bx)}{2d} + \frac{b\int e^{c-\left(b^2-d\right)x^2}\,dx}{d^2\sqrt{\pi}} - \frac{b\int e^{c+\left(-b^2+d\right)x^2}\,d}{2\left(b^2-d\right)d\sqrt{\pi}}$$
$$= \frac{be^{c-\left(b^2-d\right)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erf}(bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erf}(bx)}{2d} + \frac{be^c\text{erf}\left(\sqrt{b^2-d}\,x\right)}{2\sqrt{b^2-d}\,d^2} - \frac{be^c\text{erf}\left(\sqrt{b^2-d}\right.}{4\left(b^2-d\right)^{3/2}}$$

Mathematica [A] time = 0.30, size = 99, normalized size = 0.64

$$\frac{e^c\left(\frac{b\left(3d-2b^2\right)\text{erfi}\left(x\sqrt{d-b^2}\right)}{\left(d-b^2\right)^{3/2}} + \frac{2bdxe^{x^2\left(d-b^2\right)}}{\sqrt{\pi}\left(b^2-d\right)} + 2e^{dx^2}\left(dx^2-1\right)\text{erf}(bx)\right)}{4d^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x^3*Erf[b*x],x]
```

```
[Out] (E^c*((2*b*d*E^((-b^2 + d)*x^2)*x)/((b^2 - d)*Sqrt[Pi]) + 2*E^(d*x^2)*(-1 +
 d*x^2)*Erf[b*x] + (b*(-2*b^2 + 3*d)*Erfi[Sqrt[-b^2 + d]*x])/(-b^2 + d)^(3/
2)))/(4*d^2)
```

fricas [A] time = 0.44, size = 149, normalized size = 0.96

$$\frac{\pi\left(2\,b^3-3\,bd\right)\sqrt{b^2-d}\,\text{erf}\left(\sqrt{b^2-d}\,x\right)e^c + 2\sqrt{\pi}\left(b^3d-bd^2\right)xe^{\left(-b^2x^2+dx^2+c\right)} + 2\left(\pi\left(b^4d-2\,b^2d^2+d^3\right)x^2-\pi\left(b^4-\right.\right.}{4\,\pi\left(b^4d^2-2\,b^2d^3+d^4\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*(pi*(2*b^3 - 3*b*d)*sqrt(b^2 - d)*erf(sqrt(b^2 - d)*x)*e^c + 2*sqrt(pi)
*(b^3*d - b*d^2)*x*e^(-b^2*x^2 + d*x^2 + c) + 2*(pi*(b^4*d - 2*b^2*d^2 + d^
3)*x^2 - pi*(b^4 - 2*b^2*d + d^2))*erf(b*x)*e^(d*x^2 + c))/(pi*(b^4*d^2 - 2
*b^2*d^3 + d^4))
```

giac [A] time = 0.26, size = 124, normalized size = 0.80

$$\frac{\left(dx^2-1\right)\operatorname{erf}(bx)\,e^{\left(dx^2+c\right)}}{2\,d^2}+\frac{bd\left(\frac{2\,xe^{\left(-b^2x^2+dx^2+c\right)}}{b^2-d}+\frac{\sqrt{\pi}\operatorname{erf}\left(-\sqrt{b^2-d}\,x\right)e^c}{\left(b^2-d\right)^{\frac{3}{2}}}\right)-\frac{2\sqrt{\pi}\,b\operatorname{erf}\left(-\sqrt{b^2-d}\,x\right)e^c}{\sqrt{b^2-d}}}{4\sqrt{\pi}\,d^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*(d*x^2 - 1)*erf(b*x)*e^(d*x^2 + c)/d^2 + 1/4*(b*d*(2*x*e^(-b^2*x^2 + d*
x^2 + c)/(b^2 - d) + sqrt(pi)*erf(-sqrt(b^2 - d)*x)*e^c/(b^2 - d)^(3/2)) -
2*sqrt(pi)*b*erf(-sqrt(b^2 - d)*x)*e^c/sqrt(b^2 - d))/(sqrt(pi)*d^2)
```

maple [A] time = 0.20, size = 168, normalized size = 1.08

$$\frac{\frac{\operatorname{erf}(bx)e^c\left(\frac{b^4x^2e^{d\,x^2}}{2d}-\frac{b^4e^{d\,x^2}}{2d^2}\right)}{b^3}-\frac{e^c\left(\frac{b^2\left(\frac{bx\,e^{\left(-1+\frac{d}{b^2}\right)b^2x^2}}{-2+\frac{2d}{b^2}}-\frac{\sqrt{\pi}\operatorname{erf}\left(\sqrt{1-\frac{d}{b^2}}\,bx\right)}{4\left(-1+\frac{d}{b^2}\right)\sqrt{1-\frac{d}{b^2}}}\right)}{d}-\frac{b^4\sqrt{\pi}\operatorname{erf}\left(\sqrt{1-\frac{d}{b^2}}\,bx\right)}{2d^2\sqrt{1-\frac{d}{b^2}}}\right)}{\sqrt{\pi}\,b^3}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^3*erf(b*x),x)
```

```
[Out] (erf(b*x)/b^3*exp(c)*(1/2/d*b^4*x^2*exp(d*x^2)-1/2/d^2*b^4*exp(d*x^2))-1/Pi
^(1/2)/b^3*exp(c)*(1/d*b^2*(1/2/(-1+d/b^2)*b*x*exp((-1+d/b^2)*b^2*x^2)-1/4/
(-1+d/b^2)*Pi^(1/2)/(1-d/b^2)^(1/2)*erf((1-d/b^2)^(1/2)*b*x))-1/2/d^2*b^4*P
i^(1/2)/(1-d/b^2)^(1/2)*erf((1-d/b^2)^(1/2)*b*x)))/b
```

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

$$\frac{\left(dx^2e^c - e^c\right)\operatorname{erf}\left(bx\right)e^{\left(dx^2\right)}}{2\,d^2} - \frac{-\frac{bdx^3e^c\Gamma\left(\frac{3}{2},\left(b^2-d\right)x^2\right)}{2\left(\left(b^2-d\right)x^2\right)^{\frac{3}{2}}} - \frac{\sqrt{\pi}\,b\operatorname{erf}\left(\sqrt{b^2-d}\,x\right)e^c}{2\,\sqrt{b^2-d}}}{\sqrt{\pi}\,d^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erf(b*x),x, algorithm="maxima")
```

```
[Out] 1/2*(d*x^2*e^c - e^c)*erf(b*x)*e^(d*x^2)/d^2 - integrate((b*d*x^2*e^c - b*e
^c)*e^(-b^2*x^2 + d*x^2), x)/(sqrt(pi)*d^2)
```

mupad [B] time = 0.53, size = 131, normalized size = 0.85

$$\frac{b\,x\,\mathrm{e}^{-b^2\,x^2+d\,x^2+c}}{2\,\sqrt{\pi}\,\left(b^2\,d-d^2\right)} - \operatorname{erf}\left(b\,x\right)\left(\frac{\mathrm{e}^{d\,x^2+c}}{2\,d^2} - \frac{x^2\,\mathrm{e}^{d\,x^2+c}}{2\,d}\right) + \frac{b\,\mathrm{e}^c\operatorname{erf}\left(x\,\sqrt{b^2-d}\right)}{2\,d^2\,\sqrt{b^2-d}} + \frac{b\,\mathrm{e}^c\operatorname{erfi}\left(x\,\sqrt{d-b^2}\right)}{4\,d\,\left(d-b^2\right)^{3/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*exp(c + d*x^2)*erf(b*x),x)
```

```
[Out] (b*x*exp(c + d*x^2 - b^2*x^2))/(2*pi^(1/2)*(b^2*d - d^2)) - erf(b*x)*(exp(c
 + d*x^2)/(2*d^2) - (x^2*exp(c + d*x^2))/(2*d)) + (b*exp(c)*erf(x*(b^2 - d)
^(1/2)))/(2*d^2*(b^2 - d)^(1/2)) + (b*exp(c)*erfi(x*(d - b^2)^(1/2)))/(4*d*
(d - b^2)^(3/2))
```

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

$$e^c\int x^3e^{dx^2}\operatorname{erf}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**3*erf(b*x),x)
```

```
[Out] exp(c)*Integral(x**3*exp(d*x**2)*erf(b*x), x)
```

3.55 $\int e^{c+dx^2} x \operatorname{erf}(bx)\,dx$

Optimal. Leaf size=57

$$\frac{\operatorname{erf}(bx)e^{c+dx^2}}{2d}-\frac{be^c\operatorname{erf}\left(x\sqrt{b^2-d}\right)}{2d\sqrt{b^2-d}}$$

```
[Out] 1/2*exp(d*x^2+c)*erf(b*x)/d-1/2*b*exp(c)*erf(x*(b^2-d)^(1/2))/d/(b^2-d)^(1/
2)
```

Rubi [A] time = 0.04, antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {6382, 2205}

$$\frac{\operatorname{Erf}(bx)e^{c+dx^2}}{2d}-\frac{be^c\operatorname{Erf}\left(x\sqrt{b^2-d}\right)}{2d\sqrt{b^2-d}}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x*Erf[b*x],x]
```

```
[Out] (E^(c + d*x^2)*Erf[b*x])/(2*d) - (b*E^c*Erf[Sqrt[b^2 - d]*x])/(2*Sqrt[b^2 -
 d]*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int e^{c+dx^2} x \operatorname{erf}(bx)\,dx = \frac{e^{c+dx^2}\operatorname{erf}(bx)}{2d} - \frac{b\int e^{c-(b^2-d)x^2}\,dx}{d\sqrt{\pi}}$$
$$= \frac{e^{c+dx^2}\operatorname{erf}(bx)}{2d} - \frac{be^c\operatorname{erf}\left(\sqrt{b^2-d}\,x\right)}{2\sqrt{b^2-d}\,d}$$

Mathematica [A] time = 0.05, size = 51, normalized size = 0.89

$$\frac{e^c\left(e^{dx^2}\operatorname{erf}(bx) - \frac{b\operatorname{erfi}\left(x\sqrt{d-b^2}\right)}{\sqrt{d-b^2}}\right)}{2d}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x*Erf[b*x],x]
```

```
[Out] (E^c*(E^(d*x^2)*Erf[b*x] - (b*Erfi[Sqrt[-b^2 + d]*x])/Sqrt[-b^2 + d]))/(2*d
)
```

fricas [A] time = 0.65, size = 62, normalized size = 1.09

$$-\frac{\sqrt{b^2-d}\,b\operatorname{erf}\left(\sqrt{b^2-d}\,x\right)e^c - \left(b^2-d\right)\operatorname{erf}(bx)\,e^{\left(dx^2+c\right)}}{2\left(b^2d-d^2\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erf(b*x),x, algorithm="fricas")
```

```
[Out] -1/2*(sqrt(b^2 - d)*b*erf(sqrt(b^2 - d)*x)*e^c - (b^2 - d)*erf(b*x)*e^(d*x^
2 + c))/(b^2*d - d^2)
```

giac [A] time = 0.25, size = 48, normalized size = 0.84

$$\frac{b\operatorname{erf}\left(-\sqrt{b^2-d}\,x\right)e^c}{2\sqrt{b^2-d}\,d} + \frac{\operatorname{erf}(bx)\,e^{\left(dx^2+c\right)}}{2d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erf(b*x),x, algorithm="giac")
```

```
[Out] 1/2*b*erf(-sqrt(b^2 - d)*x)*e^c/(sqrt(b^2 - d)*d) + 1/2*erf(b*x)*e^(d*x^2 +
 c)/d
```

maple [A] time = 0.19, size = 67, normalized size = 1.18

$$\frac{\frac{\operatorname{erf}(bx)b\,\mathrm{e}^{\frac{b^2 d\,x^2+c\,b^2}{b^2}}}{2d}-\frac{b\,\mathrm{e}^{c}\operatorname{erf}\left(\sqrt{1-\frac{d}{b^2}}\;bx\right)}{2d\sqrt{1-\frac{d}{b^2}}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x*erf(b*x),x)
```

```
[Out] (1/2*erf(b*x)*b*exp((b^2*d*x^2+b^2*c)/b^2)/d-1/2*b/d*exp(c)/(1-d/b^2)^(1/2)
*erf((1-d/b^2)^(1/2)*b*x))/b
```

maxima [A] time = 0.34, size = 47, normalized size = 0.82

$$-\frac{b\operatorname{erf}\left(\sqrt{b^2-d}\,x\right)e^{c}}{2\sqrt{b^2-d}\,d}+\frac{\operatorname{erf}(bx)\,e^{\left(dx^2+c\right)}}{2\,d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erf(b*x),x, algorithm="maxima")
```

```
[Out] -1/2*b*erf(sqrt(b^2 - d)*x)*e^c/(sqrt(b^2 - d)*d) + 1/2*erf(b*x)*e^(d*x^2 +
 c)/d
```

mupad [B] time = 0.20, size = 47, normalized size = 0.82

$$\frac{\mathrm{e}^{d\,x^2}\,\mathrm{e}^{c}\operatorname{erf}(b\,x)}{2\,d}-\frac{b\,\mathrm{e}^{c}\operatorname{erf}\left(x\,\sqrt{b^2-d}\right)}{2\,d\,\sqrt{b^2-d}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(c + d*x^2)*erf(b*x),x)
```

```
[Out] (exp(d*x^2)*exp(c)*erf(b*x))/(2*d) - (b*exp(c)*erf(x*(b^2 - d)^(1/2)))/(2*d
*(b^2 - d)^(1/2))
```

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

$$e^{c}\int xe^{dx^2}\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x*erf(b*x),x)
```

```
[Out] exp(c)*Integral(x*exp(d*x**2)*erf(b*x), x)
```

3.56 $\int \frac{e^{c+dx^2}\,\mathbf{erf}(bx)}{x}\,dx$

Optimal. Leaf size=20

$$\text{Int}\left(\frac{\text{erf}(bx)e^{c+dx^2}}{x},x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erf(b*x)/x,x)
```

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erf}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erf[b*x])/x,x]
```

```
[Out] Defer[Int][(E^(c + d*x^2)*Erf[b*x])/x, x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erf}(bx)}{x}\,dx = \int \frac{e^{c+dx^2}\text{erf}(bx)}{x}\,dx$$

Mathematica [A] time = 0.16, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erf}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erf[b*x])/x,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erf[b*x])/x, x]
```

fricas [A] time = 0.63, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx)\,e^{\left(dx^2+c\right)}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x,x, algorithm="fricas")
[Out] integral(erf(b*x)*e^(d*x^2 + c)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)\, e^{\left(dx^2+c\right)}}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x, x)
```

maple [A] time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c} \operatorname{erf}(bx)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erf(b*x)/x,x)
[Out] int(exp(d*x^2+c)*erf(b*x)/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)\, e^{\left(dx^2+c\right)}}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x,x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\mathrm{e}^{d\,x^2+c} \operatorname{erf}(b\,x)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erf(b*x))/x,x)
[Out] int((exp(c + d*x^2)*erf(b*x))/x, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\operatorname{erf}\left(bx\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erf(b*x)/x,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erf(b*x)/x, x)
```

3.57 $\int \frac{e^{c+dx^2}\text{erf}(bx)}{x^3}\,dx$

Optimal. Leaf size=101

$$d\text{Int}\left(\frac{\text{erf}(bx)e^{c+dx^2}}{x},x\right)+be^c\left(-\sqrt{b^2-d}\right)\text{erf}\left(x\sqrt{b^2-d}\right)-\frac{be^{c-x^2\left(b^2-d\right)}}{\sqrt{\pi}\,x}-\frac{\text{erf}(bx)e^{c+dx^2}}{2x^2}$$

```
[Out] -1/2*exp(d*x^2+c)*erf(b*x)/x^2-b*exp(c)*erf(x*(b^2-d)^(1/2))*(b^2-d)^(1/2)-
b*exp(c-(b^2-d)*x^2)/x/Pi^(1/2)+d*Unintegrable(exp(d*x^2+c)*erf(b*x)/x,x)
```

Rubi [A] time = 0.15, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erf}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erf[b*x])/x^3,x]
```

```
[Out] -((b*E^(c - (b^2 - d)*x^2))/(Sqrt[Pi]*x)) - (E^(c + d*x^2)*Erf[b*x])/(2*x^2
) - b*Sqrt[b^2 - d]*E^c*Erf[Sqrt[b^2 - d]*x] + d*Defer[Int][(E^(c + d*x^2)*
Erf[b*x])/x, x]
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{c+dx^2}\text{erf}(bx)}{x^3}\,dx &= -\frac{e^{c+dx^2}\text{erf}(bx)}{2x^2}+d\int \frac{e^{c+dx^2}\text{erf}(bx)}{x}\,dx+\frac{b\int \frac{e^{c-\left(b^2-d\right)x^2}}{x^2}\,dx}{\sqrt{\pi}}\\
&= -\frac{be^{c-\left(b^2-d\right)x^2}}{\sqrt{\pi}\,x}-\frac{e^{c+dx^2}\text{erf}(bx)}{2x^2}+d\int \frac{e^{c+dx^2}\text{erf}(bx)}{x}\,dx-\frac{\left(2b\left(b^2-d\right)\right)\int e^{c+\left(-b^2+d\right)x^2}\,dx}{\sqrt{\pi}}\\
&= -\frac{be^{c-\left(b^2-d\right)x^2}}{\sqrt{\pi}\,x}-\frac{e^{c+dx^2}\text{erf}(bx)}{2x^2}-b\sqrt{b^2-d}\,e^c\text{erf}\left(\sqrt{b^2-d}\,x\right)+d\int \frac{e^{c+dx^2}\text{erf}(bx)}{x}\,dx
\end{aligned}$$

Mathematica [A] time = 0.21, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erf}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erf[b*x])/x^3,x]
[Out] Integrate[(E^(c + d*x^2)*Erf[b*x])/x^3, x]
```

fricas [A] time = 0.57, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{erf}\left(bx\right)e^{\left(dx^2+c\right)}}{x^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^3,x, algorithm="fricas")
[Out] integral(erf(b*x)*e^(d*x^2 + c)/x^3, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}\left(bx\right)e^{\left(dx^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^3,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x^3, x)
```

maple [A] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c}\operatorname{erf}\left(bx\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erf(b*x)/x^3,x)
[Out] int(exp(d*x^2+c)*erf(b*x)/x^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}\left(bx\right)e^{\left(dx^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^3,x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x^3, x)
```

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

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\mathrm{erf}\left(b\,x\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erf(b*x))/x^3,x)
[Out] int((exp(c + d*x^2)*erf(b*x))/x^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^2}\,\mathrm{erf}\left(bx\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erf(b*x)/x**3,x)
[Out] exp(c)*Integral(exp(d*x**2)*erf(b*x)/x**3, x)
```

3.58 $\int \frac{e^{c+dx^2}\mathbf{erf}(bx)}{x^5}\,dx$

Optimal. Leaf size=231

$$\frac{1}{2}d^2\text{Int}\left(\frac{\text{erf}(bx)e^{c+dx^2}}{x},x\right)-\frac{1}{2}be^cd\sqrt{b^2-d}\,\text{erf}\left(x\sqrt{b^2-d}\right)+\frac{1}{3}be^c\left(b^2-d\right)^{3/2}\text{erf}\left(x\sqrt{b^2-d}\right)-\frac{bde^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,x}+\frac{b\left(b^2-\right.}{}$$

```
[Out] -1/4*exp(d*x^2+c)*erf(b*x)/x^4-1/4*d*exp(d*x^2+c)*erf(b*x)/x^2+1/3*b*(b^2-d
)^(3/2)*exp(c)*erf(x*(b^2-d)^(1/2))-1/2*b*d*exp(c)*erf(x*(b^2-d)^(1/2))*(b^
2-d)^(1/2)-1/6*b*exp(c-(b^2-d)*x^2)/x^3/Pi^(1/2)+1/3*b*(b^2-d)*exp(c-(b^2-d
)*x^2)/x/Pi^(1/2)-1/2*b*d*exp(c-(b^2-d)*x^2)/x/Pi^(1/2)+1/2*d^2*Unintegrabl
e(exp(d*x^2+c)*erf(b*x)/x,x)
```

Rubi [A] time = 0.34, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}} = 0.000$, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erf}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erf[b*x])/x^5,x]
```

```
[Out] -(b*E^(c - (b^2 - d)*x^2))/(6*Sqrt[Pi]*x^3) + (b*(b^2 - d)*E^(c - (b^2 - d)
*x^2))/(3*Sqrt[Pi]*x) - (b*d*E^(c - (b^2 - d)*x^2))/(2*Sqrt[Pi]*x) - (E^(c
+ d*x^2)*Erf[b*x])/(4*x^4) - (d*E^(c + d*x^2)*Erf[b*x])/(4*x^2) + (b*(b^2 -
 d)^(3/2)*E^c*Erf[Sqrt[b^2 - d]*x])/3 - (b*Sqrt[b^2 - d]*d*E^c*Erf[Sqrt[b^2
 - d]*x])/2 + (d^2*Defer[Int][(E^(c + d*x^2)*Erf[b*x])/x, x])/2
```

Rubi steps

$$\int \frac{e^{c+dx^2}\operatorname{erf}(bx)}{x^5}\,dx = -\frac{e^{c+dx^2}\operatorname{erf}(bx)}{4x^4} + \frac{1}{2}d\int \frac{e^{c+dx^2}\operatorname{erf}(bx)}{x^3}\,dx + \frac{b\int \frac{e^{c-(b^2-d)x^2}}{x^4}\,dx}{2\sqrt{\pi}}$$

$$= -\frac{be^{c-(b^2-d)x^2}}{6\sqrt{\pi}\,x^3} - \frac{e^{c+dx^2}\operatorname{erf}(bx)}{4x^4} - \frac{de^{c+dx^2}\operatorname{erf}(bx)}{4x^2} + \frac{1}{2}d^2\int \frac{e^{c+dx^2}\operatorname{erf}(bx)}{x}\,dx - \frac{(b(b^2-d))\int \frac{e^{c}}{}}{3\sqrt{\pi}}$$

$$= -\frac{be^{c-(b^2-d)x^2}}{6\sqrt{\pi}\,x^3} + \frac{b(b^2-d)\,e^{c-(b^2-d)x^2}}{3\sqrt{\pi}\,x} - \frac{bde^{c-(b^2-d)x^2}}{2\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\operatorname{erf}(bx)}{4x^4} - \frac{de^{c+dx^2}\operatorname{erf}(bx)}{4x^2} + \frac{1}{2}d^2$$

$$= -\frac{be^{c-(b^2-d)x^2}}{6\sqrt{\pi}\,x^3} + \frac{b(b^2-d)\,e^{c-(b^2-d)x^2}}{3\sqrt{\pi}\,x} - \frac{bde^{c-(b^2-d)x^2}}{2\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\operatorname{erf}(bx)}{4x^4} - \frac{de^{c+dx^2}\operatorname{erf}(bx)}{4x^2} + \frac{1}{3}b($$

Mathematica [A] time = 0.29, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\operatorname{erf}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erf[b*x])/x^5,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erf[b*x])/x^5, x]
```

fricas [A] time = 0.56, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erf}(bx)\,e^{(dx^2+c)}}{x^5}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^5,x, algorithm="fricas")
```

```
[Out] integral(erf(b*x)*e^(d*x^2 + c)/x^5, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)\,e^{(dx^2+c)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^5,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x^5, x)
```

maple [A] time = 0.26, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^{2}+c}\,\mathrm{erf}\left(bx\right)}{x^{5}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erf(b*x)/x^5,x)
[Out] int(exp(d*x^2+c)*erf(b*x)/x^5,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erf}\left(bx\right)e^{\left(dx^{2}+c\right)}}{x^{5}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^5,x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x^5, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\mathrm{e}^{d\,x^{2}+c}\,\mathrm{erf}\left(b\,x\right)}{x^{5}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erf(b*x))/x^5,x)
[Out] int((exp(c + d*x^2)*erf(b*x))/x^5, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\,\mathrm{erf}\left(bx\right)}{x^{5}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erf(b*x)/x**5,x)
[Out] exp(c)*Integral(exp(d*x**2)*erf(b*x)/x**5, x)
```

3.59 $\int e^{c+dx^2}x^4\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=186

$$\frac{3\text{Int}\left(\text{erf}(bx)e^{c+dx^2},x\right)}{4d^2}-\frac{3be^{c-x^2\left(b^2-d\right)}}{4\sqrt{\pi}\,d^2\left(b^2-d\right)}+\frac{bx^2e^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}+\frac{be^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)^2}-\frac{3x\text{erf}(bx)e^{c+dx^2}}{4d^2}+\frac{x^3\text{erf}(bx)e^{c+dx^2}}{2d}$$

```
[Out] -3/4*exp(d*x^2+c)*x*erf(b*x)/d^2+1/2*exp(d*x^2+c)*x^3*erf(b*x)/d-3/4*b*exp(
c-(b^2-d)*x^2)/(b^2-d)/d^2/Pi^(1/2)+1/2*b*exp(c-(b^2-d)*x^2)/(b^2-d)^2/d/Pi
^(1/2)+1/2*b*exp(c-(b^2-d)*x^2)*x^2/(b^2-d)/d/Pi^(1/2)+3/4*Unintegrable(exp
(d*x^2+c)*erf(b*x),x)/d^2
```

Rubi [A] time = 0.24, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}x^4\text{Erf}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^4*Erf[b*x],x]
```

```
[Out] (-3*b*E^(c - (b^2 - d)*x^2))/(4*(b^2 - d)*d^2*Sqrt[Pi]) + (b*E^(c - (b^2 -
d)*x^2))/(2*(b^2 - d)^2*d*Sqrt[Pi]) + (b*E^(c - (b^2 - d)*x^2)*x^2)/(2*(b^2
 - d)*d*Sqrt[Pi]) - (3*E^(c + d*x^2)*x*Erf[b*x])/(4*d^2) + (E^(c + d*x^2)*x
^3*Erf[b*x])/(2*d) + (3*Defer[Int][E^(c + d*x^2)*Erf[b*x], x])/(4*d^2)
```

Rubi steps

$$\begin{aligned}\int e^{c+dx^2}x^4\text{erf}(bx)\,dx &= \frac{e^{c+dx^2}x^3\text{erf}(bx)}{2d}-\frac{3\int e^{c+dx^2}x^2\text{erf}(bx)\,dx}{2d}-\frac{b\int e^{c-\left(b^2-d\right)x^2}x^3\,dx}{d\sqrt{\pi}}\\ &= \frac{be^{c-\left(b^2-d\right)x^2}x^2}{2\left(b^2-d\right)d\sqrt{\pi}}-\frac{3e^{c+dx^2}x\text{erf}(bx)}{4d^2}+\frac{e^{c+dx^2}x^3\text{erf}(bx)}{2d}+\frac{3\int e^{c+dx^2}\text{erf}(bx)\,dx}{4d^2}+\frac{(3b)\int e^{c-(b}}{2d^2}\\ &= -\frac{3be^{c-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}}+\frac{be^{c-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}}+\frac{be^{c-\left(b^2-d\right)x^2}x^2}{2\left(b^2-d\right)d\sqrt{\pi}}-\frac{3e^{c+dx^2}x\text{erf}(bx)}{4d^2}+\frac{e^{c+dx^2}x^3\text{erf}}{2d}\end{aligned}$$

Mathematica [A] time = 0.32, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}x^4\text{erf}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^4*Erf[b*x],x]
```

```
[Out] Integrate[E^(c + d*x^2)*x^4*Erf[b*x], x]
```

fricas [A] time = 0.62, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(x^4 \,\mathrm{erf}\,(bx)\, e^{\left(dx^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erf(b*x),x, algorithm="fricas")
```

```
[Out] integral(x^4*erf(b*x)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \,\mathrm{erf}\,(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erf(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^4*erf(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.07, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^2+c} x^4 \,\mathrm{erf}\,(bx)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^4*erf(b*x),x)
```

```
[Out] int(exp(d*x^2+c)*x^4*erf(b*x),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \,\mathrm{erf}\,(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erf(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x^4*erf(b*x)*e^(d*x^2 + c), x)
```

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

$$\int x^4 \, e^{d\,x^2+c} \, \mathrm{erf}\left(b\,x\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*exp(c + d*x^2)*erf(b*x),x)
```

```
[Out] int(x^4*exp(c + d*x^2)*erf(b*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int x^{4} e^{d x^{2}} \operatorname{erf}{\left(b x \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**4*erf(b*x),x)
```

```
[Out] exp(c)*Integral(x**4*exp(d*x**2)*erf(b*x), x)
```

3.60 $\int e^{c+dx^2} x^2 \mathbf{erf}(bx)\, dx$

Optimal. Leaf size=84

$$-\frac{\operatorname{Int}\left(\operatorname{erf}(bx)e^{c+dx^2},x\right)}{2d}+\frac{be^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}+\frac{x\operatorname{erf}(bx)e^{c+dx^2}}{2d}$$

```
[Out] 1/2*exp(d*x^2+c)*x*erf(b*x)/d+1/2*b*exp(c-(b^2-d)*x^2)/(b^2-d)/d/Pi^(1/2)-1
/2*Unintegrable(exp(d*x^2+c)*erf(b*x),x)/d
```

Rubi [A] time = 0.09, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2} x^2 \operatorname{Erf}(bx)\, dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^2*Erf[b*x],x]
```

```
[Out] (b*E^(c - (b^2 - d)*x^2))/(2*(b^2 - d)*d*Sqrt[Pi]) + (E^(c + d*x^2)*x*Erf[b
*x])/(2*d) - Defer[Int][E^(c + d*x^2)*Erf[b*x], x]/(2*d)
```

Rubi steps

$$\begin{aligned}\int e^{c+dx^2} x^2 \operatorname{erf}(bx)\, dx &= \frac{e^{c+dx^2} x \operatorname{erf}(bx)}{2d}-\frac{\int e^{c+dx^2} \operatorname{erf}(bx)\, dx}{2d}-\frac{b\int e^{c-\left(b^2-d\right)x^2} x\, dx}{d\sqrt{\pi}}\\ &= \frac{be^{c-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)d\sqrt{\pi}}+\frac{e^{c+dx^2} x \operatorname{erf}(bx)}{2d}-\frac{\int e^{c+dx^2} \operatorname{erf}(bx)\, dx}{2d}\end{aligned}$$

Mathematica [A] time = 0.23, size = 0, normalized size = 0.00

$$\int e^{c+dx^2} x^2 \operatorname{erf}(bx)\, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^2*Erf[b*x],x]
```

```
[Out] Integrate[E^(c + d*x^2)*x^2*Erf[b*x], x]
```

fricas [A] time = 0.53, size = 0, normalized size = 0.00

$$\text{integral}\left(x^2 \operatorname{erf}(bx)\, e^{\left(dx^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erf(b*x),x, algorithm="fricas")
[Out] integral(x^2*erf(b*x)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erf}(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erf(b*x),x, algorithm="giac")
[Out] integrate(x^2*erf(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.22, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c} x^2 \operatorname{erf}(bx)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^2*erf(b*x),x)
[Out] int(exp(d*x^2+c)*x^2*erf(b*x),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erf}(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erf(b*x),x, algorithm="maxima")
[Out] integrate(x^2*erf(b*x)*e^(d*x^2 + c), x)
```

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

$$\int x^2\, e^{d\,x^2+c} \operatorname{erf}(b\,x)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(c + d*x^2)*erf(b*x),x)
```

```
[Out] int(x^2*exp(c + d*x^2)*erf(b*x), x)
```

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

$$e^{c} \int x^{2} e^{d x^{2}} \operatorname{erf}(b x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**2*erf(b*x),x)
```

```
[Out] exp(c)*Integral(x**2*exp(d*x**2)*erf(b*x), x)
```

3.61 $\int e^{c+dx^2}\operatorname{erf}(bx)\,dx$

Optimal. Leaf size=17

$$\operatorname{Int}\left(\operatorname{erf}(bx)e^{c+dx^2},x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erf(b*x),x)
```

Rubi [A] time = 0.01, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}\operatorname{Erf}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*Erf[b*x],x]
[Out] Defer[Int][E^(c + d*x^2)*Erf[b*x], x]
```

Rubi steps

$$\int e^{c+dx^2}\operatorname{erf}(bx)\,dx = \int e^{c+dx^2}\operatorname{erf}(bx)\,dx$$

Mathematica [A] time = 0.02, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}\operatorname{erf}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*Erf[b*x],x]
[Out] Integrate[E^(c + d*x^2)*Erf[b*x], x]
```

fricas [A] time = 0.57, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\operatorname{erf}(bx)\,e^{(dx^2+c)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x),x, algorithm="fricas")
[Out] integral(erf(b*x)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erf}(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x),x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.07, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c} \operatorname{erf}(bx)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erf(b*x),x)
[Out] int(exp(d*x^2+c)*erf(b*x),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erf}(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x),x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.06

$$\int e^{d\,x^2+c} \operatorname{erf}(b\,x)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + d*x^2)*erf(b*x),x)
[Out] int(exp(c + d*x^2)*erf(b*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c} \int e^{dx^2} \operatorname{erf}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erf(b*x),x)
[Out] exp(c)*Integral(exp(d*x**2)*erf(b*x), x)
```

3.62 $\int \frac{e^{c+dx^2}\operatorname{erf}(bx)}{x^2}\,dx$

Optimal. Leaf size=62

$$2d\text{Int}\left(\operatorname{erf}(bx)e^{c+dx^2},x\right)+\frac{be^c\operatorname{Ei}\left(-\left(\left(b^2-d\right)x^2\right)\right)}{\sqrt{\pi}}-\frac{\operatorname{erf}(bx)e^{c+dx^2}}{x}$$

```
[Out] -exp(d*x^2+c)*erf(b*x)/x+b*exp(c)*Ei(-(b^2-d)*x^2)/Pi^(1/2)+2*d*Unintegrabl
e(exp(d*x^2+c)*erf(b*x),x)
```

Rubi [A] time = 0.12, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\operatorname{Erf}(bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erf[b*x])/x^2,x]
```

```
[Out] -((E^(c + d*x^2)*Erf[b*x])/x) + (b*E^c*ExpIntegralEi[-((b^2 - d)*x^2)])/Sqr
t[Pi] + 2*d*Defer[Int][E^(c + d*x^2)*Erf[b*x], x]
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{c+dx^2}\operatorname{erf}(bx)}{x^2}\,dx &= -\frac{e^{c+dx^2}\operatorname{erf}(bx)}{x}+(2d)\int e^{c+dx^2}\operatorname{erf}(bx)\,dx+\frac{(2b)\int \frac{e^{c-\left(b^2-d\right)x^2}}{x}\,dx}{\sqrt{\pi}}\\
&= -\frac{e^{c+dx^2}\operatorname{erf}(bx)}{x}+\frac{be^c\operatorname{Ei}\left(-\left(b^2-d\right)x^2\right)}{\sqrt{\pi}}+(2d)\int e^{c+dx^2}\operatorname{erf}(bx)\,dx
\end{aligned}$$

Mathematica [A] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\operatorname{erf}(bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erf[b*x])/x^2,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erf[b*x])/x^2, x]
```

fricas [A] time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx)\,e^{\left(dx^2+c\right)}}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^2,x, algorithm="fricas")
[Out] integral(erf(b*x)*e^(d*x^2 + c)/x^2, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\,(bx)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^2,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x^2, x)
```

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\text{erf}\,(bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erf(b*x)/x^2,x)
[Out] int(exp(d*x^2+c)*erf(b*x)/x^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\,(bx)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^2,x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x^2, x)
```

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

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\text{erf}\,(b\,x)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erf(b*x))/x^2,x)
```

```
[Out] int((exp(c + d*x^2)*erf(b*x))/x^2, x)
```

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

$$e^{c}\int\frac{e^{dx^2}\operatorname{erf}(bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erf(b*x)/x**2,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erf(b*x)/x**2, x)
```

3.63 $\int \frac{e^{c+dx^2}\mathbf{erf}(bx)}{x^4}\,dx$

Optimal. Leaf size=155

$$\frac{4}{3}d^2\mathrm{Int}\left(\mathrm{erf}(bx)e^{c+dx^2},x\right)+\frac{2be^c d\mathrm{Ei}\left(-\left(\left(b^2-d\right)x^2\right)\right)}{3\sqrt{\pi}}-\frac{be^c\left(b^2-d\right)\mathrm{Ei}\left(-\left(\left(b^2-d\right)x^2\right)\right)}{3\sqrt{\pi}}-\frac{be^{c-x^2\left(b^2-d\right)}}{3\sqrt{\pi}\,x^2}-\frac{2d\mathrm{erf}(bx)e^{c+}}{3x}$$

```
[Out] -1/3*exp(d*x^2+c)*erf(b*x)/x^3-2/3*d*exp(d*x^2+c)*erf(b*x)/x-1/3*b*exp(c-(b
^2-d)*x^2)/x^2/Pi^(1/2)-1/3*b*(b^2-d)*exp(c)*Ei(-(b^2-d)*x^2)/Pi^(1/2)+2/3*
b*d*exp(c)*Ei(-(b^2-d)*x^2)/Pi^(1/2)+4/3*d^2*Unintegrable(exp(d*x^2+c)*erf(
b*x),x)
```

Rubi [A] time = 0.29, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\mathrm{Erf}(bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erf[b*x])/x^4,x]
```

```
[Out] -(b*E^(c - (b^2 - d)*x^2))/(3*Sqrt[Pi]*x^2) - (E^(c + d*x^2)*Erf[b*x])/(3*x
^3) - (2*d*E^(c + d*x^2)*Erf[b*x])/(3*x) - (b*(b^2 - d)*E^c*ExpIntegralEi[-
((b^2 - d)*x^2)])/(3*Sqrt[Pi]) + (2*b*d*E^c*ExpIntegralEi[-((b^2 - d)*x^2)]
)/(3*Sqrt[Pi]) + (4*d^2*Defer[Int][E^(c + d*x^2)*Erf[b*x], x])/3
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+dx^2}\mathrm{erf}(bx)}{x^4}\,dx &= -\frac{e^{c+dx^2}\mathrm{erf}(bx)}{3x^3}+\frac{1}{3}(2d)\int \frac{e^{c+dx^2}\mathrm{erf}(bx)}{x^2}\,dx+\frac{(2b)\int \frac{e^{c-\left(b^2-d\right)x^2}}{x^3}\,dx}{3\sqrt{\pi}}\\ &= -\frac{be^{c-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+dx^2}\mathrm{erf}(bx)}{3x^3}-\frac{2de^{c+dx^2}\mathrm{erf}(bx)}{3x}+\frac{1}{3}\left(4d^2\right)\int e^{c+dx^2}\mathrm{erf}(bx)\,dx-\frac{\left(2b\left(b^2-\right.\right.}{}\\ &= -\frac{be^{c-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+dx^2}\mathrm{erf}(bx)}{3x^3}-\frac{2de^{c+dx^2}\mathrm{erf}(bx)}{3x}-\frac{b\left(b^2-d\right)e^c\mathrm{Ei}\left(-\left(b^2-d\right)x^2\right)}{3\sqrt{\pi}}+\frac{2bde^c\mathrm{E}}{}\end{aligned}$$

Mathematica [A] time = 0.34, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\mathrm{erf}(bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erf[b*x])/x^4,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erf[b*x])/x^4, x]
```

fricas [A] time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\left(bx\right)e^{\left(dx^2+c\right)}}{x^4}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^4,x, algorithm="fricas")
```

```
[Out] integral(erf(b*x)*e^(d*x^2 + c)/x^4, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\left(bx\right)e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^4,x, algorithm="giac")
```

```
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x^4, x)
```

maple [A] time = 0.26, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\text{erf}\left(bx\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erf(b*x)/x^4,x)
```

```
[Out] int(exp(d*x^2+c)*erf(b*x)/x^4,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\left(bx\right)e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x)/x^4,x, algorithm="maxima")
```

```
[Out] integrate(erf(b*x)*e^(d*x^2 + c)/x^4, x)
```

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

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\mathrm{erf}\left(b\,x\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erf(b*x))/x^4,x)
```

```
[Out] int((exp(c + d*x^2)*erf(b*x))/x^4, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\,\mathrm{erf}\left(bx\right)}{x^{4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erf(b*x)/x**4,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erf(b*x)/x**4, x)
```

3.64 $\int e^{c+b^2x^2}x^5\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=118

$$-\frac{2e^cx}{\sqrt{\pi}\,b^5}+\frac{2e^cx^3}{3\sqrt{\pi}\,b^3}+\frac{x^4e^{b^2x^2+c}\text{erf}(bx)}{2b^2}+\frac{e^{b^2x^2+c}\text{erf}(bx)}{b^6}-\frac{x^2e^{b^2x^2+c}\text{erf}(bx)}{b^4}-\frac{e^cx^5}{5\sqrt{\pi}\,b}$$

```
[Out] exp(b^2*x^2+c)*erf(b*x)/b^6-exp(b^2*x^2+c)*x^2*erf(b*x)/b^4+1/2*exp(b^2*x^2
+c)*x^4*erf(b*x)/b^2-2*exp(c)*x/b^5/Pi^(1/2)+2/3*exp(c)*x^3/b^3/Pi^(1/2)-1/
5*exp(c)*x^5/b/Pi^(1/2)
```

Rubi [A] time = 0.14, antiderivative size = 118, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {6385, 6382, 8, 12, 30}

$$\frac{x^4e^{b^2x^2+c}\text{Erf}(bx)}{2b^2}-\frac{x^2e^{b^2x^2+c}\text{Erf}(bx)}{b^4}+\frac{e^{b^2x^2+c}\text{Erf}(bx)}{b^6}+\frac{2e^cx^3}{3\sqrt{\pi}\,b^3}-\frac{2e^cx}{\sqrt{\pi}\,b^5}-\frac{e^cx^5}{5\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^5*Erf[b*x],x]
```

```
[Out] (-2*E^c*x)/(b^5*Sqrt[Pi]) + (2*E^c*x^3)/(3*b^3*Sqrt[Pi]) - (E^c*x^5)/(5*b*S
qrt[Pi]) + (E^(c + b^2*x^2)*Erf[b*x])/b^6 - (E^(c + b^2*x^2)*x^2*Erf[b*x])/
b^4 + (E^(c + b^2*x^2)*x^4*Erf[b*x])/(2*b^2)
```

Rule 8

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

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
```

```
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\int e^{c+b^2x^2}x^5\text{erf}(bx)\,dx = \frac{e^{c+b^2x^2}x^4\text{erf}(bx)}{2b^2} - \frac{2\int e^{c+b^2x^2}x^3\text{erf}(bx)\,dx}{b^2} - \frac{\int e^c x^4\,dx}{b\sqrt{\pi}}$$

$$= -\frac{e^{c+b^2x^2}x^2\text{erf}(bx)}{b^4} + \frac{e^{c+b^2x^2}x^4\text{erf}(bx)}{2b^2} + \frac{2\int e^{c+b^2x^2}x\text{erf}(bx)\,dx}{b^4} + \frac{2\int e^c x^2\,dx}{b^3\sqrt{\pi}} - \frac{e^c\int x^4\,d}{b\sqrt{\pi}}$$

$$= -\frac{e^c x^5}{5b\sqrt{\pi}} + \frac{e^{c+b^2x^2}\text{erf}(bx)}{b^6} - \frac{e^{c+b^2x^2}x^2\text{erf}(bx)}{b^4} + \frac{e^{c+b^2x^2}x^4\text{erf}(bx)}{2b^2} - \frac{2\int e^c\,dx}{b^5\sqrt{\pi}} + \frac{(2e^c)\int x^2}{b^3\sqrt{\pi}}$$

$$= -\frac{2e^c x}{b^5\sqrt{\pi}} + \frac{2e^c x^3}{3b^3\sqrt{\pi}} - \frac{e^c x^5}{5b\sqrt{\pi}} + \frac{e^{c+b^2x^2}\text{erf}(bx)}{b^6} - \frac{e^{c+b^2x^2}x^2\text{erf}(bx)}{b^4} + \frac{e^{c+b^2x^2}x^4\text{erf}(bx)}{2b^2}$$

Mathematica [A] time = 0.05, size = 73, normalized size = 0.62

$$\frac{e^c\left(-6b^5x^5+20b^3x^3+15\sqrt{\pi}\,e^{b^2x^2}\left(b^4x^4-2b^2x^2+2\right)\text{erf}(bx)-60bx\right)}{30\sqrt{\pi}\,b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x^5*Erf[b*x],x]
```

```
[Out] (E^c*(-60*b*x + 20*b^3*x^3 - 6*b^5*x^5 + 15*E^(b^2*x^2)*Sqrt[Pi]*(2 - 2*b^2
*x^2 + b^4*x^4)*Erf[b*x]))/(30*b^6*Sqrt[Pi])
```

fricas [A] time = 0.52, size = 74, normalized size = 0.63

$$\frac{15\left(2\,\pi+\pi b^4x^4-2\,\pi b^2x^2\right)\text{erf}\,(bx)\,e^{\left(b^2x^2+c\right)}-2\,\sqrt{\pi}\left(3\,b^5x^5-10\,b^3x^3+30\,bx\right)e^c}{30\,\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^5*erf(b*x),x, algorithm="fricas")
```

```
[Out] 1/30*(15*(2*pi + pi*b^4*x^4 - 2*pi*b^2*x^2)*erf(b*x)*e^(b^2*x^2 + c) - 2*sq
rt(pi)*(3*b^5*x^5 - 10*b^3*x^3 + 30*b*x)*e^c)/(pi*b^6)
```

giac [A] time = 0.23, size = 118, normalized size = 1.00

$$\frac{1}{2}\left(\frac{c^2e^{\left(b^2x^2+c\right)}}{b^6}-\frac{\left(2\,b^2x^2-\left(b^2x^2+c\right)^2+2\left(b^2x^2+c\right)c-2\right)e^{\left(b^2x^2+c\right)}}{b^6}\right)\operatorname{erf}\left(bx\right)-\frac{3\,\sqrt{\pi}\,b^4x^5e^c-10\,\sqrt{\pi}\,b^2x^3e^c+30\,\sqrt{\pi}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^5*erf(b*x),x, algorithm="giac")
```

```
[Out] 1/2*(c^2*e^(b^2*x^2 + c)/b^6 - (2*b^2*x^2 - (b^2*x^2 + c)^2 + 2*(b^2*x^2 +
c)*c - 2)*e^(b^2*x^2 + c)/b^6)*erf(b*x) - 1/15*(3*sqrt(pi)*b^4*x^5*e^c - 10
*sqrt(pi)*b^2*x^3*e^c + 30*sqrt(pi)*x*e^c)/(pi*b^5)
```

maple [A] time = 0.07, size = 88, normalized size = 0.75

$$\frac{\frac{\operatorname{erf}(bx)\mathrm{e}^{c}\left(\frac{\mathrm{e}^{b^2x^2}b^4x^4}{2}-b^2x^2\mathrm{e}^{b^2x^2}+\mathrm{e}^{b^2x^2}\right)}{b^5}-\frac{\mathrm{e}^{c}\left(\frac{1}{5}b^5x^5-\frac{2}{3}b^3x^3+2bx\right)}{\sqrt{\pi}\,b^5}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^5*erf(b*x),x)
```

```
[Out] (erf(b*x)/b^5*exp(c)*(1/2*exp(b^2*x^2)*b^4*x^4-b^2*x^2*exp(b^2*x^2)+exp(b^2
*x^2))-1/Pi^(1/2)/b^5*exp(c)*(1/5*b^5*x^5-2/3*b^3*x^3+2*b*x))/b
```

maxima [A] time = 0.45, size = 82, normalized size = 0.69

$$-\frac{6\,b^5x^5e^c-20\,b^3x^3e^c-15\left(\sqrt{\pi}\,b^4x^4e^c-2\,\sqrt{\pi}\,b^2x^2e^c+2\,\sqrt{\pi}\,e^c\right)\operatorname{erf}\left(bx\right)e^{\left(b^2x^2\right)}+60\,bxe^c}{30\,\sqrt{\pi}\,b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^5*erf(b*x),x, algorithm="maxima")
```

```
[Out] -1/30*(6*b^5*x^5*e^c - 20*b^3*x^3*e^c - 15*(sqrt(pi)*b^4*x^4*e^c - 2*sqrt(p
i)*b^2*x^2*e^c + 2*sqrt(pi)*e^c)*erf(b*x)*e^(b^2*x^2) + 60*b*x*e^c)/(sqrt(p
i)*b^6)
```

mupad [B] time = 0.30, size = 91, normalized size = 0.77

$$\operatorname{erf}(b\,x)\left(\frac{e^{b^2\,x^2+c}}{b^6}+\frac{x^4\,e^{b^2\,x^2+c}}{2\,b^2}-\frac{x^2\,e^{b^2\,x^2+c}}{b^4}\right)-\frac{3\,e^c\,b^4\,x^5-10\,e^c\,b^2\,x^3+30\,e^c\,x}{15\,b^5\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*exp(c + b^2*x^2)*erf(b*x),x)
```

```
[Out] erf(b*x)*(exp(c + b^2*x^2)/b^6 + (x^4*exp(c + b^2*x^2))/(2*b^2) - (x^2*exp(
c + b^2*x^2))/b^4) - (30*x*exp(c) - 10*b^2*x^3*exp(c) + 3*b^4*x^5*exp(c))/(
15*b^5*pi^(1/2))
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**5*erf(b*x),x)
```

```
[Out] Timed out
```

3.65 $\int e^{c+b^2x^2}x^3\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=79

$$\frac{e^c x}{\sqrt{\pi}\, b^3}+\frac{x^2 e^{b^2x^2+c}\operatorname{erf}(bx)}{2b^2}-\frac{e^{b^2x^2+c}\operatorname{erf}(bx)}{2b^4}-\frac{e^c x^3}{3\sqrt{\pi}\, b}$$

```
[Out] -1/2*exp(b^2*x^2+c)*erf(b*x)/b^4+1/2*exp(b^2*x^2+c)*x^2*erf(b*x)/b^2+exp(c)
*x/b^3/Pi^(1/2)-1/3*exp(c)*x^3/b/Pi^(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 79, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {6385, 6382, 8, 12, 30}

$$\frac{x^2 e^{b^2x^2+c}\operatorname{Erf}(bx)}{2b^2}-\frac{e^{b^2x^2+c}\operatorname{Erf}(bx)}{2b^4}+\frac{e^c x}{\sqrt{\pi}\, b^3}-\frac{e^c x^3}{3\sqrt{\pi}\, b}$$

Antiderivative was successfully verified.

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

```
[Out] (E^c*x)/(b^3*Sqrt[Pi]) - (E^c*x^3)/(3*b*Sqrt[Pi]) - (E^(c + b^2*x^2)*Erf[b*
x])/(2*b^4) + (E^(c + b^2*x^2)*x^2*Erf[b*x])/(2*b^2)
```

Rule 8

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

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x^3\operatorname{erf}(bx)\,dx &= \frac{e^{c+b^2x^2}x^2\operatorname{erf}(bx)}{2b^2}-\frac{\int e^{c+b^2x^2}x\operatorname{erf}(bx)\,dx}{b^2}-\frac{\int e^cx^2\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{2b^4}+\frac{e^{c+b^2x^2}x^2\operatorname{erf}(bx)}{2b^2}+\frac{\int e^c\,dx}{b^3\sqrt{\pi}}-\frac{e^c\int x^2\,dx}{b\sqrt{\pi}}\\ &= \frac{e^cx}{b^3\sqrt{\pi}}-\frac{e^cx^3}{3b\sqrt{\pi}}-\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{2b^4}+\frac{e^{c+b^2x^2}x^2\operatorname{erf}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.04, size = 57, normalized size = 0.72

$$\frac{e^c\left(-2b^3x^3+3\sqrt{\pi}e^{b^2x^2}\left(b^2x^2-1\right)\operatorname{erf}(bx)+6bx\right)}{6\sqrt{\pi}b^4}$$

Antiderivative was successfully verified.

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

```
[Out] (E^c*(6*b*x - 2*b^3*x^3 + 3*E^(b^2*x^2)*Sqrt[Pi]*(-1 + b^2*x^2)*Erf[b*x]))/
(6*b^4*Sqrt[Pi])
```

fricas [A] time = 0.51, size = 55, normalized size = 0.70

$$-\frac{3\left(\pi-\pi b^2x^2\right)\operatorname{erf}(bx)e^{\left(b^2x^2+c\right)}+2\sqrt{\pi}\left(b^3x^3-3bx\right)e^c}{6\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/6*(3*(pi - pi*b^2*x^2)*erf(b*x)*e^(b^2*x^2 + c) + 2*sqrt(pi)*(b^3*x^3 -
3*b*x)*e^c)/(pi*b^4)
```

giac [A] time = 0.27, size = 71, normalized size = 0.90

$$\frac{1}{2}\left(\frac{\left(b^2x^2+c-1\right)e^{\left(b^2x^2+c\right)}}{b^4}-\frac{ce^{\left(b^2x^2+c\right)}}{b^4}\right)\operatorname{erf}(bx)-\frac{b^2x^3e^c-3xe^c}{3\sqrt{\pi}b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*((b^2*x^2 + c - 1)*e^(b^2*x^2 + c)/b^4 - c*e^(b^2*x^2 + c)/b^4)*erf(b*x
) - 1/3*(b^2*x^3*e^c - 3*x*e^c)/(sqrt(pi)*b^3)
```

maple [A] time = 0.17, size = 66, normalized size = 0.84

$$\frac{\frac{\operatorname{erf}(bx)\mathrm{e}^{c}\left(\frac{b^{2}x^{2}\mathrm{e}^{b^{2}x^{2}}}{2}-\frac{\mathrm{e}^{b^{2}x^{2}}}{2}\right)}{b^{3}}-\frac{\mathrm{e}^{c}\left(\frac{1}{3}b^{3}x^{3}-bx\right)}{\sqrt{\pi}\,b^{3}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (erf(b*x)/b^3*exp(c)*(1/2*b^2*x^2*exp(b^2*x^2)-1/2*exp(b^2*x^2))-1/Pi^(1/2)
/b^3*exp(c)*(1/3*b^3*x^3-b*x))/b
```

maxima [A] time = 0.34, size = 59, normalized size = 0.75

$$-\frac{2\,b^{3}x^{3}e^{c}-3\left(\sqrt{\pi}\,b^{2}x^{2}e^{c}-\sqrt{\pi}\,e^{c}\right)\operatorname{erf}\left(bx\right)e^{\left(b^{2}x^{2}\right)}-6\,bxe^{c}}{6\,\sqrt{\pi}\,b^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^3*erf(b*x),x, algorithm="maxima")
```

```
[Out] -1/6*(2*b^3*x^3*e^c - 3*(sqrt(pi)*b^2*x^2*e^c - sqrt(pi)*e^c)*erf(b*x)*e^(b
^2*x^2) - 6*b*x*e^c)/(sqrt(pi)*b^4)
```

mupad [B] time = 0.20, size = 65, normalized size = 0.82

$$\frac{3\,x\,\mathrm{e}^{c}-b^{2}\,x^{3}\,\mathrm{e}^{c}}{3\,b^{3}\,\sqrt{\pi}}-\operatorname{erf}\left(b\,x\right)\left(\frac{\mathrm{e}^{b^{2}\,x^{2}+c}}{2\,b^{4}}-\frac{x^{2}\,\mathrm{e}^{b^{2}\,x^{2}+c}}{2\,b^{2}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (3*x*exp(c) - b^2*x^3*exp(c))/(3*b^3*pi^(1/2)) - erf(b*x)*(exp(c + b^2*x^2)
/(2*b^4) - (x^2*exp(c + b^2*x^2))/(2*b^2))
```

sympy [A] time = 131.39, size = 76, normalized size = 0.96

$$\begin{cases} -\frac{x^3 e^c}{3\sqrt{\pi}\,b} + \frac{x^2 e^c e^{b^2x^2}\operatorname{erf}(bx)}{2b^2} + \frac{xe^c}{\sqrt{\pi}\,b^3} - \frac{e^c e^{b^2x^2}\operatorname{erf}(bx)}{2b^4} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**3*erf(b*x),x)
```

```
[Out] Piecewise((-x**3*exp(c)/(3*sqrt(pi)*b) + x**2*exp(c)*exp(b**2*x**2)*erf(b*x
)/(2*b**2) + x*exp(c)/(sqrt(pi)*b**3) - exp(c)*exp(b**2*x**2)*erf(b*x)/(2*b
**4), Ne(b, 0)), (0, True))
```

3.66 $\int e^{c+b^2x^2} x\mathbf{erf}(bx)\, dx$

Optimal. Leaf size=37

$$\frac{e^{b^2x^2+c}\text{erf}(bx)}{2b^2} - \frac{e^c x}{\sqrt{\pi}\, b}$$

```
[Out] 1/2*exp(b^2*x^2+c)*erf(b*x)/b^2-exp(c)*x/b/Pi^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 37, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {6382, 8}

$$\frac{e^{b^2x^2+c}\text{Erf}(bx)}{2b^2} - \frac{e^c x}{\sqrt{\pi}\, b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x*Erf[b*x],x]
```

```
[Out] -((E^c*x)/(b*Sqrt[Pi])) + (E^(c + b^2*x^2)*Erf[b*x])/(2*b^2)
```

Rule 8

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

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2} x\text{erf}(bx)\, dx &= \frac{e^{c+b^2x^2}\text{erf}(bx)}{2b^2} - \frac{\int e^c\, dx}{b\sqrt{\pi}}\\ &= -\frac{e^c x}{b\sqrt{\pi}} + \frac{e^{c+b^2x^2}\text{erf}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.03, size = 34, normalized size = 0.92

$$\frac{e^c\left(e^{b^2x^2}\text{erf}(bx) - \frac{2bx}{\sqrt{\pi}}\right)}{2b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x*Erf[b*x],x]
```

```
[Out] (E^c*((-2*b*x)/Sqrt[Pi] + E^(b^2*x^2)*Erf[b*x]))/(2*b^2)
```

fricas [A] time = 0.58, size = 35, normalized size = 0.95

$$-\frac{2\sqrt{\pi}\,bxe^{c}-\pi\operatorname{erf}(bx)\,e^{\left(b^{2}x^{2}+c\right)}}{2\,\pi b^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/2*(2*sqrt(pi)*b*x*e^c - pi*erf(b*x)*e^(b^2*x^2 + c))/(pi*b^2)
```

giac [A] time = 0.28, size = 31, normalized size = 0.84

$$-\frac{xe^{c}}{\sqrt{\pi}\,b}+\frac{\operatorname{erf}(bx)\,e^{\left(b^{2}x^{2}+c\right)}}{2\,b^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -x*e^c/(sqrt(pi)*b) + 1/2*erf(b*x)*e^(b^2*x^2 + c)/b^2
```

maple [A] time = 0.10, size = 51, normalized size = 1.38

$$\frac{-2\,\mathrm{e}^{b^{2}x^{2}+c}\mathrm{e}^{-b^{2}x^{2}}xb+\mathrm{e}^{b^{2}x^{2}+c}\operatorname{erf}(bx)\sqrt{\pi}}{2\sqrt{\pi}\;b^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x*erf(b*x),x)
```

```
[Out] 1/2*(-2*exp(b^2*x^2+c)*exp(-b^2*x^2)*x*b+exp(b^2*x^2+c)*erf(b*x)*Pi^(1/2))/
Pi^(1/2)/b^2
```

maxima [A] time = 0.32, size = 34, normalized size = 0.92

$$-\frac{2\,bxe^{c}-\sqrt{\pi}\,\operatorname{erf}(bx)\,e^{\left(b^{2}x^{2}+c\right)}}{2\,\sqrt{\pi}\,b^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/2*(2*b*x*e^c - sqrt(pi)*erf(b*x)*e^(b^2*x^2 + c))/(sqrt(pi)*b^2)
```

mupad [B] time = 0.10, size = 31, normalized size = 0.84

$$\frac{e^{b^2 x^2} e^c \operatorname{erf}(b x)}{2 b^2} - \frac{x e^c}{b \sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(c + b^2*x^2)*erf(b*x),x)
```

```
[Out] (exp(b^2*x^2)*exp(c)*erf(b*x))/(2*b^2) - (x*exp(c))/(b*pi^(1/2))
```

sympy [A] time = 14.84, size = 34, normalized size = 0.92

$$\begin{cases} -\frac{x e^c}{\sqrt{\pi} b} + \frac{e^c e^{b^2 x^2} \operatorname{erf}(bx)}{2b^2} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x*erf(b*x),x)
```

```
[Out] Piecewise((-x*exp(c)/(sqrt(pi)*b) + exp(c)*exp(b**2*x**2)*erf(b*x)/(2*b**2)
, Ne(b, 0)), (0, True))
```

3.67 $\int \frac{e^{c+b^2x^2}\mathbf{erf}(bx)}{x}\,dx$

Optimal. Leaf size=32

$$\frac{2be^c x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

```
[Out] 2*b*exp(c)*x*HypergeometricPFQ([1/2, 1],[3/2, 3/2],b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.04, antiderivative size = 32, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.053, Rules used = {6388}

$$\frac{2be^c x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

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

```
[Out] (2*b*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi]
```

Rule 6388

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*b
*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi], x] /; Fr
eeQ[{b, c, d}, x] && EqQ[d, b^2]
```

Rubi steps

$$\int \frac{e^{c+b^2x^2}\text{erf}(bx)}{x}\,dx = \frac{2be^c x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

Mathematica [A] time = 0.14, size = 32, normalized size = 1.00

$$\frac{2be^c x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

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

[Out] (2*b*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi]

fricas [F] time = 0.48, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}(bx)e^{(b^2x^2+c)}}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x,x, algorithm="fricas")

[Out] integral(erf(b*x)*e^(b^2*x^2 + c)/x, x)

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

$$\int \frac{\text{erf}(bx)e^{(b^2x^2+c)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x,x, algorithm="giac")

[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x, x)

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

$$\int \frac{e^{b^2x^2+c}\,\text{erf}(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(exp(b^2*x^2+c)*erf(b*x)/x,x)

[Out] int(exp(b^2*x^2+c)*erf(b*x)/x,x)

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

$$\int \frac{\text{erf}(bx)e^{(b^2x^2+c)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x,x, algorithm="maxima")

[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x, x)

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

$$\int \frac{e^{b^2 x^2+c} \operatorname{erf}(b x)}{x} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erf(b*x))/x,x)
[Out] int((exp(c + b^2*x^2)*erf(b*x))/x, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erf(b*x)/x,x)
[Out] Exception raised: AttributeError
```

3.68 $\int \frac{e^{c+b^2x^2}\,\mathbf{erf}(bx)}{x^3}\,dx$

Optimal. Leaf size=71

$$\frac{2b^3e^c x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{b^2x^2+c}\operatorname{erf}(bx)}{2x^2}-\frac{be^c}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*exp(b^2*x^2+c)*erf(b*x)/x^2-b*exp(c)/x/Pi^(1/2)+2*b^3*exp(c)*x*Hyperge
ometricPFQ([1/2, 1],[3/2, 3/2],b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.210, Rules used = {6391, 6388, 12, 30}

$$\frac{2b^3e^c x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{b^2x^2+c}\operatorname{Erf}(bx)}{2x^2}-\frac{be^c}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Int[(E^(c + b^2*x^2)*Erf[b*x])/x^3,x]
```

```
[Out] -((b*E^c)/(Sqrt[Pi]*x)) - (E^(c + b^2*x^2)*Erf[b*x])/(2*x^2) + (2*b^3*E^c*x
*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi]
```

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 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6388

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*b
*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi], x] /; Fr
eeQ[{b, c, d}, x] && EqQ[d, b^2]
```

Rule 6391

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol] :
> Simp[(x^(m + 1)*E^(c + d*x^2)*Erf[a + b*x])/(m + 1), x] + (-Dist[(2*d)/(m
```

```
 + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erf[a + b*x], x], x] - Dist[(2*b)/((m +
1)*Sqrt[Pi]), Int[x^(m + 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x])
 /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x^3}\,dx &= -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{2x^2}+b^2\int \frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x}\,dx+\frac{b\int \frac{e^c}{x^2}\,dx}{\sqrt{\pi}}\\ &= -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{2x^2}+\frac{2b^3e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}+\frac{(be^c)\int \frac{1}{x^2}\,dx}{\sqrt{\pi}}\\ &= -\frac{be^c}{\sqrt{\pi}\,x}-\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{2x^2}+\frac{2b^3e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.13, size = 34, normalized size = 0.48

$$-\frac{2be^c\,{}_2F_2\left(-\frac{1}{2},1;\frac{1}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Integrate[(E^(c + b^2*x^2)*Erf[b*x])/x^3,x]
[Out] (-2*b*E^c*HypergeometricPFQ[{-1/2, 1}, {1/2, 3/2}, b^2*x^2])/(Sqrt[Pi]*x)
```

fricas [F] time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{erf}(bx)\,e^{\left(b^2x^2+c\right)}}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^3,x, algorithm="fricas")
[Out] integral(erf(b*x)*e^(b^2*x^2 + c)/x^3, x)
```

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

$$\int \frac{\operatorname{erf}(bx)\,e^{\left(b^2x^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x^3, x)
```

maple [F] time = 0.20, size = 0, normalized size = 0.00

$$\int \frac{e^{b^2x^2+c} \operatorname{erf}(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erf(b*x)/x^3,x)
```

```
[Out] int(exp(b^2*x^2+c)*erf(b*x)/x^3,x)
```

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

$$\int \frac{\operatorname{erf}(bx)\, e^{\left(b^2x^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^3,x, algorithm="maxima")
```

```
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x^3, x)
```

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

$$\int \frac{e^{b^2\,x^2+c}\,\operatorname{erf}(b\,x)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erf(b*x))/x^3,x)
```

```
[Out] int((exp(c + b^2*x^2)*erf(b*x))/x^3, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erf(b*x)/x**3,x)
```

```
[Out] Exception raised: AttributeError
```

3.69 $\int \frac{e^{c+b^2x^2}\mathbf{erf}(bx)}{x^5}\,dx$

Optimal. Leaf size=115

$$\frac{b^5e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}-\frac{b^3e^c}{2\sqrt{\pi}\,x}-\frac{b^2e^{b^2x^2+c}\mathrm{erf}(bx)}{4x^2}-\frac{e^{b^2x^2+c}\mathrm{erf}(bx)}{4x^4}-\frac{be^c}{6\sqrt{\pi}\,x^3}$$

```
[Out] -1/4*exp(b^2*x^2+c)*erf(b*x)/x^4-1/4*b^2*exp(b^2*x^2+c)*erf(b*x)/x^2-1/6*b*
exp(c)/x^3/Pi^(1/2)-1/2*b^3*exp(c)/x/Pi^(1/2)+b^5*exp(c)*x*HypergeometricPF
Q([1/2, 1],[3/2, 3/2],b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.13, antiderivative size = 115, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.210, Rules used = {6391, 6388, 12, 30}

$$\frac{b^5e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}-\frac{b^2e^{b^2x^2+c}\mathrm{Erf}(bx)}{4x^2}-\frac{e^{b^2x^2+c}\mathrm{Erf}(bx)}{4x^4}-\frac{b^3e^c}{2\sqrt{\pi}\,x}-\frac{be^c}{6\sqrt{\pi}\,x^3}$$

Antiderivative was successfully verified.

```
[In] Int[(E^(c + b^2*x^2)*Erf[b*x])/x^5,x]
```

```
[Out] -(b*E^c)/(6*Sqrt[Pi]*x^3) - (b^3*E^c)/(2*Sqrt[Pi]*x) - (E^(c + b^2*x^2)*Erf
[b*x])/(4*x^4) - (b^2*E^(c + b^2*x^2)*Erf[b*x])/(4*x^2) + (b^5*E^c*x*Hyperg
eometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi]
```

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 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6388

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*b
*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi], x] /; Fr
eeQ[{b, c, d}, x] && EqQ[d, b^2]
```

Rule 6391

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

Rubi steps

$$\begin{aligned}\int \frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x^5}\,dx &= -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{4x^4}+\frac{1}{2}b^2\int \frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x^3}\,dx+\frac{b\int \frac{e^c}{x^4}\,dx}{2\sqrt{\pi}}\\ &= -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{4x^4}-\frac{b^2e^{c+b^2x^2}\operatorname{erf}(bx)}{4x^2}+\frac{1}{2}b^4\int \frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x}\,dx+\frac{b^3\int \frac{e^c}{x^2}\,dx}{2\sqrt{\pi}}+\frac{(be^c)\int \frac{1}{x^4}\,dx}{2\sqrt{\pi}}\\ &= -\frac{be^c}{6\sqrt{\pi}\,x^3}-\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{4x^4}-\frac{b^2e^{c+b^2x^2}\operatorname{erf}(bx)}{4x^2}+\frac{b^5e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}+\frac{\left(b^3e^c\right)\int \frac{1}{x^2}\,dx}{2\sqrt{\pi}}\\ &= -\frac{be^c}{6\sqrt{\pi}\,x^3}-\frac{b^3e^c}{2\sqrt{\pi}\,x}-\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{4x^4}-\frac{b^2e^{c+b^2x^2}\operatorname{erf}(bx)}{4x^2}+\frac{b^5e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.16, size = 36, normalized size = 0.31

$$-\frac{2be^c\,{}_2F_2\left(-\frac{3}{2},1;-\frac{1}{2},\frac{3}{2};b^2x^2\right)}{3\sqrt{\pi}\,x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(E^(c + b^2*x^2)*Erf[b*x])/x^5,x]
```

```
[Out] (-2*b*E^c*HypergeometricPFQ[{-3/2, 1}, {-1/2, 3/2}, b^2*x^2])/(3*Sqrt[Pi]*x
^3)
```

fricas [F] time = 0.71, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{erf}(bx)\,e^{\left(b^2x^2+c\right)}}{x^5},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^5,x, algorithm="fricas")
```

```
[Out] integral(erf(b*x)*e^(b^2*x^2 + c)/x^5, x)
```

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

$$\int \frac{\operatorname{erf}(bx)\, e^{\left(b^2x^2+c\right)}}{x^5}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^5,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x^5, x)
```

maple [F] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^2x^2+c} \operatorname{erf}(bx)}{x^5}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erf(b*x)/x^5,x)
[Out] int(exp(b^2*x^2+c)*erf(b*x)/x^5,x)
```

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

$$\int \frac{\operatorname{erf}(bx)\, e^{\left(b^2x^2+c\right)}}{x^5}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^5,x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x^5, x)
```

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

$$\int \frac{\mathrm{e}^{b^2\,x^2+c}\,\operatorname{erf}(b\,x)}{x^5}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erf(b*x))/x^5,x)
[Out] int((exp(c + b^2*x^2)*erf(b*x))/x^5, x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erf(b*x)/x**5,x)
```

```
[Out] Timed out
```

3.70 $\int e^{c+b^2x^2}x^4\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=119

$$\frac{3e^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{4\sqrt{\pi}\,b^3}+\frac{3e^c x^2}{4\sqrt{\pi}\,b^3}+\frac{x^3e^{b^2x^2+c}\mathrm{erf}(bx)}{2b^2}-\frac{3xe^{b^2x^2+c}\mathrm{erf}(bx)}{4b^4}-\frac{e^c x^4}{4\sqrt{\pi}\,b}$$

```
[Out] -3/4*exp(b^2*x^2+c)*x*erf(b*x)/b^4+1/2*exp(b^2*x^2+c)*x^3*erf(b*x)/b^2+3/4*
exp(c)*x^2/b^3/Pi^(1/2)-1/4*exp(c)*x^4/b/Pi^(1/2)+3/4*exp(c)*x^2*Hypergeome
tricPFQ([1, 1],[3/2, 2],b^2*x^2)/b^3/Pi^(1/2)
```

Rubi [A] time = 0.11, antiderivative size = 119, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.210, Rules used = {6385, 6376, 12, 30}

$$\frac{3e^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{4\sqrt{\pi}\,b^3}+\frac{x^3e^{b^2x^2+c}\mathrm{Erf}(bx)}{2b^2}-\frac{3xe^{b^2x^2+c}\mathrm{Erf}(bx)}{4b^4}+\frac{3e^c x^2}{4\sqrt{\pi}\,b^3}-\frac{e^c x^4}{4\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^4*Erf[b*x],x]
```

```
[Out] (3*E^c*x^2)/(4*b^3*Sqrt[Pi]) - (E^c*x^4)/(4*b*Sqrt[Pi]) - (3*E^(c + b^2*x^2
)*x*Erf[b*x])/(4*b^4) + (E^(c + b^2*x^2)*x^3*Erf[b*x])/(2*b^2) + (3*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(4*b^3*Sqrt[Pi])
```

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 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6385

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

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x^4\text{erf}(bx)\,dx &= \frac{e^{c+b^2x^2}x^3\text{erf}(bx)}{2b^2} - \frac{3\int e^{c+b^2x^2}x^2\text{erf}(bx)\,dx}{2b^2} - \frac{\int e^c x^3\,dx}{b\sqrt{\pi}}\\ &= -\frac{3e^{c+b^2x^2}x\text{erf}(bx)}{4b^4} + \frac{e^{c+b^2x^2}x^3\text{erf}(bx)}{2b^2} + \frac{3\int e^{c+b^2x^2}\text{erf}(bx)\,dx}{4b^4} + \frac{3\int e^c x\,dx}{2b^3\sqrt{\pi}} - \frac{e^c\int x^3\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^cx^4}{4b\sqrt{\pi}} - \frac{3e^{c+b^2x^2}x\text{erf}(bx)}{4b^4} + \frac{e^{c+b^2x^2}x^3\text{erf}(bx)}{2b^2} + \frac{3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{4b^3\sqrt{\pi}} + \frac{(3e^c)\int x\,d}{2b^3\sqrt{\pi}}\\ &= \frac{3e^cx^2}{4b^3\sqrt{\pi}} - \frac{e^cx^4}{4b\sqrt{\pi}} - \frac{3e^{c+b^2x^2}x\text{erf}(bx)}{4b^4} + \frac{e^{c+b^2x^2}x^3\text{erf}(bx)}{2b^2} + \frac{3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{4b^3\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.33, size = 100, normalized size = 0.84

$$\frac{e^c\left(-6b^2x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right) - 2b^4x^4 + 2\sqrt{\pi}\,bxe^{b^2x^2}\left(2b^2x^2-3\right)\text{erf}(bx) + 6b^2x^2 + 3\pi\text{erf}(bx)\text{erfi}(bx)\right)}{8\sqrt{\pi}\,b^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x^4*Erf[b*x],x]
```

```
[Out] (E^c*(6*b^2*x^2 - 2*b^4*x^4 + 2*b*E^(b^2*x^2)*Sqrt[Pi]*x*(-3 + 2*b^2*x^2)*E
rf[b*x] + 3*Pi*Erf[b*x]*Erfi[b*x] - 6*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/
2, 2}, -(b^2*x^2)]))/(8*b^5*Sqrt[Pi])
```

fricas [F] time = 0.49, size = 0, normalized size = 0.00

$$\text{integral}\left(x^4\,\text{erf}\,(bx)\,e^{\left(b^2x^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^4*erf(b*x),x, algorithm="fricas")
```

```
[Out] integral(x^4*erf(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int x^4 \operatorname{erf}(bx)\, e^{\left(b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^4*erf(b*x),x, algorithm="giac")
[Out] integrate(x^4*erf(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.06, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{b^2x^2+c} x^4 \operatorname{erf}(bx)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^4*erf(b*x),x)
[Out] int(exp(b^2*x^2+c)*x^4*erf(b*x),x)
```

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

$$\int x^4 \operatorname{erf}(bx)\, e^{\left(b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^4*erf(b*x),x, algorithm="maxima")
[Out] integrate(x^4*erf(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int x^4\, \mathrm{e}^{b^2\, x^2+c} \operatorname{erf}(b\, x)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*exp(c + b^2*x^2)*erf(b*x),x)
[Out] int(x^4*exp(c + b^2*x^2)*erf(b*x), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**4*erf(b*x),x)
```

```
[Out] Timed out
```

3.71 $\int e^{c+b^2x^2}x^2\textbf{erf}(bx)\,dx$

Optimal. Leaf size=76

$$-\frac{e^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}\,b}+\frac{xe^{b^2x^2+c}\text{erf}(bx)}{2b^2}-\frac{e^c x^2}{2\sqrt{\pi}\,b}$$

```
[Out] 1/2*exp(b^2*x^2+c)*x*erf(b*x)/b^2-1/2*exp(c)*x^2/b/Pi^(1/2)-1/2*exp(c)*x^2*
HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/b/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 76, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.210, Rules used = {6385, 6376, 12, 30}

$$-\frac{e^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}\,b}+\frac{xe^{b^2x^2+c}\text{Erf}(bx)}{2b^2}-\frac{e^c x^2}{2\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^2*Erf[b*x],x]
```

```
[Out] -(E^c*x^2)/(2*b*Sqrt[Pi]) + (E^(c + b^2*x^2)*x*Erf[b*x])/(2*b^2) - (E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(2*b*Sqrt[Pi])
```

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 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6385

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol] :
> Simp[(x^(m - 1)*E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] + (-Dist[(m - 1)/(2
```

```
*d), Int[x^(m - 2)*E^(c + d*x^2)*Erf[a + b*x], x], x] - Dist[b/(d*Sqrt[Pi])
, Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ[{a
, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x^2\operatorname{erf}(bx)\,dx &= \frac{e^{c+b^2x^2}x\operatorname{erf}(bx)}{2b^2}-\frac{\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx}{2b^2}-\frac{\int e^c x\,dx}{b\sqrt{\pi}}\\ &= \frac{e^{c+b^2x^2}x\operatorname{erf}(bx)}{2b^2}-\frac{e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2b\sqrt{\pi}}-\frac{e^c\int x\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^cx^2}{2b\sqrt{\pi}}+\frac{e^{c+b^2x^2}x\operatorname{erf}(bx)}{2b^2}-\frac{e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2b\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.22, size = 80, normalized size = 1.05

$$\frac{e^c\left(2b^2x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)+\operatorname{erf}(bx)\left(2\sqrt{\pi}\,bxe^{b^2x^2}-\pi\operatorname{erfi}(bx)\right)-2b^2x^2\right)}{4\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x^2*Erf[b*x],x]
```

```
[Out] (E^c*(-2*b^2*x^2 + Erf[b*x]*(2*b*E^(b^2*x^2)*Sqrt[Pi]*x - Pi*Erfi[b*x]) + 2
*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)]))/(4*b^3*Sqrt[Pi])
```

fricas [F] time = 0.61, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(x^2\operatorname{erf}(bx)\,e^{\left(b^2x^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(x^2*erf(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int x^2\operatorname{erf}(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(x^2*erf(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.16, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{b^2x^2+c}x^2 \operatorname{erf}(bx)\ dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^2*erf(b*x),x)
```

```
[Out] int(exp(b^2*x^2+c)*x^2*erf(b*x),x)
```

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

$$\int x^2 \operatorname{erf}(bx)\, e^{\left(b^2x^2+c\right)}\ dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(x^2*erf(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int x^2\, \mathrm{e}^{b^2\,x^2+c} \operatorname{erf}(b\,x)\ dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(c + b^2*x^2)*erf(b*x),x)
```

```
[Out] int(x^2*exp(c + b^2*x^2)*erf(b*x), x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**2*erf(b*x),x)
```

```
[Out] Exception raised: AttributeError
```

3.72 $\int e^{c+b^2x^2}\,\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=29

$$\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}$$

```
[Out] b*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.02, antiderivative size = 29, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.062, Rules used = {6376}

$$\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*Erf[b*x],x]
```

```
[Out] (b*E^c*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rubi steps

$$\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx=\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}$$

Mathematica [F] time = 0.03, size = 0, normalized size = 0.00

$$\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + b^2*x^2)*Erf[b*x],x]
```

```
[Out] Integrate[E^(c + b^2*x^2)*Erf[b*x], x]
```

fricas [F] time = 0.67, size = 0, normalized size = 0.00

$$\text{integral}\left(\text{erf}\left(bx\right)e^{\left(b^2x^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x),x, algorithm="fricas")
[Out] integral(erf(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int \text{erf}\left(bx\right)e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x),x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int e^{b^2x^2+c}\,\text{erf}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erf(b*x),x)
[Out] int(exp(b^2*x^2+c)*erf(b*x),x)
```

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

$$\int \text{erf}\left(bx\right)e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x),x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int e^{b^2\,x^2+c}\,\text{erf}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + b^2*x^2)*erf(b*x),x)
```

```
[Out] int(exp(c + b^2*x^2)*erf(b*x), x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erf(b*x),x)
```

```
[Out] Exception raised: AttributeError
```

3.73 $\int \frac{e^{c+b^2x^2}\textbf{erf}(bx)}{x^2}\,dx$

Optimal. Leaf size=66

$$\frac{2b^3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{b^2x^2+c}\mathrm{erf}(bx)}{x}+\frac{2be^c\log(x)}{\sqrt{\pi}}$$

```
[Out] -exp(b^2*x^2+c)*erf(b*x)/x+2*b^3*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2,
2],b^2*x^2)/Pi^(1/2)+2*b*exp(c)*ln(x)/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 66, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.210, Rules used = {6391, 6376, 12, 29}

$$\frac{2b^3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{b^2x^2+c}\mathrm{Erf}(bx)}{x}+\frac{2be^c\log(x)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

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

```
[Out] -((E^(c + b^2*x^2)*Erf[b*x])/x) + (2*b^3*E^c*x^2*HypergeometricPFQ[{1, 1},
{3/2, 2}, b^2*x^2])/Sqrt[Pi] + (2*b*E^c*Log[x])/Sqrt[Pi]
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 29

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

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6391

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol] :
> Simp[(x^(m + 1)*E^(c + d*x^2)*Erf[a + b*x])/(m + 1), x] + (-Dist[(2*d)/(m
```

```
 + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erf[a + b*x], x], x] - Dist[(2*b)/((m +
1)*Sqrt[Pi]), Int[x^(m + 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x])
 /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x^2}\,dx &= -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x} + \left(2b^2\right)\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx + \frac{(2b)\int \frac{e^c}{x}\,dx}{\sqrt{\pi}} \\ &= -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x} + \frac{2b^3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}} + \frac{(2be^c)\int \frac{1}{x}\,dx}{\sqrt{\pi}} \\ &= -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x} + \frac{2b^3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}} + \frac{2be^c\log(x)}{\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.23, size = 74, normalized size = 1.12

$$\frac{e^c\left(-2b^3x^3\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right) + \operatorname{erf}(bx)\left(\pi bx\operatorname{erfi}(bx) - \sqrt{\pi}\,e^{b^2x^2}\right) + 2bx\log(x)\right)}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

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

```
[Out] (E^c*(Erf[b*x]*(-(E^(b^2*x^2)*Sqrt[Pi]) + b*Pi*x*Erfi[b*x]) - 2*b^3*x^3*Hyp
ergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)] + 2*b*x*Log[x]))/(Sqrt[Pi]*x)
```

fricas [F] time = 0.50, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erf}(bx)\,e^{\left(b^2x^2+c\right)}}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(erf(b*x)*e^(b^2*x^2 + c)/x^2, x)
```

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

$$\int \frac{\operatorname{erf}(bx)\,e^{\left(b^2x^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^2,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x^2, x)
```

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int \frac{e^{b^2x^2+c} \operatorname{erf}(bx)}{x^2} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erf(b*x)/x^2,x)
[Out] int(exp(b^2*x^2+c)*erf(b*x)/x^2,x)
```

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

$$\int \frac{\operatorname{erf}(bx)\, e^{\left(b^2x^2+c\right)}}{x^2} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^2,x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x^2, x)
```

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

$$\int \frac{e^{b^2\,x^2+c}\, \operatorname{erf}(b\,x)}{x^2} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erf(b*x))/x^2,x)
[Out] int((exp(c + b^2*x^2)*erf(b*x))/x^2, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erf(b*x)/x**2,x)
[Out] Exception raised: AttributeError
```

3.74 $\int \frac{e^{c+b^2x^2}\,\mathbf{erf}(bx)}{x^4}\,dx$

Optimal. Leaf size=115

$$\frac{4b^5e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{3\sqrt{\pi}}+\frac{4b^3e^c\log(x)}{3\sqrt{\pi}}-\frac{2b^2e^{b^2x^2+c}\mathrm{erf}(bx)}{3x}-\frac{e^{b^2x^2+c}\mathrm{erf}(bx)}{3x^3}-\frac{be^c}{3\sqrt{\pi}\,x^2}$$

```
[Out] -1/3*exp(b^2*x^2+c)*erf(b*x)/x^3-2/3*b^2*exp(b^2*x^2+c)*erf(b*x)/x-1/3*b*ex
p(c)/x^2/Pi^(1/2)+4/3*b^5*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*
x^2)/Pi^(1/2)+4/3*b^3*exp(c)*ln(x)/Pi^(1/2)
```

Rubi [A] time = 0.11, antiderivative size = 115, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {6391, 6376, 12, 29, 30}

$$\frac{4b^5e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{3\sqrt{\pi}}-\frac{2b^2e^{b^2x^2+c}\mathrm{Erf}(bx)}{3x}-\frac{e^{b^2x^2+c}\mathrm{Erf}(bx)}{3x^3}+\frac{4b^3e^c\log(x)}{3\sqrt{\pi}}-\frac{be^c}{3\sqrt{\pi}\,x^2}$$

Antiderivative was successfully verified.

```
[In] Int[(E^(c + b^2*x^2)*Erf[b*x])/x^4,x]
```

```
[Out] -(b*E^c)/(3*Sqrt[Pi]*x^2) - (E^(c + b^2*x^2)*Erf[b*x])/(3*x^3) - (2*b^2*E^(
c + b^2*x^2)*Erf[b*x])/(3*x) + (4*b^5*E^c*x^2*HypergeometricPFQ[{1, 1}, {3/
2, 2}, b^2*x^2])/(3*Sqrt[Pi]) + (4*b^3*E^c*Log[x])/(3*Sqrt[Pi])
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 29

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

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
```

```
d}, x] && EqQ[d, b^2]
```

Rule 6391

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

Rubi steps

$$\int \frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x^4}\,dx = -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{3x^3}+\frac{1}{3}\left(2b^2\right)\int \frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x^2}\,dx+\frac{(2b)\int \frac{e^c}{x^3}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{3x^3}-\frac{2b^2e^{c+b^2x^2}\operatorname{erf}(bx)}{3x}+\frac{1}{3}\left(4b^4\right)\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx+\frac{\left(4b^3\right)\int \frac{e^c}{x}\,dx}{3\sqrt{\pi}}+\frac{(2be$$

$$= -\frac{be^c}{3\sqrt{\pi}\,x^2}-\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{3x^3}-\frac{2b^2e^{c+b^2x^2}\operatorname{erf}(bx)}{3x}+\frac{4b^5e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{3\sqrt{\pi}}+\frac{\left(4b^3e^c\right)\int}{3\sqrt{\pi}$$

$$= -\frac{be^c}{3\sqrt{\pi}\,x^2}-\frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{3x^3}-\frac{2b^2e^{c+b^2x^2}\operatorname{erf}(bx)}{3x}+\frac{4b^5e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{3\sqrt{\pi}}+\frac{4b^3e^c\log}{3\sqrt{\pi}$$

Mathematica [A] time = 0.38, size = 100, normalized size = 0.87

$$-\frac{e^c\left(4b^5x^5\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)-2\pi b^3x^3\operatorname{erf}(bx)\operatorname{erfi}(bx)-4b^3x^3\log(x)+\sqrt{\pi}\,e^{b^2x^2}\left(2b^2x^2+1\right)\operatorname{erf}(bx)+bx\right)}{3\sqrt{\pi}\,x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(E^(c + b^2*x^2)*Erf[b*x])/x^4,x]
```

```
[Out] -1/3*(E^c*(b*x + E^(b^2*x^2)*Sqrt[Pi]*(1 + 2*b^2*x^2)*Erf[b*x] - 2*b^3*Pi*x
^3*Erf[b*x]*Erfi[b*x] + 4*b^5*x^5*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2
*x^2)] - 4*b^3*x^3*Log[x]))/(Sqrt[Pi]*x^3)
```

fricas [F] time = 0.51, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erf}\left(bx\right)e^{\left(b^2x^2+c\right)}}{x^4}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^4,x, algorithm="fricas")
[Out] integral(erf(b*x)*e^(b^2*x^2 + c)/x^4, x)
```

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

$$\int \frac{\operatorname{erf}(bx)\, e^{\left(b^2x^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^4,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x^4, x)
```

maple [F] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^2x^2+c} \operatorname{erf}(bx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erf(b*x)/x^4,x)
[Out] int(exp(b^2*x^2+c)*erf(b*x)/x^4,x)
```

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

$$\int \frac{\operatorname{erf}(bx)\, e^{\left(b^2x^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erf(b*x)/x^4,x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(b^2*x^2 + c)/x^4, x)
```

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

$$\int \frac{\mathrm{e}^{b^2\,x^2+c}\,\operatorname{erf}(b\,x)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erf(b*x))/x^4,x)
```

```
[Out] int((exp(c + b^2*x^2)*erf(b*x))/x^4, x)
```

sympy [**F(-1)**] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erf(b*x)/x**4,x)
```

```
[Out] Timed out
```

3.75 $\int e^{-b^2x^2}x^5\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=135

$$\frac{43\text{erf}\left(\sqrt{2}\,bx\right)}{32\sqrt{2}\,b^6}-\frac{x^4e^{-b^2x^2}\text{erf}(bx)}{2b^2}-\frac{e^{-b^2x^2}\text{erf}(bx)}{b^6}-\frac{11xe^{-2b^2x^2}}{16\sqrt{\pi}\,b^5}-\frac{x^2e^{-b^2x^2}\text{erf}(bx)}{b^4}-\frac{x^3e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

```
[Out] -erf(b*x)/b^6/exp(b^2*x^2)-x^2*erf(b*x)/b^4/exp(b^2*x^2)-1/2*x^4*erf(b*x)/b
^2/exp(b^2*x^2)+43/64*erf(b*x*2^(1/2))/b^6*2^(1/2)-11/16*x/b^5/exp(2*b^2*x^
2)/Pi^(1/2)-1/4*x^3/b^3/exp(2*b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.20, antiderivative size = 135, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6385, 6382, 2205, 2212}

$$-\frac{x^4e^{-b^2x^2}\text{Erf}(bx)}{2b^2}-\frac{x^2e^{-b^2x^2}\text{Erf}(bx)}{b^4}-\frac{e^{-b^2x^2}\text{Erf}(bx)}{b^6}+\frac{43\text{Erf}\left(\sqrt{2}\,bx\right)}{32\sqrt{2}\,b^6}-\frac{x^3e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}-\frac{11xe^{-2b^2x^2}}{16\sqrt{\pi}\,b^5}$$

Antiderivative was successfully verified.

```
[In] Int[(x^5*Erf[b*x])/E^(b^2*x^2),x]
```

```
[Out] (-11*x)/(16*b^5*E^(2*b^2*x^2)*Sqrt[Pi]) - x^3/(4*b^3*E^(2*b^2*x^2)*Sqrt[Pi]
) - Erf[b*x]/(b^6*E^(b^2*x^2)) - (x^2*Erf[b*x])/(b^4*E^(b^2*x^2)) - (x^4*Er
f[b*x])/(2*b^2*E^(b^2*x^2)) + (43*Erf[Sqrt[2]*b*x])/(32*Sqrt[2]*b^6)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
```

```
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\int e^{-b^2x^2}x^5\text{erf}(bx)\,dx = -\frac{e^{-b^2x^2}x^4\text{erf}(bx)}{2b^2}+\frac{2\int e^{-b^2x^2}x^3\text{erf}(bx)\,dx}{b^2}+\frac{\int e^{-2b^2x^2}x^4\,dx}{b\sqrt{\pi}}$$

$$= -\frac{e^{-2b^2x^2}x^3}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}x^2\text{erf}(bx)}{b^4}-\frac{e^{-b^2x^2}x^4\text{erf}(bx)}{2b^2}+\frac{2\int e^{-b^2x^2}x\text{erf}(bx)\,dx}{b^4}+\frac{3\int e^{-2b^2x^2}x^2\,d}{4b^3\sqrt{\pi}}$$

$$= -\frac{11e^{-2b^2x^2}x}{16b^5\sqrt{\pi}}-\frac{e^{-2b^2x^2}x^3}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{erf}(bx)}{b^6}-\frac{e^{-b^2x^2}x^2\text{erf}(bx)}{b^4}-\frac{e^{-b^2x^2}x^4\text{erf}(bx)}{2b^2}+\frac{3\int e^{-2b^2}}{16b^5\sqrt{}}$$

$$= -\frac{11e^{-2b^2x^2}x}{16b^5\sqrt{\pi}}-\frac{e^{-2b^2x^2}x^3}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{erf}(bx)}{b^6}-\frac{e^{-b^2x^2}x^2\text{erf}(bx)}{b^4}-\frac{e^{-b^2x^2}x^4\text{erf}(bx)}{2b^2}+\frac{43\text{erf}\left(\sqrt{}\right.}{32\sqrt{2}}$$

Mathematica [A] time = 0.08, size = 86, normalized size = 0.64

$$\frac{-\frac{4bxe^{-2b^2x^2}\left(4b^2x^2+11\right)}{\sqrt{\pi}}-32e^{-b^2x^2}\left(b^4x^4+2b^2x^2+2\right)\text{erf}(bx)+43\sqrt{2}\,\text{erf}\left(\sqrt{2}\,bx\right)}{64b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^5*Erf[b*x])/E^(b^2*x^2),x]
```

```
[Out] ((-4*b*x*(11 + 4*b^2*x^2))/(E^(2*b^2*x^2)*Sqrt[Pi]) - (32*(2 + 2*b^2*x^2 +
b^4*x^4)*Erf[b*x])/E^(b^2*x^2) + 43*Sqrt[2]*Erf[Sqrt[2]*b*x])/(64*b^6)
```

fricas [A] time = 0.57, size = 97, normalized size = 0.72

$$\frac{43\sqrt{2}\,\pi\sqrt{b^2}\,\text{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)-32\left(\pi b^5x^4+2\,\pi b^3x^2+2\,\pi b\right)\text{erf}\,(bx)\,e^{\left(-b^2x^2\right)}-4\,\sqrt{\pi}\left(4\,b^4x^3+11\,b^2x\right)e^{\left(-2\,b^2x^2\right)}}{64\,\pi b^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erf(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] 1/64*(43*sqrt(2)*pi*sqrt(b^2)*erf(sqrt(2)*sqrt(b^2)*x) - 32*(pi*b^5*x^4 + 2
*pi*b^3*x^2 + 2*pi*b)*erf(b*x)*e^(-b^2*x^2) - 4*sqrt(pi)*(4*b^4*x^3 + 11*b^
2*x)*e^(-2*b^2*x^2))/(pi*b^7)
```

giac [A] time = 0.37, size = 153, normalized size = 1.13

$$-\frac{\left(b^4x^4+2\,b^2x^2+2\right)\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)}}{2\,b^6}-\frac{b^4\left(\frac{4\left(4\,b^2x^3+3\,x\right)e^{\left(-2\,b^2x^2\right)}}{b^4}+\frac{3\,\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b^5}\right)+8\,b^2\left(\frac{4\,xe^{\left(-2\,b^2x^2\right)}}{b^2}+\frac{\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{2}\right.}{b^3}\right.}{64\,\sqrt{\pi}\,b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erf(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] -1/2*(b^4*x^4 + 2*b^2*x^2 + 2)*erf(b*x)*e^(-b^2*x^2)/b^6 - 1/64*(b^4*(4*(4*
b^2*x^3 + 3*x)*e^(-2*b^2*x^2)/b^4 + 3*sqrt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b^
5) + 8*b^2*(4*x*e^(-2*b^2*x^2)/b^2 + sqrt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b^3
) + 32*sqrt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b)/(sqrt(pi)*b^5)
```

maple [A] time = 0.08, size = 119, normalized size = 0.88

$$\frac{\frac{\operatorname{erf}(bx)\left(-\frac{e^{-b^2x^2}b^4x^4}{2}-e^{-b^2x^2}b^2x^2-e^{-b^2x^2}\right)}{b^5}-\frac{-\frac{43\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(bx\sqrt{2}\right)}{64}+\frac{11\,e^{-2b^2x^2}bx}{16}+\frac{e^{-2b^2x^2}b^3x^3}{4}}{\sqrt{\pi}\,b^5}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erf(b*x)/exp(b^2*x^2),x)
```

```
[Out] (erf(b*x)/b^5*(-1/2/exp(b^2*x^2)*b^4*x^4-1/exp(b^2*x^2)*b^2*x^2-1/exp(b^2*x
^2))-1/Pi^(1/2)/b^5*(-43/64*2^(1/2)*Pi^(1/2)*erf(b*x*2^(1/2))+11/16/exp(b^2
*x^2)^2*b*x+1/4/exp(b^2*x^2)^2*b^3*x^3))/b
```

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

$$-\frac{\left(b^4x^4+2\,b^2x^2+2\right)\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)}}{2\,b^6}+\frac{-\frac{1}{64}\,b^4\left(\frac{4\left(4\,b^2x^3+3\,x\right)e^{\left(-2\,b^2x^2\right)}}{b^4}-\frac{3\,\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(\sqrt{2}\,bx\right)}{b^5}\right)-\frac{1}{8}\,b^2\left(\frac{4\,xe^{\left(-2\,b^2x^2\right)}}{b^2}-\frac{\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(\right.}{b^3}\right.}{\sqrt{\pi}\,b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erf(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] -1/2*(b^4*x^4 + 2*b^2*x^2 + 2)*erf(b*x)*e^(-b^2*x^2)/b^6 + integrate((b^4*x
^4 + 2*b^2*x^2 + 2)*e^(-2*b^2*x^2), x)/(sqrt(pi)*b^5)
```

mupad [B] time = 0.45, size = 192, normalized size = 1.42

$$\frac{\sqrt{2}\,\mathrm{erf}\left(\sqrt{2}\,x\,\sqrt{b^2}\right)}{2\,b\,\left(b^2\right)^{5/2}}-\frac{\mathrm{erfi}\left(x\,\sqrt{-2\,b^2}\right)}{2\,b^3\,\left(-2\,b^2\right)^{3/2}}-\frac{x^3\,\mathrm{e}^{-2\,b^2\,x^2}}{4\,b^3\,\sqrt{\pi}}-\mathrm{erf}\left(b\,x\right)\,\left(\frac{\mathrm{e}^{-b^2\,x^2}}{b^6}+\frac{x^4\,\mathrm{e}^{-b^2\,x^2}}{2\,b^2}+\frac{x^2\,\mathrm{e}^{-b^2\,x^2}}{b^4}\right)-\frac{11\,x\,\mathrm{e}^{-2\,b^2\,x^2}}{16\,b^5\,\sqrt{\pi}}+\frac{}{64}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*exp(-b^2*x^2)*erf(b*x),x)
```

```
[Out] (2^(1/2)*erf(2^(1/2)*x*(b^2)^(1/2)))/(2*b*(b^2)^(5/2)) - erfi(x*(-2*b^2)^(1
/2))/(2*b^3*(-2*b^2)^(3/2)) - (x^3*exp(-2*b^2*x^2))/(4*b^3*pi^(1/2)) - erf(
b*x)*(exp(-b^2*x^2)/b^6 + (x^4*exp(-b^2*x^2))/(2*b^2) + (x^2*exp(-b^2*x^2))
/b^4) - (11*x*exp(-2*b^2*x^2))/(16*b^5*pi^(1/2)) + (3*2^(1/2)*x^5)/(64*b*(b
^2*x^2)^(5/2)) - (3*2^(1/2)*x^5*erfc((2*b^2*x^2)^(1/2)))/(64*b*(b^2*x^2)^(5
/2))
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*erf(b*x)/exp(b**2*x**2),x)
```

```
[Out] Timed out
```

3.76 $\int e^{-b^2x^2}x^3\textbf{erf}(bx)\,dx$

Optimal. Leaf size=90

$$\frac{5\text{erf}\left(\sqrt{2}\,bx\right)}{8\sqrt{2}\,b^4}-\frac{x^2e^{-b^2x^2}\text{erf}(bx)}{2b^2}-\frac{e^{-b^2x^2}\text{erf}(bx)}{2b^4}-\frac{xe^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

```
[Out] -1/2*erf(b*x)/b^4/exp(b^2*x^2)-1/2*x^2*erf(b*x)/b^2/exp(b^2*x^2)+5/16*erf(b
*x*2^(1/2))/b^4*2^(1/2)-1/4*x/b^3/exp(2*b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.10, antiderivative size = 90, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6385, 6382, 2205, 2212}

$$-\frac{x^2e^{-b^2x^2}\text{Erf}(bx)}{2b^2}-\frac{e^{-b^2x^2}\text{Erf}(bx)}{2b^4}+\frac{5\text{Erf}\left(\sqrt{2}\,bx\right)}{8\sqrt{2}\,b^4}-\frac{xe^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*Erf[b*x])/E^(b^2*x^2),x]
```

```
[Out] -x/(4*b^3*E^(2*b^2*x^2)*Sqrt[Pi]) - Erf[b*x]/(2*b^4*E^(b^2*x^2)) - (x^2*Erf
[b*x])/(2*b^2*E^(b^2*x^2)) + (5*Erf[Sqrt[2]*b*x])/(8*Sqrt[2]*b^4)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}x^3\operatorname{erf}(bx)\,dx &= -\frac{e^{-b^2x^2}x^2\operatorname{erf}(bx)}{2b^2}+\frac{\int e^{-b^2x^2}x\operatorname{erf}(bx)\,dx}{b^2}+\frac{\int e^{-2b^2x^2}x^2\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^{-2b^2x^2}x}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{2b^4}-\frac{e^{-b^2x^2}x^2\operatorname{erf}(bx)}{2b^2}+\frac{\int e^{-2b^2x^2}\,dx}{4b^3\sqrt{\pi}}+\frac{\int e^{-2b^2x^2}\,dx}{b^3\sqrt{\pi}}\\ &= -\frac{e^{-2b^2x^2}x}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{2b^4}-\frac{e^{-b^2x^2}x^2\operatorname{erf}(bx)}{2b^2}+\frac{5\operatorname{erf}\left(\sqrt{2}\,bx\right)}{8\sqrt{2}\,b^4}\end{aligned}$$

Mathematica [A] time = 0.06, size = 68, normalized size = 0.76

$$\frac{-8e^{-b^2x^2}\left(b^2x^2+1\right)\operatorname{erf}(bx)-\frac{4bxe^{-2b^2x^2}}{\sqrt{\pi}}+5\sqrt{2}\operatorname{erf}\left(\sqrt{2}\,bx\right)}{16b^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^3*Erf[b*x])/E^(b^2*x^2),x]
```

```
[Out] ((-4*b*x)/(E^(2*b^2*x^2)*Sqrt[Pi]) - (8*(1 + b^2*x^2)*Erf[b*x])/E^(b^2*x^2)
 + 5*Sqrt[2]*Erf[Sqrt[2]*b*x])/(16*b^4)
```

fricas [A] time = 0.55, size = 76, normalized size = 0.84

$$-\frac{4\sqrt{\pi}\,b^2xe^{\left(-2\,b^2x^2\right)}-5\sqrt{2}\,\pi\sqrt{b^2}\,\operatorname{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)+8\left(\pi b^3x^2+\pi b\right)\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)}}{16\,\pi b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erf(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] -1/16*(4*sqrt(pi)*b^2*x*e^(-2*b^2*x^2) - 5*sqrt(2)*pi*sqrt(b^2)*erf(sqrt(2)
*sqrt(b^2)*x) + 8*(pi*b^3*x^2 + pi*b)*erf(b*x)*e^(-b^2*x^2))/(pi*b^5)
```

giac [A] time = 0.30, size = 94, normalized size = 1.04

$$-\frac{\left(b^2x^2+1\right)\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)}}{2\,b^4}-\frac{b^2\left(\frac{4\,xe^{\left(-2\,b^2x^2\right)}}{b^2}+\frac{\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b^3}\right)+\frac{4\,\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b}}{16\,\sqrt{\pi}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erf(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] -1/2*(b^2*x^2 + 1)*erf(b*x)*e^(-b^2*x^2)/b^4 - 1/16*(b^2*(4*x*e^(-2*b^2*x^2
)/b^2 + sqrt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b^3) + 4*sqrt(2)*sqrt(pi)*erf(-s
qrt(2)*b*x)/b)/(sqrt(pi)*b^3)
```

maple [A] time = 0.19, size = 83, normalized size = 0.92

$$\frac{\frac{\operatorname{erf}(bx)\left(-\frac{\mathrm{e}^{-b^2x^2}b^2x^2}{2}-\frac{\mathrm{e}^{-b^2x^2}}{2}\right)}{b^3}-\frac{-\frac{5\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(bx\sqrt{2}\right)}{16}+\frac{\mathrm{e}^{-2b^2x^2}bx}{4}}{b^3\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erf(b*x)/exp(b^2*x^2),x)
```

```
[Out] (erf(b*x)/b^3*(-1/2/exp(b^2*x^2)*b^2*x^2-1/2/exp(b^2*x^2))-1/b^3/Pi^(1/2)*(
-5/16*2^(1/2)*Pi^(1/2)*erf(b*x*2^(1/2))+1/4/exp(b^2*x^2)^2*b*x))/b
```

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

$$-\frac{\left(b^2x^2+1\right)\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)}}{2\,b^4}+\frac{-\frac{1}{16}\,b^2\left(\frac{4\,xe^{\left(-2\,b^2x^2\right)}}{b^2}-\frac{\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(\sqrt{2}\,bx\right)}{b^3}\right)+\frac{\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(\sqrt{2}\,bx\right)}{4\,b}}{\sqrt{\pi}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erf(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

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

mupad [B] time = 0.45, size = 106, normalized size = 1.18

$$\frac{\sqrt{2}\,\operatorname{erf}\left(\sqrt{2}\,x\,\sqrt{b^2}\right)}{4\,b\,{\left(b^2\right)}^{3/2}}-\frac{\operatorname{erfi}\left(\sqrt{2}\,x\,\sqrt{-b^2}\right)}{4\,b\,{\left(-2\,b^2\right)}^{3/2}}-\operatorname{erf}\left(b\,x\right)\,\left(\frac{{\mathrm{e}}^{-b^2\,x^2}}{2\,b^4}+\frac{x^2\,{\mathrm{e}}^{-b^2\,x^2}}{2\,b^2}\right)-\frac{x\,{\mathrm{e}}^{-2\,b^2\,x^2}}{4\,b^3\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*exp(-b^2*x^2)*erf(b*x),x)
```

```
[Out] (2^(1/2)*erf(2^(1/2)*x*(b^2)^(1/2)))/(4*b*(b^2)^(3/2)) - erfi(2^(1/2)*x*(-b
^2)^(1/2))/(4*b*(-2*b^2)^(3/2)) - erf(b*x)*(exp(-b^2*x^2)/(2*b^4) + (x^2*ex
p(-b^2*x^2))/(2*b^2)) - (x*exp(-2*b^2*x^2))/(4*b^3*pi^(1/2))
```

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

$$\int x^3 e^{-b^2x^2} \operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*erf(b*x)/exp(b**2*x**2),x)
```

```
[Out] Integral(x**3*exp(-b**2*x**2)*erf(b*x), x)
```

3.77 $\int e^{-b^2x^2} x\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=43

$$\frac{\operatorname{erf}\left(\sqrt{2}\,bx\right)}{2\sqrt{2}\,b^2}-\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{2b^2}$$

```
[Out] -1/2*erf(b*x)/b^2/exp(b^2*x^2)+1/4*erf(b*x*2^(1/2))/b^2*2^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 43, 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 = {6382, 2205}

$$\frac{\operatorname{Erf}\left(\sqrt{2}\,bx\right)}{2\sqrt{2}\,b^2}-\frac{e^{-b^2x^2}\operatorname{Erf}(bx)}{2b^2}$$

Antiderivative was successfully verified.

```
[In] Int[(x*Erf[b*x])/E^(b^2*x^2),x]
```

```
[Out] -Erf[b*x]/(2*b^2*E^(b^2*x^2)) + Erf[Sqrt[2]*b*x]/(2*Sqrt[2]*b^2)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2} x\operatorname{erf}(bx)\,dx &= -\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{2b^2}+\frac{\int e^{-2b^2x^2}\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{2b^2}+\frac{\operatorname{erf}\left(\sqrt{2}\,bx\right)}{2\sqrt{2}\,b^2}\end{aligned}$$

Mathematica [A] time = 0.02, size = 39, normalized size = 0.91

$$\frac{\sqrt{2}\,\mathrm{erf}\left(\sqrt{2}\,bx\right)-2e^{-b^2x^2}\mathrm{erf}(bx)}{4b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*Erf[b*x])/E^(b^2*x^2),x]
[Out] ((-2*Erf[b*x])/E^(b^2*x^2) + Sqrt[2]*Erf[Sqrt[2]*b*x])/(4*b^2)
```

fricas [A] time = 0.48, size = 43, normalized size = 1.00

$$-\frac{2\,b\,\mathrm{erf}\left(bx\right)e^{\left(-b^2x^2\right)}-\sqrt{2}\,\sqrt{b^2}\,\mathrm{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)}{4\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x)/exp(b^2*x^2),x, algorithm="fricas")
[Out] -1/4*(2*b*erf(b*x)*e^(-b^2*x^2) - sqrt(2)*sqrt(b^2)*erf(sqrt(2)*sqrt(b^2)*x
))/b^3
```

giac [A] time = 0.26, size = 35, normalized size = 0.81

$$-\frac{\mathrm{erf}\left(bx\right)e^{\left(-b^2x^2\right)}}{2\,b^2}-\frac{\sqrt{2}\,\mathrm{erf}\left(-\sqrt{2}\,bx\right)}{4\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x)/exp(b^2*x^2),x, algorithm="giac")
[Out] -1/2*erf(b*x)*e^(-b^2*x^2)/b^2 - 1/4*sqrt(2)*erf(-sqrt(2)*b*x)/b^2
```

maple [A] time = 0.07, size = 39, normalized size = 0.91

$$\frac{-\frac{\mathrm{erf}(bx)\mathrm{e}^{-b^2x^2}}{2b}+\frac{\sqrt{2}\,\mathrm{erf}\left(bx\sqrt{2}\right)}{4b}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erf(b*x)/exp(b^2*x^2),x)
[Out] (-1/2*erf(b*x)/b*exp(-b^2*x^2)+1/4/b*2^(1/2)*erf(b*x*2^(1/2)))/b
```

maxima [A] time = 0.45, size = 34, normalized size = 0.79

$$-\frac{\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)}}{2\,b^2}+\frac{\sqrt{2}\,\operatorname{erf}\left(\sqrt{2}\,bx\right)}{4\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

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

mupad [B] time = 0.18, size = 43, normalized size = 1.00

$$\frac{\sqrt{2}\,\operatorname{erf}\left(\sqrt{2}\,x\,\sqrt{b^2}\right)}{4\,b\,\sqrt{b^2}}-\frac{\mathrm{e}^{-b^2\,x^2}\,\operatorname{erf}(b\,x)}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(-b^2*x^2)*erf(b*x),x)
```

```
[Out] (2^(1/2)*erf(2^(1/2)*x*(b^2)^(1/2)))/(4*b*(b^2)^(1/2)) - (exp(-b^2*x^2)*erf
(b*x))/(2*b^2)
```

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

$$\int xe^{-b^2x^2}\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erf(b*x)/exp(b**2*x**2),x)
```

```
[Out] Integral(x*exp(-b**2*x**2)*erf(b*x), x)
```

3.78 $\int \frac{e^{-b^2x^2}\,\mathbf{erf}(bx)}{x}\,dx$

Optimal. Leaf size=21

$$\operatorname{Int}\left(\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x},x\right)$$

```
[Out] Unintegrable(erf(b*x)/exp(b^2*x^2)/x,x)
```

Rubi [A] time = 0.03, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{-b^2x^2}\operatorname{Erf}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[b*x]/(E^(b^2*x^2)*x),x]
```

```
[Out] Defer[Int][Erf[b*x]/(E^(b^2*x^2)*x), x]
```

Rubi steps

$$\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x}\,dx = \int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x}\,dx$$

Mathematica [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erf[b*x]/(E^(b^2*x^2)*x),x]
```

```
[Out] Integrate[Erf[b*x]/(E^(b^2*x^2)*x), x]
```

fricas [A] time = 0.63, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x,x, algorithm="fricas")
[Out] integral(erf(b*x)*e^(-b^2*x^2)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x, x)
```

maple [A] time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)\,\mathrm{e}^{-b^2x^2}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/exp(b^2*x^2)/x,x)
[Out] int(erf(b*x)/exp(b^2*x^2)/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x,x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\operatorname{erf}(b\,x)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erf(b*x))/x,x)
[Out] int((exp(-b^2*x^2)*erf(b*x))/x, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b**2*x**2)/x,x)
```

```
[Out] Integral(exp(-b**2*x**2)*erf(b*x)/x, x)
```

3.79 $\int \frac{e^{-b^2x^2}\mathbf{erf}(bx)}{x^3}\,dx$

Optimal. Leaf size=88

$$-b^2\text{Int}\left(\frac{e^{-b^2x^2}\text{erf}(bx)}{x},x\right)-\frac{e^{-b^2x^2}\text{erf}(bx)}{2x^2}-\sqrt{2}\,b^2\text{erf}\left(\sqrt{2}\,bx\right)-\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*erf(b*x)/exp(b^2*x^2)/x^2-b^2*erf(b*x*2^(1/2))*2^(1/2)-b/exp(2*b^2*x^2
)/x/Pi^(1/2)-b^2*Unintegrable(erf(b*x)/exp(b^2*x^2)/x,x)
```

Rubi [A] time = 0.10, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{-b^2x^2}\text{Erf}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[b*x]/(E^(b^2*x^2)*x^3),x]
```

```
[Out] -(b/(E^(2*b^2*x^2)*Sqrt[Pi]*x)) - Erf[b*x]/(2*E^(b^2*x^2)*x^2) - Sqrt[2]*b^
2*Erf[Sqrt[2]*b*x] - b^2*Defer[Int][Erf[b*x]/(E^(b^2*x^2)*x), x]
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x^3}\,dx &= -\frac{e^{-b^2x^2}\text{erf}(bx)}{2x^2}-b^2\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x}\,dx+\frac{b\int \frac{e^{-2b^2x^2}}{x^2}\,dx}{\sqrt{\pi}}\\
&= -\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\text{erf}(bx)}{2x^2}-b^2\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x}\,dx-\frac{\left(4b^3\right)\int e^{-2b^2x^2}\,dx}{\sqrt{\pi}}\\
&= -\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\text{erf}(bx)}{2x^2}-\sqrt{2}\,b^2\text{erf}\left(\sqrt{2}\,bx\right)-b^2\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x}\,dx
\end{aligned}$$

Mathematica [A] time = 0.14, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erf[b*x]/(E^(b^2*x^2)*x^3),x]
```

```
[Out] Integrate[Erf[b*x]/(E^(b^2*x^2)*x^3), x]
```

fricas [A] time = 0.53, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^3,x, algorithm="fricas")
```

```
[Out] integral(erf(b*x)*e^(-b^2*x^2)/x^3, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^3,x, algorithm="giac")
```

```
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x^3, x)
```

maple [A] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\,(bx)\,\mathrm{e}^{-b^2x^2}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/exp(b^2*x^2)/x^3,x)
```

```
[Out] int(erf(b*x)/exp(b^2*x^2)/x^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^3,x, algorithm="maxima")
```

```
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x^3, x)
```

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

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\mathrm{erf}\,(b\,x)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erf(b*x))/x^3,x)
```

```
[Out] int((exp(-b^2*x^2)*erf(b*x))/x^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\,\mathrm{erf}\,(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b**2*x**2)/x**3,x)
```

```
[Out] Integral(exp(-b**2*x**2)*erf(b*x)/x**3, x)
```

3.80 $\int \frac{e^{-b^2x^2}\mathbf{erf}(bx)}{x^5}\,dx$

Optimal. Leaf size=161

$$\frac{1}{2}b^4\text{Int}\left(\frac{e^{-b^2x^2}\text{erf}(bx)}{x},x\right)+\frac{2}{3}\sqrt{2}\,b^4\text{erf}\left(\sqrt{2}\,bx\right)+\frac{b^4\text{erf}\left(\sqrt{2}\,bx\right)}{\sqrt{2}}+\frac{b^2e^{-b^2x^2}\text{erf}(bx)}{4x^2}-\frac{e^{-b^2x^2}\text{erf}(bx)}{4x^4}-\frac{be^{-2b^2x^2}}{6\sqrt{\pi}\,x^3}+\frac{7b^3e^{-2b}}{6\sqrt{\pi}}$$

```
[Out] -1/4*erf(b*x)/exp(b^2*x^2)/x^4+1/4*b^2*erf(b*x)/exp(b^2*x^2)/x^2+7/6*b^4*er
f(b*x*2^(1/2))*2^(1/2)-1/6*b/exp(2*b^2*x^2)/x^3/Pi^(1/2)+7/6*b^3/exp(2*b^2*
x^2)/x/Pi^(1/2)+1/2*b^4*Unintegrable(erf(b*x)/exp(b^2*x^2)/x,x)
```

Rubi [A] time = 0.19, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{-b^2x^2}\text{Erf}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erf[b*x]/(E^(b^2*x^2)*x^5),x]
```

```
[Out] -b/(6*E^(2*b^2*x^2)*Sqrt[Pi]*x^3) + (7*b^3)/(6*E^(2*b^2*x^2)*Sqrt[Pi]*x) -
Erf[b*x]/(4*E^(b^2*x^2)*x^4) + (b^2*Erf[b*x])/(4*E^(b^2*x^2)*x^2) + (b^4*Er
f[Sqrt[2]*b*x])/Sqrt[2] + (2*Sqrt[2]*b^4*Erf[Sqrt[2]*b*x])/3 + (b^4*Defer[I
nt][Erf[b*x]/(E^(b^2*x^2)*x), x])/2
```

Rubi steps

$$\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x^5}\,dx = -\frac{e^{-b^2x^2}\text{erf}(bx)}{4x^4}-\frac{1}{2}b^2\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x^3}\,dx+\frac{b\int \frac{e^{-2b^2x^2}}{x^4}\,dx}{2\sqrt{\pi}}$$

$$= -\frac{be^{-2b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{e^{-b^2x^2}\text{erf}(bx)}{4x^4}+\frac{b^2e^{-b^2x^2}\text{erf}(bx)}{4x^2}+\frac{1}{2}b^4\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x}\,dx-\frac{b^3\int \frac{e^{-2b^2x^2}}{x^2}\,dx}{2\sqrt{\pi}}-$$

$$= -\frac{be^{-2b^2x^2}}{6\sqrt{\pi}\,x^3}+\frac{7b^3e^{-2b^2x^2}}{6\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\text{erf}(bx)}{4x^4}+\frac{b^2e^{-b^2x^2}\text{erf}(bx)}{4x^2}+\frac{1}{2}b^4\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x}\,dx+\frac{(2b}{}$$

$$= -\frac{be^{-2b^2x^2}}{6\sqrt{\pi}\,x^3}+\frac{7b^3e^{-2b^2x^2}}{6\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\text{erf}(bx)}{4x^4}+\frac{b^2e^{-b^2x^2}\text{erf}(bx)}{4x^2}+\frac{b^4\text{erf}\left(\sqrt{2}\,bx\right)}{\sqrt{2}}+\frac{2}{3}\sqrt{2}\,b^4\text{erf}\left(\right.$$

Mathematica [A] time = 0.17, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erf[b*x]/(E^(b^2*x^2)*x^5),x]
[Out] Integrate[Erf[b*x]/(E^(b^2*x^2)*x^5), x]
```

fricas [A] time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)}}{x^5}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^5,x, algorithm="fricas")
[Out] integral(erf(b*x)*e^(-b^2*x^2)/x^5, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^5,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x^5, x)
```

maple [A] time = 0.24, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)\,\mathrm{e}^{-b^2x^2}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/exp(b^2*x^2)/x^5,x)
[Out] int(erf(b*x)/exp(b^2*x^2)/x^5,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^5,x, algorithm="maxima")
```

```
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x^5, x)
```

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

$$\int \frac{e^{-b^2 x^2} \operatorname{erf}(b x)}{x^5} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erf(b*x))/x^5,x)
```

```
[Out] int((exp(-b^2*x^2)*erf(b*x))/x^5, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2} \operatorname{erf}(bx)}{x^5} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b**2*x**2)/x**5,x)
```

```
[Out] Integral(exp(-b**2*x**2)*erf(b*x)/x**5, x)
```

3.81 $\int e^{-b^2x^2}x^4\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=112

$$\frac{3\sqrt{\pi}\,\mathrm{erf}(bx)^2}{16b^5}-\frac{x^3e^{-b^2x^2}\mathrm{erf}(bx)}{2b^2}-\frac{e^{-2b^2x^2}}{2\sqrt{\pi}\,b^5}-\frac{3xe^{-b^2x^2}\mathrm{erf}(bx)}{4b^4}-\frac{x^2e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

```
[Out] -3/4*x*erf(b*x)/b^4/exp(b^2*x^2)-1/2*x^3*erf(b*x)/b^2/exp(b^2*x^2)-1/2/b^5/
exp(2*b^2*x^2)/Pi^(1/2)-1/4*x^2/b^3/exp(2*b^2*x^2)/Pi^(1/2)+3/16*erf(b*x)^2
*Pi^(1/2)/b^5
```

Rubi [A] time = 0.15, antiderivative size = 112, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.278, Rules used = {6385, 6373, 30, 2209, 2212}

$$-\frac{x^3e^{-b^2x^2}\mathrm{Erf}(bx)}{2b^2}-\frac{3xe^{-b^2x^2}\mathrm{Erf}(bx)}{4b^4}+\frac{3\sqrt{\pi}\,\mathrm{Erf}(bx)^2}{16b^5}-\frac{x^2e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}-\frac{e^{-2b^2x^2}}{2\sqrt{\pi}\,b^5}$$

Antiderivative was successfully verified.

```
[In] Int[(x^4*Erf[b*x])/E^(b^2*x^2),x]
```

```
[Out] -1/(2*b^5*E^(2*b^2*x^2)*Sqrt[Pi]) - x^2/(4*b^3*E^(2*b^2*x^2)*Sqrt[Pi]) - (3
*x*Erf[b*x])/(4*b^4*E^(b^2*x^2)) - (x^3*Erf[b*x])/(2*b^2*E^(b^2*x^2)) + (3*
Sqrt[Pi]*Erf[b*x]^2)/(16*b^5)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
```

```
0])
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6385

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

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}x^4\operatorname{erf}(bx)\,dx &= -\frac{e^{-b^2x^2}x^3\operatorname{erf}(bx)}{2b^2}+\frac{3\int e^{-b^2x^2}x^2\operatorname{erf}(bx)\,dx}{2b^2}+\frac{\int e^{-2b^2x^2}x^3\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^{-2b^2x^2}x^2}{4b^3\sqrt{\pi}}-\frac{3e^{-b^2x^2}x\operatorname{erf}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^3\operatorname{erf}(bx)}{2b^2}+\frac{3\int e^{-b^2x^2}\operatorname{erf}(bx)\,dx}{4b^4}+\frac{\int e^{-2b^2x^2}x\,dx}{2b^3\sqrt{\pi}}+\\ &= -\frac{e^{-2b^2x^2}}{2b^5\sqrt{\pi}}-\frac{e^{-2b^2x^2}x^2}{4b^3\sqrt{\pi}}-\frac{3e^{-b^2x^2}x\operatorname{erf}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^3\operatorname{erf}(bx)}{2b^2}+\frac{\left(3\sqrt{\pi}\right)\operatorname{Subst}\left(\int x\,dx,x,\operatorname{erf}\right.}{8b^5}\\ &= -\frac{e^{-2b^2x^2}}{2b^5\sqrt{\pi}}-\frac{e^{-2b^2x^2}x^2}{4b^3\sqrt{\pi}}-\frac{3e^{-b^2x^2}x\operatorname{erf}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^3\operatorname{erf}(bx)}{2b^2}+\frac{3\sqrt{\pi}\operatorname{erf}(bx)^2}{16b^5}\end{aligned}$$

Mathematica [A] time = 0.04, size = 85, normalized size = 0.76

$$\frac{e^{-2b^2x^2}\left(3\pi e^{2b^2x^2}\operatorname{erf}(bx)^2-4\sqrt{\pi}\,bxe^{b^2x^2}\left(2b^2x^2+3\right)\operatorname{erf}(bx)-4\left(b^2x^2+2\right)\right)}{16\sqrt{\pi}\,b^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^4*Erf[b*x])/E^(b^2*x^2),x]
```

```
[Out] (-4*(2 + b^2*x^2) - 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(3 + 2*b^2*x^2)*Erf[b*x] + 3
*E^(2*b^2*x^2)*Pi*Erf[b*x]^2)/(16*b^5*E^(2*b^2*x^2)*Sqrt[Pi])
```

fricas [A] time = 0.41, size = 74, normalized size = 0.66

$$-\frac{4\left(2\pi b^3x^3+3\pi bx\right)\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}-\sqrt{\pi}\left(3\pi\operatorname{erf}(bx)^2-4\left(b^2x^2+2\right)e^{\left(-2b^2x^2\right)}\right)}{16\pi b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erf(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] -1/16*(4*(2*pi*b^3*x^3 + 3*pi*b*x)*erf(b*x)*e^(-b^2*x^2) - sqrt(pi)*(3*pi*e
rf(b*x)^2 - 4*(b^2*x^2 + 2)*e^(-2*b^2*x^2)))/(pi*b^5)
```

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

$$\int x^4\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erf(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x^4*erf(b*x)*e^(-b^2*x^2), x)
```

maple [F] time = 0.19, size = 0, normalized size = 0.00

$$\int x^4\operatorname{erf}(bx)\,\mathrm{e}^{-b^2x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erf(b*x)/exp(b^2*x^2),x)
```

```
[Out] int(x^4*erf(b*x)/exp(b^2*x^2),x)
```

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

$$\frac{-\frac{\left(2b^2x^2+1\right)e^{\left(-2b^2x^2\right)}}{4b^2}-\frac{3e^{\left(-2b^2x^2\right)}}{4b^2}}{2\sqrt{\pi}b^3}-\frac{4\left(2b^3x^3+3bx\right)\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}-3\sqrt{\pi}\operatorname{erf}(bx)^2}{16b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erf(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] 1/2*integrate((2*b^2*x^3 + 3*x)*e^(-2*b^2*x^2), x)/(sqrt(pi)*b^3) - 1/16*(4
*(2*b^3*x^3 + 3*b*x)*erf(b*x)*e^(-b^2*x^2) - 3*sqrt(pi)*erf(b*x)^2)/b^5
```

mupad [B] time = 0.75, size = 90, normalized size = 0.80

$$-\frac{8\,\mathrm{e}^{-2\,b^2\,x^2}-3\,\pi\,\mathrm{erf}\left(b\,x\right)^2}{16\,b^5\,\sqrt{\pi}}-\frac{x^2\,\mathrm{e}^{-2\,b^2\,x^2}}{4\,b^3\,\sqrt{\pi}}-\frac{3\,x\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erf}\left(b\,x\right)}{4\,b^4}-\frac{x^3\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erf}\left(b\,x\right)}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*exp(-b^2*x^2)*erf(b*x),x)
```

```
[Out] - (8*exp(-2*b^2*x^2) - 3*pi*erf(b*x)^2)/(16*b^5*pi^(1/2)) - (x^2*exp(-2*b^2
*x^2))/(4*b^3*pi^(1/2)) - (3*x*exp(-b^2*x^2)*erf(b*x))/(4*b^4) - (x^3*exp(-
b^2*x^2)*erf(b*x))/(2*b^2)
```

sympy [A] time = 37.09, size = 109, normalized size = 0.97

$$\begin{cases} -\frac{x^3e^{-b^2x^2}\,\mathrm{erf}\,(bx)}{2b^2}-\frac{x^2e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}-\frac{3xe^{-b^2x^2}\,\mathrm{erf}\,(bx)}{4b^4}+\frac{3\sqrt{\pi}\,\mathrm{erf}^2\,(bx)}{16b^5}-\frac{e^{-2b^2x^2}}{2\sqrt{\pi}\,b^5} & \text{for } b\neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*erf(b*x)/exp(b**2*x**2),x)
```

```
[Out] Piecewise((-x**3*exp(-b**2*x**2)*erf(b*x)/(2*b**2) - x**2*exp(-2*b**2*x**2)
/(4*sqrt(pi)*b**3) - 3*x*exp(-b**2*x**2)*erf(b*x)/(4*b**4) + 3*sqrt(pi)*erf
(b*x)**2/(16*b**5) - exp(-2*b**2*x**2)/(2*sqrt(pi)*b**5), Ne(b, 0)), (0, Tr
ue))
```

3.82 $\int e^{-b^2x^2}x^2\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=63

$$\frac{\sqrt{\pi}\,\mathrm{erf}(bx)^2}{8b^3}-\frac{xe^{-b^2x^2}\mathrm{erf}(bx)}{2b^2}-\frac{e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

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

Rubi [A] time = 0.07, antiderivative size = 63, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6385, 6373, 30, 2209}

$$-\frac{xe^{-b^2x^2}\mathrm{Erf}(bx)}{2b^2}+\frac{\sqrt{\pi}\,\mathrm{Erf}(bx)^2}{8b^3}-\frac{e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*Erf[b*x])/E^(b^2*x^2),x]
```

```
[Out] -1/(4*b^3*E^(2*b^2*x^2)*Sqrt[Pi]) - (x*Erf[b*x])/(2*b^2*E^(b^2*x^2)) + (Sqr
t[Pi]*Erf[b*x]^2)/(8*b^3)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6385

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol] :
> Simp[(x^(m - 1)*E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] + (-Dist[(m - 1)/(2
```

```
*d), Int[x^(m - 2)*E^(c + d*x^2)*Erf[a + b*x], x], x] - Dist[b/(d*Sqrt[Pi])
, Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ[{a
, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}x^2\text{erf}(bx)\,dx &= -\frac{e^{-b^2x^2}x\text{erf}(bx)}{2b^2}+\frac{\int e^{-b^2x^2}\text{erf}(bx)\,dx}{2b^2}+\frac{\int e^{-2b^2x^2}x\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^{-2b^2x^2}}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}x\text{erf}(bx)}{2b^2}+\frac{\sqrt{\pi}\ \text{Subst}(\int x\,dx,x,\text{erf}(bx))}{4b^3}\\ &= -\frac{e^{-2b^2x^2}}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}x\text{erf}(bx)}{2b^2}+\frac{\sqrt{\pi}\,\text{erf}(bx)^2}{8b^3}\end{aligned}$$

Mathematica [A] time = 0.05, size = 56, normalized size = 0.89

$$-\frac{4bxe^{-b^2x^2}\text{erf}(bx)+\frac{2e^{-2b^2x^2}}{\sqrt{\pi}}-\sqrt{\pi}\,\text{erf}(bx)^2}{8b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^2*Erf[b*x])/E^(b^2*x^2),x]
```

```
[Out] -1/8*(2/(E^(2*b^2*x^2)*Sqrt[Pi]) + (4*b*x*Erf[b*x])/E^(b^2*x^2) - Sqrt[Pi]*
Erf[b*x]^2)/b^3
```

fricas [A] time = 0.39, size = 52, normalized size = 0.83

$$-\frac{4\,\pi bx\,\text{erf}\,(bx)\,e^{\left(-b^2x^2\right)}-\sqrt{\pi}\left(\pi\,\text{erf}\,(bx)^2-2\,e^{\left(-2\,b^2x^2\right)}\right)}{8\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erf(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] -1/8*(4*pi*b*x*erf(b*x)*e^(-b^2*x^2) - sqrt(pi)*(pi*erf(b*x)^2 - 2*e^(-2*b^
2*x^2)))/(pi*b^3)
```

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

$$\int x^2\,\text{erf}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erf(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x^2*erf(b*x)*e^(-b^2*x^2), x)
```

maple [F] time = 0.18, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erf}(bx)\, e^{-b^2x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erf(b*x)/exp(b^2*x^2),x)
```

```
[Out] int(x^2*erf(b*x)/exp(b^2*x^2),x)
```

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

$$\frac{-\frac{e^{\left(-2\,b^2x^2\right)}}{4\,b^2}}{\sqrt{\pi}\,b} - \frac{4\,bx\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)} - \sqrt{\pi}\,\operatorname{erf}(bx)^2}{8\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erf(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x*e^(-2*b^2*x^2), x)/(sqrt(pi)*b) - 1/8*(4*b*x*erf(b*x)*e^(-b^2*x
^2) - sqrt(pi)*erf(b*x)^2)/b^3
```

mupad [B] time = 0.30, size = 80, normalized size = 1.27

$$-\operatorname{erf}(b\,x)\left(\frac{\sqrt{\pi}\,\operatorname{erfi}\left(x\,\sqrt{-b^2}\right)}{4\left(-b^2\right)^{3/2}} + \frac{x\,e^{-b^2\,x^2}}{2\,b^2}\right) - \frac{2\,e^{-2\,b^2\,x^2} - \pi\,\operatorname{erfi}\left(x\,\sqrt{-b^2}\right)^2}{8\,b^3\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(-b^2*x^2)*erf(b*x),x)
```

```
[Out] - erf(b*x)*((pi^(1/2)*erfi(x*(-b^2)^(1/2)))/(4*(-b^2)^(3/2)) + (x*exp(-b^2*
x^2))/(2*b^2)) - (2*exp(-2*b^2*x^2) - pi*erfi(x*(-b^2)^(1/2))^2)/(8*b^3*pi^
(1/2))
```

sympy [A] time = 6.30, size = 60, normalized size = 0.95

$$\begin{cases} -\frac{xe^{-b^2x^2}\operatorname{erf}(bx)}{2b^2} + \frac{\sqrt{\pi}\operatorname{erf}^2(bx)}{8b^3} - \frac{e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erf(b*x)/exp(b**2*x**2),x)
```

```
[Out] Piecewise((-x*exp(-b**2*x**2)*erf(b*x)/(2*b**2) + sqrt(pi)*erf(b*x)**2/(8*b
**3) - exp(-2*b**2*x**2)/(4*sqrt(pi)*b**3), Ne(b, 0)), (0, True))
```

3.83 $\int e^{-b^2x^2}\mathbf{erf}(bx)\,dx$

Optimal. Leaf size=18

$$\frac{\sqrt{\pi}\,\mathrm{erf}(bx)^2}{4b}$$

```
[Out] 1/4*erf(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.02, antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {6373, 30}

$$\frac{\sqrt{\pi}\,\mathrm{Erf}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/E^(b^2*x^2),x]
```

```
[Out] (Sqrt[Pi]*Erf[b*x]^2)/(4*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}\mathrm{erf}(bx)\,dx &= \frac{\sqrt{\pi}\ \mathrm{Subst}\left(\int x\,dx, x, \mathrm{erf}(bx)\right)}{2b}\\ &= \frac{\sqrt{\pi}\,\mathrm{erf}(bx)^2}{4b}\end{aligned}$$

Mathematica [A] time = 0.00, size = 18, normalized size = 1.00

$$\frac{\sqrt{\pi}\,\mathrm{erf}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/E^(b^2*x^2),x]
[Out] (Sqrt[Pi]*Erf[b*x]^2)/(4*b)
```

fricas [A] time = 0.39, size = 14, normalized size = 0.78

$$\frac{\sqrt{\pi}\ \mathrm{erf}\left(bx\right)^{2}}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2),x, algorithm="fricas")
[Out] 1/4*sqrt(pi)*erf(b*x)^2/b
```

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

$$\int \mathrm{erf}\left(bx\right)e^{\left(-b^{2}x^{2}\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2),x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(-b^2*x^2), x)
```

maple [A] time = 0.04, size = 15, normalized size = 0.83

$$\frac{\mathrm{erf}\left(bx\right)^{2}\sqrt{\pi}}{4b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/exp(b^2*x^2),x)
[Out] 1/4*erf(b*x)^2*Pi^(1/2)/b
```

maxima [A] time = 0.31, size = 14, normalized size = 0.78

$$\frac{\sqrt{\pi}\ \mathrm{erf}\left(bx\right)^{2}}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2),x, algorithm="maxima")
[Out] 1/4*sqrt(pi)*erf(b*x)^2/b
```

mupad [B] time = 0.20, size = 41, normalized size = 2.28

$$\frac{\sqrt{\pi}\,\mathrm{erf}\left(x\sqrt{b^2}\right)\mathrm{erf}\left(b\,x\right)}{2\sqrt{b^2}}-\frac{\sqrt{\pi}\,\mathrm{erf}\left(x\sqrt{b^2}\right)^2}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2)*erf(b*x),x)
```

```
[Out] (pi^(1/2)*erf(x*(b^2)^(1/2))*erf(b*x))/(2*(b^2)^(1/2)) - (pi^(1/2)*erf(x*(b
^2)^(1/2))^2)/(4*b)
```

sympy [A] time = 0.99, size = 15, normalized size = 0.83

$$\begin{cases}\frac{\sqrt{\pi}\,\mathrm{erf}^2\,(bx)}{4b} & \text{for } b \neq 0\\ 0 & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b**2*x**2),x)
```

```
[Out] Piecewise((sqrt(pi)*erf(b*x)**2/(4*b), Ne(b, 0)), (0, True))
```

3.84 $\int \frac{e^{-b^2x^2}\mathbf{erf}(bx)}{x^2}\,dx$

Optimal. Leaf size=52

$$-\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x}+\frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}}-\frac{1}{2}\sqrt{\pi}\,b\operatorname{erf}(bx)^2$$

```
[Out] -erf(b*x)/exp(b^2*x^2)/x+b*Ei(-2*b^2*x^2)/Pi^(1/2)-1/2*b*erf(b*x)^2*Pi^(1/2
)
```

Rubi [A] time = 0.07, antiderivative size = 52, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6391, 6373, 30, 2210}

$$-\frac{e^{-b^2x^2}\operatorname{Erf}(bx)}{x}+\frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}}-\frac{1}{2}\sqrt{\pi}\,b\operatorname{Erf}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/(E^(b^2*x^2)*x^2),x]
```

```
[Out] -(Erf[b*x]/(E^(b^2*x^2)*x)) - (b*Sqrt[Pi]*Erf[b*x]^2)/2 + (b*ExpIntegralEi[
-2*b^2*x^2])/Sqrt[Pi]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6391

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol] :
> Simp[(x^(m + 1)*E^(c + d*x^2)*Erf[a + b*x])/(m + 1), x] + (-Dist[(2*d)/(m
```

```
 + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erf[a + b*x], x], x] - Dist[(2*b)/((m +
1)*Sqrt[Pi]), Int[x^(m + 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x])
 /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x^2}\,dx &= -\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x} - \left(2b^2\right)\int e^{-b^2x^2}\operatorname{erf}(bx)\,dx + \frac{(2b)\int \frac{e^{-2b^2x^2}}{x}\,dx}{\sqrt{\pi}} \\
&= -\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x} + \frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}} - \left(b\sqrt{\pi}\right)\operatorname{Subst}\left(\int x\,dx, x, \operatorname{erf}(bx)\right) \\
&= -\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x} - \frac{1}{2}b\sqrt{\pi}\operatorname{erf}(bx)^2 + \frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}}
\end{aligned}$$

Mathematica [A] time = 0.02, size = 52, normalized size = 1.00

$$-\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x} + \frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}} - \frac{1}{2}\sqrt{\pi}\,b\operatorname{erf}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/(E^(b^2*x^2)*x^2),x]
```

```
[Out] -(Erf[b*x]/(E^(b^2*x^2)*x)) - (b*Sqrt[Pi]*Erf[b*x]^2)/2 + (b*ExpIntegralEi[
-2*b^2*x^2])/Sqrt[Pi]
```

fricas [A] time = 0.44, size = 53, normalized size = 1.02

$$-\frac{2\,\pi\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)} + \sqrt{\pi}\left(\pi bx\operatorname{erf}(bx)^2 - 2\,bx\operatorname{Ei}\left(-2\,b^2x^2\right)\right)}{2\,\pi x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^2,x, algorithm="fricas")
```

```
[Out] -1/2*(2*pi*erf(b*x)*e^(-b^2*x^2) + sqrt(pi)*(pi*b*x*erf(b*x)^2 - 2*b*x*Ei(-
2*b^2*x^2)))/(pi*x)
```

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

$$\int \frac{\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^2,x, algorithm="giac")
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x^2, x)
```

maple [F] time = 0.20, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx)\,\mathrm{e}^{-b^2x^2}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/exp(b^2*x^2)/x^2,x)
[Out] int(erf(b*x)/exp(b^2*x^2)/x^2,x)
```

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

$$\int \frac{\operatorname{erf}(bx)\,e^{\left(-b^2x^2\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^2,x, algorithm="maxima")
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x^2, x)
```

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

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\operatorname{erf}(b\,x)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erf(b*x))/x^2,x)
[Out] int((exp(-b^2*x^2)*erf(b*x))/x^2, x)
```

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

$$\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b**2*x**2)/x**2,x)
[Out] Integral(exp(-b**2*x**2)*erf(b*x)/x**2, x)
```

3.85 $\int \frac{e^{-b^2x^2}\operatorname{erf}(bx)}{x^4}\,dx$

Optimal. Leaf size=108

$$\frac{1}{3}\sqrt{\pi}\,b^3\operatorname{erf}(bx)^2+\frac{2b^2e^{-b^2x^2}\operatorname{erf}(bx)}{3x}-\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{3x^3}-\frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{4b^3\operatorname{Ei}\left(-2b^2x^2\right)}{3\sqrt{\pi}}$$

```
[Out] -1/3*erf(b*x)/exp(b^2*x^2)/x^3+2/3*b^2*erf(b*x)/exp(b^2*x^2)/x-1/3*b/exp(2*
b^2*x^2)/x^2/Pi^(1/2)-4/3*b^3*Ei(-2*b^2*x^2)/Pi^(1/2)+1/3*b^3*erf(b*x)^2*Pi
^(1/2)
```

Rubi [A] time = 0.15, antiderivative size = 108, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.278, Rules used = {6391, 6373, 30, 2210, 2214}

$$\frac{2b^2e^{-b^2x^2}\operatorname{Erf}(bx)}{3x}-\frac{e^{-b^2x^2}\operatorname{Erf}(bx)}{3x^3}+\frac{1}{3}\sqrt{\pi}\,b^3\operatorname{Erf}(bx)^2-\frac{4b^3\operatorname{Ei}\left(-2b^2x^2\right)}{3\sqrt{\pi}}-\frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/(E^(b^2*x^2)*x^4),x]
```

```
[Out] -b/(3*E^(2*b^2*x^2)*Sqrt[Pi]*x^2) - Erf[b*x]/(3*E^(b^2*x^2)*x^3) + (2*b^2*E
rf[b*x])/(3*E^(b^2*x^2)*x) + (b^3*Sqrt[Pi]*Erf[b*x]^2)/3 - (4*b^3*ExpIntegr
alEi[-2*b^2*x^2])/(3*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
```

```
] && LeQ[-n, m + 1]))
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6391

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

Rubi steps

$$\begin{aligned}\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x^4}\,dx &= -\frac{e^{-b^2x^2}\text{erf}(bx)}{3x^3}-\frac{1}{3}\left(2b^2\right)\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x^2}\,dx+\frac{(2b)\int \frac{e^{-2b^2x^2}}{x^3}\,dx}{3\sqrt{\pi}}\\
&= -\frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{-b^2x^2}\text{erf}(bx)}{3x^3}+\frac{2b^2e^{-b^2x^2}\text{erf}(bx)}{3x}+\frac{1}{3}\left(4b^4\right)\int e^{-b^2x^2}\text{erf}(bx)\,dx-2\frac{\left(4b^3\right)\int \frac{e^{-2b}}{x}}{3\sqrt{\pi}}\\
&= -\frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{-b^2x^2}\text{erf}(bx)}{3x^3}+\frac{2b^2e^{-b^2x^2}\text{erf}(bx)}{3x}-\frac{4b^3\text{Ei}\left(-2b^2x^2\right)}{3\sqrt{\pi}}+\frac{1}{3}\left(2b^3\sqrt{\pi}\right)\text{Subst}(\int x\\
&= -\frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{-b^2x^2}\text{erf}(bx)}{3x^3}+\frac{2b^2e^{-b^2x^2}\text{erf}(bx)}{3x}+\frac{1}{3}b^3\sqrt{\pi}\,\text{erf}(bx)^2-\frac{4b^3\text{Ei}\left(-2b^2x^2\right)}{3\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.07, size = 85, normalized size = 0.79

$$\frac{1}{3}\left(\sqrt{\pi}\,b^3\text{erf}(bx)^2+\frac{e^{-b^2x^2}\left(2b^2x^2-1\right)\text{erf}(bx)}{x^3}+\frac{b\left(-4b^2\text{Ei}\left(-2b^2x^2\right)-\frac{e^{-2b^2x^2}}{x^2}\right)}{\sqrt{\pi}}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/(E^(b^2*x^2)*x^4),x]
```

```
[Out] (((-1 + 2*b^2*x^2)*Erf[b*x])/(E^(b^2*x^2)*x^3) + b^3*Sqrt[Pi]*Erf[b*x]^2 +
(b*(-(1/(E^(2*b^2*x^2)*x^2)) - 4*b^2*ExpIntegralEi[-2*b^2*x^2]))/Sqrt[Pi])/
3
```

fricas [A] time = 0.49, size = 84, normalized size = 0.78

$$-\frac{\left(\pi - 2\,\pi b^2 x^2\right)\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)} - \sqrt{\pi}\left(\pi b^3 x^3 \operatorname{erf}\left(bx\right)^2 - 4\,b^3x^3\operatorname{Ei}\left(-2\,b^2x^2\right) - bxe^{\left(-2\,b^2x^2\right)}\right)}{3\,\pi x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^4,x, algorithm="fricas")
```

```
[Out] -1/3*((pi - 2*pi*b^2*x^2)*erf(b*x)*e^(-b^2*x^2) - sqrt(pi)*(pi*b^3*x^3*erf(
b*x)^2 - 4*b^3*x^3*Ei(-2*b^2*x^2) - b*x*e^(-2*b^2*x^2)))/(pi*x^3)
```

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

$$\int \frac{\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^4,x, algorithm="giac")
```

```
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x^4, x)
```

maple [F] time = 0.24, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}\left(bx\right)\mathrm{e}^{-b^2x^2}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/exp(b^2*x^2)/x^4,x)
```

```
[Out] int(erf(b*x)/exp(b^2*x^2)/x^4,x)
```

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

$$\int \frac{\operatorname{erf}\left(bx\right)e^{\left(-b^2x^2\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^4,x, algorithm="maxima")
```

```
[Out] integrate(erf(b*x)*e^(-b^2*x^2)/x^4, x)
```

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

$$\int \frac{e^{-b^2 x^2} \operatorname{erf}(b x)}{x^4} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erf(b*x))/x^4,x)
[Out] int((exp(-b^2*x^2)*erf(b*x))/x^4, x)
```

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

$$\int \frac{e^{-b^2x^2} \operatorname{erf}(bx)}{x^4} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b**2*x**2)/x**4,x)
[Out] Integral(exp(-b**2*x**2)*erf(b*x)/x**4, x)
```

3.86 $\int e^{c+dx^2}x^3\mathbf{erf}(a+bx)\,dx$

Optimal. Leaf size=342

$$\frac{be^{\frac{a^2d}{b^2-d}+c}\operatorname{erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{2d^2\sqrt{b^2-d}}-\frac{be^{\frac{a^2d}{b^2-d}+c}\operatorname{erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{4d\left(b^2-d\right)^{3/2}}-\frac{ab^2e^{-a^2-2abx-x^2(b^2-d)+c}}{2\sqrt{\pi}\,d\left(b^2-d\right)^2}+\frac{bxe^{-a^2-2abx-x^2(b^2-d)+c}}{2\sqrt{\pi}\,d\left(b^2-d\right)}-\frac{a^2b^3e^{\frac{a^2d}{b^2-d}+c}\operatorname{erf}\left(\cdots\right.}{2d\left(b^2-\cdots\right.}$$

```
[Out] -1/2*exp(d*x^2+c)*erf(b*x+a)/d^2+1/2*exp(d*x^2+c)*x^2*erf(b*x+a)/d-1/2*a^2*
b^3*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/(b^2-d)^(5/2)/d
-1/4*b*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/(b^2-d)^(3/2
)/d+1/2*b*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/d^2/(b^2-
d)^(1/2)-1/2*a*b^2*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/(b^2-d)^2/d/Pi^(1/2)+1/2
*b*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)*x/(b^2-d)/d/Pi^(1/2)
```

Rubi **[A]** time = 0.51, antiderivative size = 342, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6385, 6382, 2234, 2205, 2241, 2240}

$$\frac{be^{\frac{a^2d}{b^2-d}+c}\operatorname{Erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{2d^2\sqrt{b^2-d}}-\frac{a^2b^3e^{\frac{a^2d}{b^2-d}+c}\operatorname{Erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{2d\left(b^2-d\right)^{5/2}}-\frac{be^{\frac{a^2d}{b^2-d}+c}\operatorname{Erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{4d\left(b^2-d\right)^{3/2}}-\frac{ab^2e^{-a^2-2abx-x^2(b^2-d)+c}}{2\sqrt{\pi}\,d\left(b^2-d\right)^2}+\frac{bxe^{-a^2-2ab\cdots}}{2\sqrt{\pi}\,d\cdots}$$

Antiderivative was successfully verified.

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

```
[Out] -(a*b^2*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(2*(b^2 - d)^2*d*Sqrt[Pi])
+ (b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2)*x)/(2*(b^2 - d)*d*Sqrt[Pi]) - (
E^(c + d*x^2)*Erf[a + b*x])/(2*d^2) + (E^(c + d*x^2)*x^2*Erf[a + b*x])/(2*d
) + (b*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/(2
*Sqrt[b^2 - d]*d^2) - (a^2*b^3*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 -
d)*x)/Sqrt[b^2 - d]])/(2*(b^2 - d)^(5/2)*d) - (b*E^(c + (a^2*d)/(b^2 - d))*
Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/(4*(b^2 - d)^(3/2)*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2240

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)*((d_.) + (e_.)*(x_)), x_Symbol
] :> Simp[(e*F^(a + b*x + c*x^2))/(2*c*Log[F]), x] - Dist[(b*e - 2*c*d)/(2*
c), Int[F^(a + b*x + c*x^2), x], x] /; FreeQ[{F, a, b, c, d, e}, x] && NeQ[
b*e - 2*c*d, 0]
```

Rule 2241

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)*((d_.) + (e_.)*(x_))^(m_), x_S
ymbol] :> Simp[(e*(d + e*x)^(m - 1)*F^(a + b*x + c*x^2))/(2*c*Log[F]), x] +
 (-Dist[(b*e - 2*c*d)/(2*c), Int[(d + e*x)^(m - 1)*F^(a + b*x + c*x^2), x],
 x] - Dist[((m - 1)*e^2)/(2*c*Log[F]), Int[(d + e*x)^(m - 2)*F^(a + b*x + c
*x^2), x], x]) /; FreeQ[{F, a, b, c, d, e}, x] && NeQ[b*e - 2*c*d, 0] && Gt
Q[m, 1]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6385

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

Rubi steps

$$\int e^{c+dx^2}x^3\text{erf}(a+bx)\,dx = \frac{e^{c+dx^2}x^2\text{erf}(a+bx)}{2d} - \frac{\int e^{c+dx^2}x\text{erf}(a+bx)\,dx}{d} - \frac{b\int e^{-a^2+c-2abx+\left(-b^2+d\right)x^2}x^2\,dx}{d\sqrt{\pi}}$$

$$= \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erf}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erf}(a+bx)}{2d} + \frac{b\int e^{-a^2+c-2abx-\left(b^2-\right.}}{d^2\sqrt{\pi}}$$

$$= -\frac{ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erf}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erf}(a\,-}{2d}$$

$$= -\frac{ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erf}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erf}(a\,-}{2d}$$

$$= -\frac{ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erf}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erf}(a\,-}{2d}$$

Mathematica [A] time = 5.45, size = 240, normalized size = 0.70

$$\frac{e^c\left(-\frac{bde^{-a^2-2abx+x^2\left(d-b^2\right)}\left(\sqrt{\pi}\sqrt{b^2-d}\left(\left(2a^2+1\right)b^2-d\right)e^{\frac{\left(ab+x\left(b^2-d\right)\right)^2}{b^2-d}}\text{erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)+2\left(b^2-d\right)\left(ab+x\left(d-b^2\right)\right)\right)}{\sqrt{\pi}\left(b^2-d\right)^3} + \frac{2be^{\frac{a^2d}{b^2-d}}\text{erfi}\left(\frac{x\left(d-b^2\right)-ab}{\sqrt{d-b^2}}\right)}{\sqrt{d-b^2}} + 2e^{dx^2}\right.}{4d^2}$$

Antiderivative was successfully verified.

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

```
[Out] (E^c*(2*E^(d*x^2)*(-1 + d*x^2)*Erf[a + b*x] - (b*d*E^(-a^2 - 2*a*b*x + (-b^
2 + d)*x^2)*(2*(b^2 - d)*(a*b + (-b^2 + d)*x) + Sqrt[b^2 - d]*((1 + 2*a^2)*
b^2 - d)*E^((a*b + (b^2 - d)*x)^2/(b^2 - d))*Sqrt[Pi]*Erf[(a*b + (b^2 - d)*
x)/Sqrt[b^2 - d]]))/((b^2 - d)^3*Sqrt[Pi]) + (2*b*E^((a^2*d)/(b^2 - d))*Erf
i[(-(a*b) + (-b^2 + d)*x)/Sqrt[-b^2 + d]])/Sqrt[-b^2 + d]))/(4*d^2)
```

fricas [A] time = 0.68, size = 267, normalized size = 0.78

$$\frac{\pi\left(2\,b^5-\left(2\,a^2+5\right)b^3d+3\,bd^2\right)\sqrt{b^2-d}\,\operatorname{erf}\left(\frac{ab+\left(b^2-d\right)x}{\sqrt{b^2-d}}\right)e^{\left(\frac{b^2c+\left(a^2-c\right)d}{b^2-d}\right)}+2\left(\pi\left(b^6d-3\,b^4d^2+3\,b^2d^3-d^4\right)x^2-\pi\left(b^6\right.\right.}{4\,\pi\left(b^6d^2-3\,b^4d\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.27, size = 271, normalized size = 0.79

$$\frac{\left(dx^2-1\right)\operatorname{erf}\left(bx+a\right)e^{\left(dx^2+c\right)}}{2\,d^2}-\frac{\frac{2\,\sqrt{\pi}\,b\operatorname{erf}\left(-\sqrt{b^2-d}\left(\frac{ab}{b^2-d}+x\right)\right)e^{\left(\frac{b^2c+a^2d-cd}{b^2-d}\right)}}{\sqrt{b^2-d}}-\frac{\left(\frac{\sqrt{\pi}\left(2\,a^2b^2+b^2-d\right)\operatorname{erf}\left(-\sqrt{b^2-d}\left(\frac{ab}{b^2-d}+x\right)\right)e^{\left(\frac{b^2c+a^2d-cd}{b^2-d}\right)}}{\sqrt{b^2-d}}+2\left(\left(\cdots\right.\right.\right.}{b^4-2\,b^2\cdots}}{4\,\sqrt{\pi}\,d^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*(d*x^2 - 1)*erf(b*x + a)*e^(d*x^2 + c)/d^2 - 1/4*(2*sqrt(pi)*b*erf(-sqr
t(b^2 - d)*(a*b/(b^2 - d) + x))*e^((b^2*c + a^2*d - c*d)/(b^2 - d))/sqrt(b^
2 - d) - (sqrt(pi)*(2*a^2*b^2 + b^2 - d)*erf(-sqrt(b^2 - d)*(a*b/(b^2 - d)
+ x))*e^((b^2*c + a^2*d - c*d)/(b^2 - d))/sqrt(b^2 - d) + 2*((a*b/(b^2 - d)
 + x)*b^2 - 2*a*b - (a*b/(b^2 - d) + x)*d)*e^(-b^2*x^2 - 2*a*b*x + d*x^2 -
a^2 + c))*b*d/(b^4 - 2*b^2*d + d^2))/(sqrt(pi)*d^2)
```

maple [F] time = 0.25, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^2+c}x^3\operatorname{erf}\left(bx+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\frac{\left(dx^2e^c - e^c\right)\operatorname{erf}\left(bx+a\right)e^{\left(dx^2\right)}}{2\,d^2} - \frac{-\frac{\left(\frac{\sqrt{\pi}\left(ab+\left(b^2-d\right)x\right)a^2b^2\left(\operatorname{erf}\left(\sqrt{\frac{\left(ab+\left(b^2-d\right)x\right)^2}{b^2-d}}\right)-1\right)}{\left(-b^2+d\right)^{\frac{5}{2}}\sqrt{\frac{\left(ab+\left(b^2-d\right)x\right)^2}{b^2-d}}} - \frac{2\,abe^{\left(-\frac{\left(ab+\left(b^2-d\right)x\right)^2}{b^2-d}\right)}}{\left(-b^2+d\right)^{\frac{3}{2}}} - \frac{\left(ab+\left(b^2-d\right)x\right)^3\Gamma\left(\frac{3}{2},\frac{\left(ab+\left(b^2-d\right)x\right)^2}{b^2-d}\right)}{\left(-b^2+d\right)^{\frac{5}{2}}\left(\frac{\left(ab+\left(b^2-d\right)x\right)^2}{b^2-d}\right)^{\frac{3}{2}}}\right)bde^{\left(\cdots\right.}}{2\sqrt{-b^2+d}}}{\sqrt{\pi}\,d^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erf(b*x+a),x, algorithm="maxima")
```

```
[Out] 1/2*(d*x^2*e^c - e^c)*erf(b*x + a)*e^(d*x^2)/d^2 - integrate((b*d*x^2*e^c -
 b*e^c)*e^(-b^2*x^2 - 2*a*b*x + d*x^2 - a^2), x)/(sqrt(pi)*d^2)
```

mupad [B] time = 1.16, size = 386, normalized size = 1.13

$$\frac{\operatorname{erfi}\left(\frac{a\,b-x\,\left(d-b^2\right)}{\sqrt{d-b^2}}\right)\,\left(b^3\,\mathrm{e}^{\frac{c\,d}{d-b^2}-\frac{a^2\,d}{d-b^2}-\frac{b^2\,c}{d-b^2}}+2\,a^2\,b^3\,\mathrm{e}^{\frac{c\,d}{d-b^2}-\frac{a^2\,d}{d-b^2}-\frac{b^2\,c}{d-b^2}}-b\,d\,\mathrm{e}^{\frac{c\,d}{d-b^2}-\frac{a^2\,d}{d-b^2}-\frac{b^2\,c}{d-b^2}}\right)}{4\,d\,{\left(d-b^2\right)}^{5/2}}-\frac{\frac{a\,b^2\,\mathrm{e}^{-a^2-2\,a\,b\,x-b^2\,x^2+d\,x^2+c}}{2\,{\left(d-b^2\right)}^2}+\frac{b\,x\,\mathrm{e}^{-a^2\cdots}}{\cdots}}{d\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (erfi((a*b - x*(d - b^2))/(d - b^2)^(1/2))*(b^3*exp((c*d)/(d - b^2) - (a^2*
d)/(d - b^2) - (b^2*c)/(d - b^2)) + 2*a^2*b^3*exp((c*d)/(d - b^2) - (a^2*d)
/(d - b^2) - (b^2*c)/(d - b^2)) - b*d*exp((c*d)/(d - b^2) - (a^2*d)/(d - b^
2) - (b^2*c)/(d - b^2))))/(4*d*(d - b^2)^(5/2)) - ((a*b^2*exp(c + d*x^2 - a
^2 - b^2*x^2 - 2*a*b*x))/(2*(d - b^2)^2) + (b*x*exp(c + d*x^2 - a^2 - b^2*x
^2 - 2*a*b*x))/(2*(d - b^2)))/(d*pi^(1/2)) - erf(a + b*x)*(exp(c + d*x^2)/(
2*d^2) - (x^2*exp(c + d*x^2))/(2*d)) + (b*erf((a*b*1i - x*(d - b^2)*1i)/(d
- b^2)^(1/2))*exp(c - a^2 - (a^2*b^2)/(d - b^2))*1i)/(2*d^2*(d - b^2)^(1/2)
)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**3*erf(b*x+a),x)
```

```
[Out] Timed out
```

3.87 $\int e^{c+dx^2} x \mathbf{erf}(a+bx)\, dx$

Optimal. Leaf size=86

$$\frac{e^{c+dx^2}\text{erf}(a+bx)}{2d}-\frac{be^{\frac{a^2d}{b^2-d}+c}\text{erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{2d\sqrt{b^2-d}}$$

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

Rubi [A] time = 0.06, antiderivative size = 86, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.176, Rules used = {6382, 2234, 2205}

$$\frac{e^{c+dx^2}\text{Erf}(a+bx)}{2d}-\frac{be^{\frac{a^2d}{b^2-d}+c}\text{Erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{2d\sqrt{b^2-d}}$$

Antiderivative was successfully verified.

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

```
[Out] (E^(c + d*x^2)*Erf[a + b*x])/(2*d) - (b*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b
+ (b^2 - d)*x)/Sqrt[b^2 - d]])/(2*Sqrt[b^2 - d]*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 6382

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Sim
p[(E^(c + d*x^2)*Erf[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(-a^2
 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int e^{c+dx^2}x\mathrm{erf}(a+bx)\,dx = \frac{e^{c+dx^2}\mathrm{erf}(a+bx)}{2d} - \frac{b\int e^{-a^2+c-2abx-(b^2-d)x^2}\,dx}{d\sqrt{\pi}}$$
$$= \frac{e^{c+dx^2}\mathrm{erf}(a+bx)}{2d} - \frac{\left(be^{\frac{b^2c+a^2d-cd}{b^2-d}}\right)\int \exp\left(\frac{\left(-2ab+2\left(-b^2+d\right)x\right)^2}{4\left(-b^2+d\right)}\right)dx}{d\sqrt{\pi}}$$
$$= \frac{e^{c+dx^2}\mathrm{erf}(a+bx)}{2d} - \frac{be^{\frac{b^2c+a^2d-cd}{b^2-d}}\mathrm{erf}\left(\frac{ab+\left(b^2-d\right)x}{\sqrt{b^2-d}}\right)}{2\sqrt{b^2-d}\,d}$$

Mathematica [A] time = 0.11, size = 82, normalized size = 0.95

$$\frac{e^c\left(e^{dx^2}\mathrm{erf}(a+bx)-\frac{be^{\frac{a^2d}{b^2-d}}\mathrm{erfi}\left(\frac{x\left(d-b^2\right)-ab}{\sqrt{d-b^2}}\right)}{\sqrt{d-b^2}}\right)}{2d}$$

Antiderivative was successfully verified.

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

```
[Out] (E^c*(E^(d*x^2)*Erf[a + b*x] - (b*E^((a^2*d)/(b^2 - d))*Erfi[(-(a*b) + (-b^
2 + d)*x)/Sqrt[-b^2 + d]])/Sqrt[-b^2 + d]))/(2*d)
```

fricas [A] time = 0.48, size = 100, normalized size = 1.16

$$-\frac{\sqrt{b^2-d}\,b\,\mathrm{erf}\left(\frac{ab+\left(b^2-d\right)x}{\sqrt{b^2-d}}\right)e^{\left(\frac{b^2c+\left(a^2-c\right)d}{b^2-d}\right)}-\left(b^2-d\right)\mathrm{erf}\left(bx+a\right)e^{\left(dx^2+c\right)}}{2\left(b^2d-d^2\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.47, size = 87, normalized size = 1.01

$$\frac{b\,\mathrm{erf}\left(-\sqrt{b^2-d}\left(\frac{ab}{b^2-d}+x\right)\right)e^{\left(\frac{b^2c+a^2d-cd}{b^2-d}\right)}}{2\sqrt{b^2-d}\,d}+\frac{\mathrm{erf}\left(bx+a\right)e^{\left(dx^2+c\right)}}{2\,d}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.21, size = 134, normalized size = 1.56

$$\frac{\frac{\operatorname{erf}(bx+a)b\,\mathrm{e}^{\frac{(bx+a)^2d}{b^2}-\frac{2ad(bx+a)}{b^2}+\frac{a^2d}{b^2}+c}}{2d}-\frac{b\,\mathrm{e}^{\frac{a^2d}{b^2}+c-\frac{a^2d^2}{b^4\left(-1+\frac{d}{b^2}\right)}}\operatorname{erf}\left(\sqrt{1-\frac{d}{b^2}}\,(bx+a)+\frac{ad}{b^2\sqrt{1-\frac{d}{b^2}}}\right)}{2d\sqrt{1-\frac{d}{b^2}}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 0.33, size = 84, normalized size = 0.98

$$-\frac{b\operatorname{erf}\left(\frac{ab}{\sqrt{b^2-d}}+\sqrt{b^2-d}\,x\right)e^{\left(\frac{a^2b^2}{b^2-d}-a^2+c\right)}}{2\sqrt{b^2-d}\,d}+\frac{\operatorname{erf}\left(bx+a\right)e^{\left(dx^2+c\right)}}{2d}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 0.18, size = 89, normalized size = 1.03

$$\frac{\operatorname{erf}\left(a+b\,x\right)\,\mathrm{e}^{d\,x^2+c}}{2\,d}-\frac{b\operatorname{erf}\left(\frac{a\,b\,1\mathrm{i}-x\,\left(d-b^2\right)\,1\mathrm{i}}{\sqrt{d-b^2}}\right)\,\mathrm{e}^{c-a^2-\frac{a^2\,b^2}{d-b^2}}\,1\mathrm{i}}{2\,d\,\sqrt{d-b^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (erf(a + b*x)*exp(c + d*x^2))/(2*d) - (b*erf((a*b*1i - x*(d - b^2)*1i)/(d -
 b^2)^(1/2))*exp(c - a^2 - (a^2*b^2)/(d - b^2))*1i)/(2*d*(d - b^2)^(1/2))
```

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

$$e^{c}\int xe^{dx^{2}}\operatorname{erf}\left(a+bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x*erf(b*x+a),x)
```

```
[Out] exp(c)*Integral(x*exp(d*x**2)*erf(a + b*x), x)
```

3.88 $\int \frac{e^{c+dx^2}\textbf{erf}(a+bx)}{x}\,dx$

Optimal. Leaf size=22

$$\text{Int}\left(\frac{e^{c+dx^2}\text{erf}(a+bx)}{x},x\right)$$

[Out] Unintegrable(exp(d*x^2+c)*erf(b*x+a)/x,x)

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erf}(a+bx)}{x}\,dx$$

Verification is Not applicable to the result.

[In] Int[(E^(c + d*x^2)*Erf[a + b*x])/x,x]

[Out] Defer[Int][(E^(c + d*x^2)*Erf[a + b*x])/x, x]

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erf}(a+bx)}{x}\,dx = \int \frac{e^{c+dx^2}\text{erf}(a+bx)}{x}\,dx$$

Mathematica [A] time = 0.24, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erf}(a+bx)}{x}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[(E^(c + d*x^2)*Erf[a + b*x])/x,x]

[Out] Integrate[(E^(c + d*x^2)*Erf[a + b*x])/x, x]

fricas [A] time = 0.60, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\left(bx+a\right)e^{\left(dx^2+c\right)}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(erf(b*x + a)*e^(d*x^2 + c)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)\, e^{\left(dx^2+c\right)}}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c} \operatorname{erf}(bx+a)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(exp(d*x^2+c)*erf(b*x+a)/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)\, e^{\left(dx^2+c\right)}}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{erf}(a+b\,x)\, \mathrm{e}^{d\,x^2+c}}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int((erf(a + b*x)*exp(c + d*x^2))/x, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\operatorname{erf}\left(a+bx\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] exp(c)*Integral(exp(d*x**2)*erf(a + b*x)/x, x)
```

3.89 $\int \frac{e^{c+dx^2}\mathbf{erf}(a+bx)}{x^3}\,dx$

Optimal. Leaf size=185

$$-\frac{2ab^2\mathrm{Int}\left(\frac{e^{-a^2-2abx+x^2\left(d-b^2\right)+c}}{x},x\right)}{\sqrt{\pi}}+d\mathrm{Int}\left(\frac{e^{c+dx^2}\mathrm{erf}(a+bx)}{x},x\right)-b\sqrt{b^2-d}\,e^{\frac{a^2d}{b^2-d}+c}\mathrm{erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)-\frac{be^{-a^2-2abx-x^2(b}}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*exp(d*x^2+c)*erf(b*x+a)/x^2-b*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)
/(b^2-d)^(1/2))*(b^2-d)^(1/2)-b*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/x/Pi^(1/2)-
2*a*b^2*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2+d)*x^2)/x,x)/Pi^(1/2)+d*Unint
egrable(exp(d*x^2+c)*erf(b*x+a)/x,x)
```

Rubi [A] time = 0.42, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\mathrm{Erf}(a+bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erf[a + b*x])/x^3,x]
```

```
[Out] -((b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(Sqrt[Pi]*x)) - (E^(c + d*x^2)
*Erf[a + b*x])/(2*x^2) - b*Sqrt[b^2 - d]*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b
 + (b^2 - d)*x)/Sqrt[b^2 - d]] - (2*a*b^2*Defer[Int][E^(-a^2 + c - 2*a*b*x
+ (-b^2 + d)*x^2)/x, x])/Sqrt[Pi] + d*Defer[Int][(E^(c + d*x^2)*Erf[a + b*x
])/x, x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\operatorname{erf}(a+bx)}{x^3}\,dx = -\frac{e^{c+dx^2}\operatorname{erf}(a+bx)}{2x^2} + d\int \frac{e^{c+dx^2}\operatorname{erf}(a+bx)}{x}\,dx + \frac{b\int \frac{e^{-a^2+c-2abx+\left(-b^2+d\right)x^2}}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\operatorname{erf}(a+bx)}{2x^2} + d\int \frac{e^{c+dx^2}\operatorname{erf}(a+bx)}{x}\,dx - \frac{\left(2ab^2\right)\int \frac{e^{-a^2+}}{}}{}$$

$$= -\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\operatorname{erf}(a+bx)}{2x^2} + d\int \frac{e^{c+dx^2}\operatorname{erf}(a+bx)}{x}\,dx - \frac{\left(2ab^2\right)\int \frac{e^{-a^2+}}{}}{}$$

$$= -\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\operatorname{erf}(a+bx)}{2x^2} - b\sqrt{b^2-d}\,e^{\frac{b^2c+a^2d-cd}{b^2-d}}\operatorname{erf}\left(\frac{ab+\left(b^2-d\right)x}{\sqrt{b^2-d}}\right) +$$

Mathematica [A] time = 0.42, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\operatorname{erf}(a+bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erf[a + b*x])/x^3,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erf[a + b*x])/x^3, x]
```

fricas [A] time = 0.73, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erf}(bx+a)\,e^{\left(dx^2+c\right)}}{x^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(erf(b*x + a)*e^(d*x^2 + c)/x^3, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erf}(bx+a)\,e^{\left(dx^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x+a)/x^3,x, algorithm="giac")
[Out] integrate(erf(b*x + a)*e^(d*x^2 + c)/x^3, x)
```

maple [A] time = 0.28, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\,\mathrm{erf}\left(bx+a\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erf(b*x+a)/x^3,x)
[Out] int(exp(d*x^2+c)*erf(b*x+a)/x^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erf}\left(bx+a\right)e^{\left(dx^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x+a)/x^3,x, algorithm="maxima")
[Out] integrate(erf(b*x + a)*e^(d*x^2 + c)/x^3, x)
```

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

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erf(a + b*x)*exp(c + d*x^2))/x^3,x)
[Out] int((erf(a + b*x)*exp(c + d*x^2))/x^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^2}\,\mathrm{erf}\left(a+bx\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erf(b*x+a)/x**3,x)
[Out] exp(c)*Integral(exp(d*x**2)*erf(a + b*x)/x**3, x)
```

3.90 $\int e^{c+dx^2} x^4 \mathbf{erf}(a+bx)\, dx$

Optimal. Leaf size=527

$$\frac{3\text{Int}\left(e^{c+dx^2}\text{erf}(a+bx),x\right)}{4d^2}-\frac{3ab^2e^{\frac{a^2d}{b^2-d}+c}\text{erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)}{4d^2\left(b^2-d\right)^{3/2}}-\frac{3be^{-a^2-2abx-x^2\left(b^2-d\right)+c}}{4\sqrt{\pi}\,d^2\left(b^2-d\right)}+\frac{3ab^2e^{\frac{a^2d}{b^2-d}+c}\text{erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)}{4d\left(b^2-d\right)^{5/2}}-\frac{ab^2}{\cdots}$$

```
[Out] -3/4*exp(d*x^2+c)*x*erf(b*x+a)/d^2+1/2*exp(d*x^2+c)*x^3*erf(b*x+a)/d-3/4*a*
b^2*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/(b^2-d)^(3/2)/d
^2+1/2*a^3*b^4*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/(b^2
-d)^(7/2)/d+3/4*a*b^2*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2
))/(b^2-d)^(5/2)/d-3/4*b*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/(b^2-d)/d^2/Pi^(1/
2)+1/2*a^2*b^3*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/(b^2-d)^3/d/Pi^(1/2)+1/2*b*e
xp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/(b^2-d)^2/d/Pi^(1/2)-1/2*a*b^2*exp(-a^2+c-2*
a*b*x-(b^2-d)*x^2)*x/(b^2-d)^2/d/Pi^(1/2)+1/2*b*exp(-a^2+c-2*a*b*x-(b^2-d)*
x^2)*x^2/(b^2-d)/d/Pi^(1/2)+3/4*Unintegrable(exp(d*x^2+c)*erf(b*x+a),x)/d^2
```

Rubi [A] time = 0.97, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}x^4\text{Erf}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^4*Erf[a + b*x],x]
```

```
[Out] (-3*b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(4*(b^2 - d)*d^2*Sqrt[Pi]) +
(a^2*b^3*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(2*(b^2 - d)^3*d*Sqrt[Pi])
 + (b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(2*(b^2 - d)^2*d*Sqrt[Pi]) -
(a*b^2*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2)*x)/(2*(b^2 - d)^2*d*Sqrt[Pi])
 + (b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2)*x^2)/(2*(b^2 - d)*d*Sqrt[Pi])
- (3*E^(c + d*x^2)*x*Erf[a + b*x])/(4*d^2) + (E^(c + d*x^2)*x^3*Erf[a + b*x
])/(2*d) - (3*a*b^2*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[
b^2 - d]])/(4*(b^2 - d)^(3/2)*d^2) + (a^3*b^4*E^(c + (a^2*d)/(b^2 - d))*Erf
[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/(2*(b^2 - d)^(7/2)*d) + (3*a*b^2*E^(c
+ (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/(4*(b^2 - d)^(
5/2)*d) + (3*Defer[Int][E^(c + d*x^2)*Erf[a + b*x], x])/(4*d^2)
```

Rubi steps

$$\int e^{c+dx^2}x^4\text{erf}(a+bx)\,dx = \frac{e^{c+dx^2}x^3\text{erf}(a+bx)}{2d} - \frac{3\int e^{c+dx^2}x^2\text{erf}(a+bx)\,dx}{2d} - \frac{b\int e^{-a^2+c-2abx+\left(-b^2+d\right)x^2}x^3\,dx}{d\sqrt{\pi}}$$

$$= \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}x^2}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{3e^{c+dx^2}x\text{erf}(a+bx)}{4d^2} + \frac{e^{c+dx^2}x^3\text{erf}(a+bx)}{2d} + \frac{3\int e^{c+dx^2}\text{erf}(a \cdots}{4d^2}$$

$$= -\frac{3be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}} + \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}x}{2\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{be^{-a^2+c-2a\cdots}}{2\left(b^2-\cdots\right.}$$

$$= -\frac{3be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}} + \frac{a^2b^3e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^3d\sqrt{\pi}} + \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{ab^2e^{-a^2+c-\cdots}}{2\left(b^2-\cdots\right.}$$

$$= -\frac{3be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}} + \frac{a^2b^3e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^3d\sqrt{\pi}} + \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{ab^2e^{-a^2+c-\cdots}}{2\left(b^2-\cdots\right.}$$

$$= -\frac{3be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}} + \frac{a^2b^3e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^3d\sqrt{\pi}} + \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{ab^2e^{-a^2+c-\cdots}}{2\left(b^2-\cdots\right.}$$

Mathematica [A] time = 0.56, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}x^4\text{erf}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^4*Erf[a + b*x],x]
[Out] Integrate[E^(c + d*x^2)*x^4*Erf[a + b*x], x]
```

fricas [A] time = 0.56, size = 0, normalized size = 0.00

$$\text{integral}\left(x^4\,\text{erf}\,(bx+a)\,e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erf(b*x+a),x, algorithm="fricas")
[Out] integral(x^4*erf(b*x + a)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erf}(bx + a)\, e^{\left(dx^2 + c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erf(b*x+a),x, algorithm="giac")
[Out] integrate(x^4*erf(b*x + a)*e^(d*x^2 + c), x)
```

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int e^{d\,x^2 + c} x^4 \operatorname{erf}(bx + a)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^4*erf(b*x+a),x)
[Out] int(exp(d*x^2+c)*x^4*erf(b*x+a),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erf}(bx + a)\, e^{\left(dx^2 + c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erf(b*x+a),x, algorithm="maxima")
[Out] integrate(x^4*erf(b*x + a)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.00

$$\int x^4 \operatorname{erf}(a + b\,x)\, e^{d\,x^2 + c}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erf(a + b*x)*exp(c + d*x^2),x)
[Out] int(x^4*erf(a + b*x)*exp(c + d*x^2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**4*erf(b*x+a),x)
[Out] Timed out
```

3.91 $\int e^{c+dx^2} x^2 \mathbf{erf}(a+bx)\,dx$

Optimal. Leaf size=164

$$-\frac{\mathrm{Int}\left(e^{c+dx^2}\mathrm{erf}(a+bx),x\right)}{2d}+\frac{ab^2e^{\frac{a^2d}{b^2-d}+c}\mathrm{erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{2d\left(b^2-d\right)^{3/2}}+\frac{be^{-a^2-2abx-x^2(b^2-d)+c}}{2\sqrt{\pi}\,d\left(b^2-d\right)}+\frac{xe^{c+dx^2}\mathrm{erf}(a+bx)}{2d}$$

```
[Out] 1/2*exp(d*x^2+c)*x*erf(b*x+a)/d+1/2*a*b^2*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^
2-d)*x)/(b^2-d)^(1/2))/(b^2-d)^(3/2)/d+1/2*b*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2
)/(b^2-d)/d/Pi^(1/2)-1/2*Unintegrable(exp(d*x^2+c)*erf(b*x+a),x)/d
```

Rubi [A] time = 0.19, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}x^2\mathrm{Erf}(a+bx)\,dx$$

Verification is Not applicable to the result.

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

```
[Out] (b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(2*(b^2 - d)*d*Sqrt[Pi]) + (E^(c
 + d*x^2)*x*Erf[a + b*x])/(2*d) + (a*b^2*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b
 + (b^2 - d)*x)/Sqrt[b^2 - d]])/(2*(b^2 - d)^(3/2)*d) - Defer[Int][E^(c + d
*x^2)*Erf[a + b*x], x]/(2*d)
```

Rubi steps

$$\int e^{c+dx^2}x^2\mathrm{erf}(a+bx)\,dx=\frac{e^{c+dx^2}x\mathrm{erf}(a+bx)}{2d}-\frac{\int e^{c+dx^2}\mathrm{erf}(a+bx)\,dx}{2d}-\frac{b\int e^{-a^2+c-2abx+\left(-b^2+d\right)x^2}x\,dx}{d\sqrt{\pi}}$$

$$=\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)d\sqrt{\pi}}+\frac{e^{c+dx^2}x\mathrm{erf}(a+bx)}{2d}-\frac{\int e^{c+dx^2}\mathrm{erf}(a+bx)\,dx}{2d}+\frac{\left(ab^2\right)\int e^{-a^2+c-2}\ldots}{\left(b^2-d\ldots\right.}$$

$$=\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)d\sqrt{\pi}}+\frac{e^{c+dx^2}x\mathrm{erf}(a+bx)}{2d}-\frac{\int e^{c+dx^2}\mathrm{erf}(a+bx)\,dx}{2d}+\frac{\left(ab^2e^{\frac{b^2c+a^2d-cd}{b^2-d}}\right)\ldots}{(\ldots}$$

$$=\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)d\sqrt{\pi}}+\frac{e^{c+dx^2}x\mathrm{erf}(a+bx)}{2d}+\frac{ab^2e^{\frac{b^2c+a^2d-cd}{b^2-d}}\mathrm{erf}\left(\frac{ab+\left(b^2-d\right)x}{\sqrt{b^2-d}}\right)}{2\left(b^2-d\right)^{3/2}d}-\frac{\int e^{c+dx^2}\mathrm{er}\ldots}{\ldots}$$

Mathematica [A] time = 0.47, size = 0, normalized size = 0.00

$$\int e^{c+dx^2} x^2 \operatorname{erf}(a+bx)\, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^2*Erf[a + b*x],x]
[Out] Integrate[E^(c + d*x^2)*x^2*Erf[a + b*x], x]
```

fricas [A] time = 0.42, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(x^2 \operatorname{erf}(bx+a)\, e^{\left(dx^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erf(b*x+a),x, algorithm="fricas")
[Out] integral(x^2*erf(b*x + a)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erf}(bx+a)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erf(b*x+a),x, algorithm="giac")
[Out] integrate(x^2*erf(b*x + a)*e^(d*x^2 + c), x)
```

maple [A] time = 0.19, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c} x^2 \operatorname{erf}(bx+a)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^2*erf(b*x+a),x)
[Out] int(exp(d*x^2+c)*x^2*erf(b*x+a),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erf}(bx+a)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int x^2 \operatorname{erf}(a+b\,x)\;\mathrm{e}^{d\,x^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(x^2*erf(a + b*x)*exp(c + d*x^2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**2*erf(b*x+a),x)
```

```
[Out] Timed out
```

3.92 $\int e^{c+dx^2}\mathbf{erf}(a+bx)\,dx$

Optimal. Leaf size=19

$$\mathrm{Int}\left(e^{c+dx^2}\mathrm{erf}(a+bx),x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erf(b*x+a),x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}\mathrm{Erf}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*Erf[a + b*x],x]
[Out] Defer[Int][E^(c + d*x^2)*Erf[a + b*x], x]
```

Rubi steps

$$\int e^{c+dx^2}\mathrm{erf}(a+bx)\,dx=\int e^{c+dx^2}\mathrm{erf}(a+bx)\,dx$$

Mathematica [A] time = 0.05, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}\mathrm{erf}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*Erf[a + b*x],x]
[Out] Integrate[E^(c + d*x^2)*Erf[a + b*x], x]
```

fricas [A] time = 0.41, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\mathrm{erf}\left(bx+a\right)e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x+a),x, algorithm="fricas")
[Out] integral(erf(b*x + a)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erf}(bx + a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.07, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c}\operatorname{erf}(bx + a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(exp(d*x^2+c)*erf(b*x+a),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erf}(bx + a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \operatorname{erf}(a + b\,x)\,e^{d\,x^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(erf(a + b*x)*exp(c + d*x^2), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int e^{dx^2}\operatorname{erf}(a + bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erf(b*x+a),x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erf(a + b*x), x)
```

3.93 $\int \frac{e^{c+dx^2}\textbf{erf}(a+bx)}{x^2}\,dx$

Optimal. Leaf size=83

$$\frac{2b\text{Int}\left(\frac{e^{-a^2-2abx+x^2(d-b^2)+c}}{x},x\right)}{\sqrt{\pi}}+2d\text{Int}\left(e^{c+dx^2}\text{erf}(a+bx),x\right)-\frac{e^{c+dx^2}\text{erf}(a+bx)}{x}$$

```
[Out] -exp(d*x^2+c)*erf(b*x+a)/x+2*b*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2+d)*x^2
)/x,x)/Pi^(1/2)+2*d*Unintegrable(exp(d*x^2+c)*erf(b*x+a),x)
```

Rubi [A] time = 0.22, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erf}(a+bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

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

```
[Out] -((E^(c + d*x^2)*Erf[a + b*x])/x) + (2*b*Defer[Int][E^(-a^2 + c - 2*a*b*x +
 (-b^2 + d)*x^2)/x, x])/Sqrt[Pi] + 2*d*Defer[Int][E^(c + d*x^2)*Erf[a + b*x
], x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erf}(a+bx)}{x^2}\,dx=-\frac{e^{c+dx^2}\text{erf}(a+bx)}{x}+(2d)\int e^{c+dx^2}\text{erf}(a+bx)\,dx+\frac{(2b)\int \frac{e^{-a^2+c-2abx+(-b^2+d)x^2}}{x}\,dx}{\sqrt{\pi}}$$

Mathematica [A] time = 0.46, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erf}(a+bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

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

```
[Out] Integrate[(E^(c + d*x^2)*Erf[a + b*x])/x^2, x]
```

fricas [A] time = 0.47, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x+a)/x^2,x, algorithm="fricas")
[Out] integral(erf(b*x + a)*e^(d*x^2 + c)/x^2, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x+a)/x^2,x, algorithm="giac")
[Out] integrate(erf(b*x + a)*e^(d*x^2 + c)/x^2, x)
```

maple [A] time = 0.11, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\,\text{erf}\,(bx+a)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erf(b*x+a)/x^2,x)
[Out] int(exp(d*x^2+c)*erf(b*x+a)/x^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x+a)/x^2,x, algorithm="maxima")
[Out] integrate(erf(b*x + a)*e^(d*x^2 + c)/x^2, x)
```

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

$$\int \frac{\text{erf}\,(a+b\,x)\,e^{d\,x^2+c}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int((erf(a + b*x)*exp(c + d*x^2))/x^2, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\operatorname{erf}\left(a+bx\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] exp(c)*Integral(exp(d*x**2)*erf(a + b*x)/x**2, x)
```

3.94 $\int \frac{e^{c+dx^2}\mathbf{erf}(a+bx)}{x^4}\,dx$

Optimal. Leaf size=355

$$-\frac{2b\left(b^2-d\right)\operatorname{Int}\left(\frac{e^{-a^2-2abx+x^2\left(d-b^2\right)+c}}{x},x\right)}{3\sqrt{\pi}}+\frac{4bd\operatorname{Int}\left(\frac{e^{-a^2-2abx+x^2\left(d-b^2\right)+c}}{x},x\right)}{3\sqrt{\pi}}+\frac{4a^2b^3\operatorname{Int}\left(\frac{e^{-a^2-2abx+x^2\left(d-b^2\right)+c}}{x},x\right)}{3\sqrt{\pi}}+\frac{4}{3}d^2\operatorname{Int}\left(e^{c+d}\right.$$

```
[Out] -1/3*exp(d*x^2+c)*erf(b*x+a)/x^3-2/3*d*exp(d*x^2+c)*erf(b*x+a)/x+2/3*a*b^2*
exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))*(b^2-d)^(1/2)-1/3*b
*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/x^2/Pi^(1/2)+2/3*a*b^2*exp(-a^2+c-2*a*b*x-
(b^2-d)*x^2)/x/Pi^(1/2)+4/3*a^2*b^3*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2+d
)*x^2)/x,x)/Pi^(1/2)-2/3*b*(b^2-d)*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2+d)
*x^2)/x,x)/Pi^(1/2)+4/3*b*d*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2+d)*x^2)/x
,x)/Pi^(1/2)+4/3*d^2*Unintegrable(exp(d*x^2+c)*erf(b*x+a),x)
```

Rubi [A] time = 0.91, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\operatorname{Erf}(a+bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erf[a + b*x])/x^4,x]
```

```
[Out] -(b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(3*Sqrt[Pi]*x^2) + (2*a*b^2*E^(
-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(3*Sqrt[Pi]*x) - (E^(c + d*x^2)*Erf[a
+ b*x])/(3*x^3) - (2*d*E^(c + d*x^2)*Erf[a + b*x])/(3*x) + (2*a*b^2*Sqrt[b^
2 - d]*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/3
+ (4*a^2*b^3*Defer[Int][E^(-a^2 + c - 2*a*b*x + (-b^2 + d)*x^2)/x, x])/(3*S
qrt[Pi]) - (2*b*(b^2 - d)*Defer[Int][E^(-a^2 + c - 2*a*b*x + (-b^2 + d)*x^2
)/x, x])/(3*Sqrt[Pi]) + (4*b*d*Defer[Int][E^(-a^2 + c - 2*a*b*x + (-b^2 + d
)*x^2)/x, x])/(3*Sqrt[Pi]) + (4*d^2*Defer[Int][E^(c + d*x^2)*Erf[a + b*x],
x])/3
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erf}(a+bx)}{x^4}\,dx = -\frac{e^{c+dx^2}\text{erf}(a+bx)}{3x^3}+\frac{1}{3}(2d)\int \frac{e^{c+dx^2}\text{erf}(a+bx)}{x^2}\,dx+\frac{(2b)\int \frac{e^{-a^2+c-2abx+\left(-b^2+d\right)x^2}}{x^3}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+dx^2}\text{erf}(a+bx)}{3x^3}-\frac{2de^{c+dx^2}\text{erf}(a+bx)}{3x}+\frac{1}{3}\left(4d^2\right)\int e^{c+dx^2}\text{er}$$

$$= -\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2}+\frac{2ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x}-\frac{e^{c+dx^2}\text{erf}(a+bx)}{3x^3}-\frac{2de^{c+dx^2}\text{erf}(a+}{3x}$$

$$= -\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2}+\frac{2ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x}-\frac{e^{c+dx^2}\text{erf}(a+bx)}{3x^3}-\frac{2de^{c+dx^2}\text{erf}(a+}{3x}$$

$$= -\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2}+\frac{2ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x}-\frac{e^{c+dx^2}\text{erf}(a+bx)}{3x^3}-\frac{2de^{c+dx^2}\text{erf}(a+}{3x}$$

Mathematica [A] time = 0.63, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erf}(a+bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erf[a + b*x])/x^4,x]
[Out] Integrate[(E^(c + d*x^2)*Erf[a + b*x])/x^4, x]
```

fricas [A] time = 0.46, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x+a)/x^4,x, algorithm="fricas")
[Out] integral(erf(b*x + a)*e^(d*x^2 + c)/x^4, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erf}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x+a)/x^4,x, algorithm="giac")
[Out] integrate(erf(b*x + a)*e^(d*x^2 + c)/x^4, x)
```

maple [A] time = 0.29, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\,\mathrm{erf}\,(bx+a)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erf(b*x+a)/x^4,x)
[Out] int(exp(d*x^2+c)*erf(b*x+a)/x^4,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erf}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erf(b*x+a)/x^4,x, algorithm="maxima")
[Out] integrate(erf(b*x + a)*e^(d*x^2 + c)/x^4, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\mathrm{erf}\,(a+b\,x)\;e^{d\,x^2+c}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erf(a + b*x)*exp(c + d*x^2))/x^4,x)
[Out] int((erf(a + b*x)*exp(c + d*x^2))/x^4, x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erf(b*x+a)/x**4,x)
[Out] Timed out
```

3.95 $\int \left(\frac{e^{-b^2x^2}\,\mathbf{erf}(bx)}{x^3} + \frac{b^2e^{-b^2x^2}\,\mathbf{erf}(bx)}{x} \right) dx$

Optimal. Leaf size=62

$$-\frac{e^{-b^2x^2}\operatorname{erf}(bx)}{2x^2}-\sqrt{2}\,b^2\operatorname{erf}\left(\sqrt{2}\,bx\right)-\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*erf(b*x)/exp(b^2*x^2)/x^2-b^2*erf(b*x*2^(1/2))*2^(1/2)-b/exp(2*b^2*x^2
)/x/Pi^(1/2)
```

Rubi [A] time = 0.14, antiderivative size = 62, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 40, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.075, Rules used = {6391, 2214, 2205}

$$-\frac{e^{-b^2x^2}\operatorname{Erf}(bx)}{2x^2}-\sqrt{2}\,b^2\operatorname{Erf}\left(\sqrt{2}\,bx\right)-\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]/(E^(b^2*x^2)*x^3) + (b^2*Erf[b*x])/(E^(b^2*x^2)*x),x]
```

```
[Out] -(b/(E^(2*b^2*x^2)*Sqrt[Pi]*x)) - Erf[b*x]/(2*E^(b^2*x^2)*x^2) - Sqrt[2]*b^
2*Erf[Sqrt[2]*b*x]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6391

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol] :
> Simp[(x^(m + 1)*E^(c + d*x^2)*Erf[a + b*x])/(m + 1), x] + (-Dist[(2*d)/(m
```

```
 + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erf[a + b*x], x], x] - Dist[(2*b)/((m +
1)*Sqrt[Pi]), Int[x^(m + 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x])
 /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \left(\frac{e^{-b^2x^2}\text{erf}(bx)}{x^3}+\frac{b^2e^{-b^2x^2}\text{erf}(bx)}{x}\right)dx &= b^2\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x}\,dx+\int \frac{e^{-b^2x^2}\text{erf}(bx)}{x^3}\,dx\\
&= -\frac{e^{-b^2x^2}\text{erf}(bx)}{2x^2}+\frac{b\int \frac{e^{-2b^2x^2}}{x^2}\,dx}{\sqrt{\pi}}\\
&= -\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\text{erf}(bx)}{2x^2}-\frac{\left(4b^3\right)\int e^{-2b^2x^2}\,dx}{\sqrt{\pi}}\\
&= -\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\text{erf}(bx)}{2x^2}-\sqrt{2}\,b^2\text{erf}\left(\sqrt{2}\,bx\right)
\end{aligned}$$

Mathematica [A] time = 0.13, size = 62, normalized size = 1.00

$$-\frac{e^{-b^2x^2}\text{erf}(bx)}{2x^2}-\sqrt{2}\,b^2\text{erf}\left(\sqrt{2}\,bx\right)-\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]/(E^(b^2*x^2)*x^3) + (b^2*Erf[b*x])/(E^(b^2*x^2)*x),x]
```

```
[Out] -(b/(E^(2*b^2*x^2)*Sqrt[Pi]*x)) - Erf[b*x]/(2*E^(b^2*x^2)*x^2) - Sqrt[2]*b^
2*Erf[Sqrt[2]*b*x]
```

fricas [A] time = 0.49, size = 66, normalized size = 1.06

$$-\frac{2\,\sqrt{2}\,\pi\sqrt{b^2}\,bx^2\,\text{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)+2\,\sqrt{\pi}\,bxe^{\left(-2\,b^2x^2\right)}+\pi\,\text{erf}\,(bx)\,e^{\left(-b^2x^2\right)}}{2\,\pi x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^3+b^2*erf(b*x)/exp(b^2*x^2)/x,x, algorith
m="fricas")
```

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

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

$$\int \frac{b^2 \operatorname{erf}(bx) e^{\left(-b^2x^2\right)}}{x} + \frac{\operatorname{erf}(bx) e^{\left(-b^2x^2\right)}}{x^3} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^3+b^2*erf(b*x)/exp(b^2*x^2)/x,x, algorith
m="giac")
```

```
[Out] integrate(b^2*erf(b*x)*e^(-b^2*x^2)/x + erf(b*x)*e^(-b^2*x^2)/x^3, x)
```

maple [A] time = 0.24, size = 67, normalized size = 1.08

$$\frac{-\frac{\operatorname{erf}(bx) b \, e^{-b^2x^2}}{2x^2} + \frac{b^3\left(-\frac{e^{-2b^2x^2}}{bx} - \sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(bx\sqrt{2}\right)\right)}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)/exp(b^2*x^2)/x^3+b^2*erf(b*x)/exp(b^2*x^2)/x,x)
```

```
[Out] (-1/2*erf(b*x)*b/exp(b^2*x^2)/x^2+1/Pi^(1/2)*b^3*(-1/exp(b^2*x^2)^2/b/x-2^(
1/2)*Pi^(1/2)*erf(b*x*2^(1/2))))/b
```

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

$$-\frac{\frac{\sqrt{2}\, b^2 \sqrt{x^2}\, \Gamma\left(-\frac{1}{2}, 2\, b^2x^2\right)}{2\, x}}{\sqrt{\pi}} - \frac{\operatorname{erf}(bx) e^{\left(-b^2x^2\right)}}{2\, x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b^2*x^2)/x^3+b^2*erf(b*x)/exp(b^2*x^2)/x,x, algorith
m="maxima")
```

```
[Out] b*integrate(e^(-2*b^2*x^2)/x^2, x)/sqrt(pi) - 1/2*erf(b*x)*e^(-b^2*x^2)/x^2
```

mupad [B] time = 0.22, size = 52, normalized size = 0.84

$$-\frac{\frac{e^{-b^2\,x^2}\,\operatorname{erf}(b\,x)}{2} + \frac{b\,x\,e^{-2\,b^2\,x^2}}{\sqrt{\pi}}}{x^2} - \sqrt{2}\, b^2 \operatorname{erf}\left(\sqrt{2}\, b\, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erf(b*x))/x^3 + (b^2*exp(-b^2*x^2)*erf(b*x))/x,x)
```

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

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

$$\int \frac{\left(b^2x^2+1\right)e^{-b^2x^2}\operatorname{erf}(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)/exp(b**2*x**2)/x**3+b**2*erf(b*x)/exp(b**2*x**2)/x,x)
```

```
[Out] Integral((b**2*x**2 + 1)*exp(-b**2*x**2)*erf(b*x)/x**3, x)
```

3.96 $\int \operatorname{erf}(bx)\sin\left(c+ib^2x^2\right)\,dx$

Optimal. Leaf size=66

$$\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{i\sqrt{\pi}\,e^{ic}\operatorname{erf}(bx)^2}{8b}$$

```
[Out] 1/2*I*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/exp(I*c)/Pi^(1/2)-1/
8*I*exp(I*c)*erf(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.06, antiderivative size = 66, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6404, 6376, 6373, 30}

$$\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{i\sqrt{\pi}\,e^{ic}\operatorname{Erf}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]*Sin[c + I*b^2*x^2],x]
```

```
[Out] ((-I/8)*E^(I*c)*Sqrt[Pi]*Erf[b*x]^2)/b + ((I/2)*b*x^2*HypergeometricPFQ[{1,
 1}, {3/2, 2}, b^2*x^2])/(E^(I*c)*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6404

```
Int[Erf[(b_.)*(x_)]*Sin[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[I/2, Int[E
^(-(I*c) - I*d*x^2)*Erf[b*x], x], x] - Dist[I/2, Int[E^(I*c + I*d*x^2)*Erf[
b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erf}(bx)\sin\left(c+ib^2x^2\right)\,dx &= -\left(\frac{1}{2}i\int e^{ic-b^2x^2}\operatorname{erf}(bx)\,dx\right)+\frac{1}{2}i\int e^{-ic+b^2x^2}\operatorname{erf}(bx)\,dx\\ &= \frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\left(ie^{ic}\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erf}(bx))}{4b}\\ &= -\frac{ie^{ic}\sqrt{\pi}\operatorname{erf}(bx)^2}{8b}+\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.10, size = 69, normalized size = 1.05

$$\frac{(\cos(c)-i\sin(c))\left(4ib^2x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)+\pi\operatorname{erf}(bx)^2(\sin(2c)-i\cos(2c))\right)}{8\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]*Sin[c + I*b^2*x^2],x]
```

```
[Out] ((Cos[c] - I*Sin[c])*((4*I)*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2
*x^2] + Pi*Erf[b*x]^2*((-I)*Cos[2*c] + Sin[2*c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.62, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{1}{2}\left(-i\operatorname{erf}(bx)\,e^{\left(-2\,b^2x^2+2i\,c\right)}+i\operatorname{erf}(bx)\right)e^{\left(b^2x^2-i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)*sin(c+I*b^2*x^2),x, algorithm="fricas")
```

```
[Out] integral(1/2*(-I*erf(b*x)*e^(-2*b^2*x^2 + 2*I*c) + I*erf(b*x))*e^(b^2*x^2 -
 I*c), x)
```

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

$$\int \operatorname{erf}(bx)\sin\left(i\,b^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)*sin(c+I*b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(erf(b*x)*sin(I*b^2*x^2 + c), x)
```

maple [F] time = 0.12, size = 0, normalized size = 0.00

$$\int \operatorname{erf}(bx)\sin\left(ib^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)*sin(c+I*b^2*x^2),x)
```

```
[Out] int(erf(b*x)*sin(c+I*b^2*x^2),x)
```

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

$$-\frac{i\sqrt{\pi}\cos(c)\operatorname{erf}(bx)^2}{8b}+\frac{\sqrt{\pi}\operatorname{erf}(bx)^2\sin(c)}{8b}+\frac{1}{2}i\cos(c)\int\operatorname{erf}(bx)e^{\left(b^2x^2\right)}\,dx+\frac{1}{2}\int\operatorname{erf}(bx)e^{\left(b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)*sin(c+I*b^2*x^2),x, algorithm="maxima")
```

```
[Out] -1/8*I*sqrt(pi)*cos(c)*erf(b*x)^2/b + 1/8*sqrt(pi)*erf(b*x)^2*sin(c)/b + 1/
2*I*cos(c)*integrate(erf(b*x)*e^(b^2*x^2), x) + 1/2*integrate(erf(b*x)*e^(b
^2*x^2), x)*sin(c)
```

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

$$\int \sin\left(b^2\,x^2\,1\mathrm{i}+c\right)\,\operatorname{erf}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sin(c + b^2*x^2*1i)*erf(b*x),x)
```

```
[Out] int(sin(c + b^2*x^2*1i)*erf(b*x), x)
```

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

$$\int \sin\left(ib^2x^2+c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)*sin(c+I*b**2*x**2),x)
```

```
[Out] Integral(sin(I*b**2*x**2 + c)*erf(b*x), x)
```

3.97 $\int \mathbf{erf}(bx)\sin\left(c-ib^2x^2\right)\,dx$

Optimal. Leaf size=66

$$\frac{i\sqrt{\pi}\,e^{-ic}\text{erf}(bx)^2}{8b}-\frac{ibe^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}$$

```
[Out] -1/2*I*b*exp(I*c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)+1
/8*I*erf(b*x)^2*Pi^(1/2)/b/exp(I*c)
```

Rubi [A] time = 0.06, antiderivative size = 66, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6404, 6373, 30, 6376}

$$\frac{i\sqrt{\pi}\,e^{-ic}\text{Erf}(bx)^2}{8b}-\frac{ibe^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]*Sin[c - I*b^2*x^2],x]
```

```
[Out] ((I/8)*Sqrt[Pi]*Erf[b*x]^2)/(b*E^(I*c)) - ((I/2)*b*E^(I*c)*x^2*Hypergeometr
icPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6404

```
Int[Erf[(b_.)*(x_)]*Sin[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[I/2, Int[E
^(-(I*c) - I*d*x^2)*Erf[b*x], x], x] - Dist[I/2, Int[E^(I*c + I*d*x^2)*Erf[
b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}
\int \operatorname{erf}(bx)\sin\left(c-ib^2x^2\right)\,dx &= \frac{1}{2}i\int e^{-ic-b^2x^2}\operatorname{erf}(bx)\,dx-\frac{1}{2}i\int e^{ic+b^2x^2}\operatorname{erf}(bx)\,dx\\
&= -\frac{ibe^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(ie^{-ic}\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erf}(bx))}{4b}\\
&= \frac{ie^{-ic}\sqrt{\pi}\operatorname{erf}(bx)^2}{8b}-\frac{ibe^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}
\end{aligned}$$

Mathematica [A] time = 0.09, size = 67, normalized size = 1.02

$$\frac{(\sin(c)+i\cos(c))\left(\pi\operatorname{erf}(bx)^2-4b^2x^2(\cos(2c)+i\sin(2c))\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)\right)}{8\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]*Sin[c - I*b^2*x^2],x]
```

```
[Out] ((I*Cos[c] + Sin[c])*(Pi*Erf[b*x]^2 - 4*b^2*x^2*HypergeometricPFQ[{1, 1}, {
3/2, 2}, b^2*x^2]*(Cos[2*c] + I*Sin[2*c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.63, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{1}{2}\left(i\,\operatorname{erf}(bx)\,e^{\left(-2\,b^2x^2-2i\,c\right)}-i\,\operatorname{erf}(bx)\right)e^{\left(b^2x^2+i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erf(b*x)*sin(-c+I*b^2*x^2),x, algorithm="fricas")
```

```
[Out] integral(1/2*(I*erf(b*x)*e^(-2*b^2*x^2 - 2*I*c) - I*erf(b*x))*e^(b^2*x^2 +
I*c), x)
```

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

$$\int -\operatorname{erf}(bx)\sin\left(i\,b^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erf(b*x)*sin(-c+I*b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(-erf(b*x)*sin(I*b^2*x^2 - c), x)
```

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

$$\int -\operatorname{erf}(bx)\sin\left(ib^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-erf(b*x)*sin(-c+I*b^2*x^2),x)
```

```
[Out] int(-erf(b*x)*sin(-c+I*b^2*x^2),x)
```

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

$$\frac{i\sqrt{\pi}\cos(c)\operatorname{erf}(bx)^2}{8b}+\frac{\sqrt{\pi}\operatorname{erf}(bx)^2\sin(c)}{8b}-\frac{1}{2}i\cos(c)\int\operatorname{erf}(bx)e^{\left(b^2x^2\right)}\,dx+\frac{1}{2}\int\operatorname{erf}(bx)e^{\left(b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erf(b*x)*sin(-c+I*b^2*x^2),x, algorithm="maxima")
```

```
[Out] 1/8*I*sqrt(pi)*cos(c)*erf(b*x)^2/b + 1/8*sqrt(pi)*erf(b*x)^2*sin(c)/b - 1/2
*I*cos(c)*integrate(erf(b*x)*e^(b^2*x^2), x) + 1/2*integrate(erf(b*x)*e^(b^
2*x^2), x)*sin(c)
```

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

$$\int\sin\left(c-b^2\,x^2\,1\mathrm{i}\right)\,\operatorname{erf}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sin(c - b^2*x^2*1i)*erf(b*x),x)
```

```
[Out] int(sin(c - b^2*x^2*1i)*erf(b*x), x)
```

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

$$-\int\sin\left(ib^2x^2-c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erf(b*x)*sin(-c+I*b**2*x**2),x)
```

```
[Out] -Integral(sin(I*b**2*x**2 - c)*erf(b*x), x)
```

3.98 $\int \cos\left(c + ib^2x^2\right) \mathbf{erf}(bx)\, dx$

Optimal. Leaf size=62

$$\frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{ic}\operatorname{erf}(bx)^2}{8b}$$

```
[Out] 1/2*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/exp(I*c)/Pi^(1/2)+1/8*
exp(I*c)*erf(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.06, antiderivative size = 62, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6407, 6376, 6373, 30}

$$\frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{ic}\operatorname{Erf}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Cos[c + I*b^2*x^2]*Erf[b*x],x]
```

```
[Out] (E^(I*c)*Sqrt[Pi]*Erf[b*x]^2)/(8*b) + (b*x^2*HypergeometricPFQ[{1, 1}, {3/2
, 2}, b^2*x^2])/(2*E^(I*c)*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6407

```
Int[Cos[(c_.) + (d_.)*(x_)^2]*Erf[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int[E
^(-(I*c) - I*d*x^2)*Erf[b*x], x], x] + Dist[1/2, Int[E^(I*c + I*d*x^2)*Erf[
b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \cos\left(c+ib^2x^2\right)\operatorname{erf}(bx)\,dx &= \frac{1}{2}\int e^{ic-b^2x^2}\operatorname{erf}(bx)\,dx+\frac{1}{2}\int e^{-ic+b^2x^2}\operatorname{erf}(bx)\,dx\\ &= \frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(e^{ic}\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erf}(bx))}{4b}\\ &= \frac{e^{ic}\sqrt{\pi}\operatorname{erf}(bx)^2}{8b}+\frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [F] time = 0.77, size = 0, normalized size = 0.00

$$\int \cos\left(c+ib^2x^2\right)\operatorname{erf}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Cos[c + I*b^2*x^2]*Erf[b*x],x]
[Out] Integrate[Cos[c + I*b^2*x^2]*Erf[b*x], x]
```

fricas [F] time = 0.56, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{1}{2}\left(\operatorname{erf}(bx)\,e^{\left(-2\,b^2x^2+2i\,c\right)}+\operatorname{erf}(bx)\right)e^{\left(b^2x^2-i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b^2*x^2)*erf(b*x),x, algorithm="fricas")
[Out] integral(1/2*(erf(b*x)*e^(-2*b^2*x^2 + 2*I*c) + erf(b*x))*e^(b^2*x^2 - I*c)
, x)
```

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

$$\int \cos\left(i\,b^2x^2+c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b^2*x^2)*erf(b*x),x, algorithm="giac")
[Out] integrate(cos(I*b^2*x^2 + c)*erf(b*x), x)
```

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int \cos\left(ib^2x^2+c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(c+I*b^2*x^2)*erf(b*x),x)
[Out] int(cos(c+I*b^2*x^2)*erf(b*x),x)
```

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

$$\frac{\sqrt{\pi}\cos(c)\operatorname{erf}(bx)^2}{8\,b}+\frac{i\sqrt{\pi}\operatorname{erf}(bx)^2\sin(c)}{8\,b}+\frac{1}{2}\cos(c)\int\operatorname{erf}(bx)\,e^{\left(b^2x^2\right)}\,dx-\frac{1}{2}i\int\operatorname{erf}(bx)\,e^{\left(b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b^2*x^2)*erf(b*x),x, algorithm="maxima")
[Out] 1/8*sqrt(pi)*cos(c)*erf(b*x)^2/b + 1/8*I*sqrt(pi)*erf(b*x)^2*sin(c)/b + 1/2
*cos(c)*integrate(erf(b*x)*e^(b^2*x^2), x) - 1/2*I*integrate(erf(b*x)*e^(b^
2*x^2), x)*sin(c)
```

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

$$\int \cos\left(b^2\,x^2\,1\mathrm{i}+c\right)\,\operatorname{erf}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(c + b^2*x^2*1i)*erf(b*x),x)
[Out] int(cos(c + b^2*x^2*1i)*erf(b*x), x)
```

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

$$\int \cos\left(ib^2x^2+c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b**2*x**2)*erf(b*x),x)
[Out] Integral(cos(I*b**2*x**2 + c)*erf(b*x), x)
```

3.99 $\int \cos \left(c - ib^2x^2\right) \mathbf{erf}(bx) \, dx$

Optimal. Leaf size=62

$$\frac{be^{ic}x^2 \, {}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}} + \frac{\sqrt{\pi}\, e^{-ic}\mathrm{erf}(bx)^2}{8b}$$

```
[Out] 1/2*b*exp(I*c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)+1/8*
erf(b*x)^2*Pi^(1/2)/b/exp(I*c)
```

Rubi [A] time = 0.05, antiderivative size = 62, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6407, 6373, 30, 6376}

$$\frac{be^{ic}x^2 \, {}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}} + \frac{\sqrt{\pi}\, e^{-ic}\mathrm{Erf}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Cos[c - I*b^2*x^2]*Erf[b*x],x]
```

```
[Out] (Sqrt[Pi]*Erf[b*x]^2)/(8*b*E^(I*c)) + (b*E^(I*c)*x^2*HypergeometricPFQ[{1,
1}, {3/2, 2}, b^2*x^2])/(2*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6407

```
Int[Cos[(c_.) + (d_.)*(x_)^2]*Erf[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int[E
^(-(I*c) - I*d*x^2)*Erf[b*x], x], x] + Dist[1/2, Int[E^(I*c + I*d*x^2)*Erf[
b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \cos\left(c-ib^2x^2\right)\operatorname{erf}(bx)\,dx &= \frac{1}{2}\int e^{-ic-b^2x^2}\operatorname{erf}(bx)\,dx+\frac{1}{2}\int e^{ic+b^2x^2}\operatorname{erf}(bx)\,dx\\ &= \frac{be^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(e^{-ic}\sqrt{\pi}\right)\operatorname{Subst}\left(\int x\,dx,x,\operatorname{erf}(bx)\right)}{4b}\\ &= \frac{e^{-ic}\sqrt{\pi}\operatorname{erf}(bx)^2}{8b}+\frac{be^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [F] time = 0.77, size = 0, normalized size = 0.00

$$\int \cos\left(c-ib^2x^2\right)\operatorname{erf}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Cos[c - I*b^2*x^2]*Erf[b*x],x]
[Out] Integrate[Cos[c - I*b^2*x^2]*Erf[b*x], x]
```

fricas [F] time = 0.41, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{1}{2}\left(\operatorname{erf}(bx)\,e^{\left(-2\,b^2x^2-2i\,c\right)}+\operatorname{erf}(bx)\right)e^{\left(b^2x^2+i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b^2*x^2)*erf(b*x),x, algorithm="fricas")
[Out] integral(1/2*(erf(b*x)*e^(-2*b^2*x^2 - 2*I*c) + erf(b*x))*e^(b^2*x^2 + I*c)
, x)
```

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

$$\int \cos\left(i\,b^2x^2-c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b^2*x^2)*erf(b*x),x, algorithm="giac")
```

```
[Out] integrate(cos(I*b^2*x^2 - c)*erf(b*x), x)
```

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

$$\int \cos\left(ib^2x^2 - c\right) \operatorname{erf}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(-c+I*b^2*x^2)*erf(b*x),x)
```

```
[Out] int(cos(-c+I*b^2*x^2)*erf(b*x),x)
```

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

$$\frac{\sqrt{\pi}\cos(c)\operatorname{erf}(bx)^2}{8\,b} - \frac{i\sqrt{\pi}\operatorname{erf}(bx)^2\sin(c)}{8\,b} + \frac{1}{2}\cos(c)\int \operatorname{erf}(bx)\,e^{\left(b^2x^2\right)}\,dx + \frac{1}{2}i\int \operatorname{erf}(bx)\,e^{\left(b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b^2*x^2)*erf(b*x),x, algorithm="maxima")
```

```
[Out] 1/8*sqrt(pi)*cos(c)*erf(b*x)^2/b - 1/8*I*sqrt(pi)*erf(b*x)^2*sin(c)/b + 1/2
*cos(c)*integrate(erf(b*x)*e^(b^2*x^2), x) + 1/2*I*integrate(erf(b*x)*e^(b^
2*x^2), x)*sin(c)
```

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

$$\int \cos\left(c - b^2\,x^2\,1\mathrm{i}\right)\,\operatorname{erf}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(c - b^2*x^2*1i)*erf(b*x),x)
```

```
[Out] int(cos(c - b^2*x^2*1i)*erf(b*x), x)
```

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

$$\int \cos\left(ib^2x^2 - c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b**2*x**2)*erf(b*x),x)
```

```
[Out] Integral(cos(I*b**2*x**2 - c)*erf(b*x), x)
```

3.100 $\int \textbf{erf}(bx)\sinh\left(c+b^2x^2\right)\,dx$

Optimal. Leaf size=56

$$\frac{be^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\sqrt{\pi}\,e^{-c}\mathrm{erf}(bx)^2}{8b}$$

```
[Out] 1/2*b*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)-1/8*er
f(b*x)^2*Pi^(1/2)/b/exp(c)
```

Rubi [A] time = 0.06, antiderivative size = 56, 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 = {6410, 6376, 6373, 30}

$$\frac{be^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\sqrt{\pi}\,e^{-c}\mathrm{Erf}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]*Sinh[c + b^2*x^2],x]
```

```
[Out] -(Sqrt[Pi]*Erf[b*x]^2)/(8*b*E^c) + (b*E^c*x^2*HypergeometricPFQ[{1, 1}, {3/
2, 2}, b^2*x^2])/(2*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6410

```
Int[Erf[(b_.)*(x_)]*Sinh[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[1/2, Int[
E^(c + d*x^2)*Erf[b*x], x], x] - Dist[1/2, Int[E^(-c - d*x^2)*Erf[b*x], x],
 x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erf}(bx)\sinh\left(c+b^2x^2\right)\,dx &= -\left(\frac{1}{2}\int e^{-c-b^2x^2}\operatorname{erf}(bx)\,dx\right)+\frac{1}{2}\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx\\ &= \frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\left(e^{-c}\sqrt{\pi}\right)\operatorname{Subst}\left(\int x\,dx,x,\operatorname{erf}(bx)\right)}{4b}\\ &= -\frac{e^{-c}\sqrt{\pi}\operatorname{erf}(bx)^2}{8b}+\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.06, size = 57, normalized size = 1.02

$$\frac{4b^2x^2(\sinh(c)+\cosh(c))\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)+\pi\operatorname{erf}(bx)^2(\sinh(c)-\cosh(c))}{8\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]*Sinh[c + b^2*x^2],x]
```

```
[Out] (Pi*Erf[b*x]^2*(-Cosh[c] + Sinh[c]) + 4*b^2*x^2*HypergeometricPFQ[{1, 1}, {
3/2, 2}, b^2*x^2]*(Cosh[c] + Sinh[c]))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.55, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\operatorname{erf}(bx)\sinh\left(b^2x^2+c\right),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(erf(b*x)*sinh(b^2*x^2 + c), x)
```

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

$$\int \operatorname{erf}(bx)\sinh\left(b^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erf(b*x)*sinh(b^2*x^2 + c), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int \operatorname{erf}(bx)\sinh\left(b^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erf(b*x)*sinh(b^2*x^2+c),x)
```

```
[Out] int(erf(b*x)*sinh(b^2*x^2+c),x)
```

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

$$-\frac{\sqrt{\pi}\operatorname{erf}(bx)^2 e^{(-c)}}{8b}+\frac{1}{2}\int \operatorname{erf}(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/8*sqrt(pi)*erf(b*x)^2*e^(-c)/b + 1/2*integrate(erf(b*x)*e^(b^2*x^2 + c),
 x)
```

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

$$\int \sinh\left(b^2\,x^2+c\right)\,\operatorname{erf}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(c + b^2*x^2)*erf(b*x),x)
```

```
[Out] int(sinh(c + b^2*x^2)*erf(b*x), x)
```

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

$$\int \sinh\left(b^2x^2+c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erf(b*x)*sinh(b**2*x**2+c),x)
```

```
[Out] Integral(sinh(b**2*x**2 + c)*erf(b*x), x)
```

3.101 $\int \mathbf{erf}(bx)\sinh\left(c-b^2x^2\right)\,dx$

Optimal. Leaf size=56

$$\frac{\sqrt{\pi}\,e^c\text{erf}(bx)^2}{8b}-\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}$$

```
[Out] -1/2*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/exp(c)/Pi^(1/2)+1/8*e
xp(c)*erf(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.06, antiderivative size = 56, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6410, 6373, 30, 6376}

$$\frac{\sqrt{\pi}\,e^c\text{Erf}(bx)^2}{8b}-\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erf[b*x]*Sinh[c - b^2*x^2],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erf[b*x]^2)/(8*b) - (b*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}
, b^2*x^2])/(2*E^c*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6410

```
Int[Erf[(b_.)*(x_)]*Sinh[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[1/2, Int[
E^(c + d*x^2)*Erf[b*x], x], x] - Dist[1/2, Int[E^(-c - d*x^2)*Erf[b*x], x],
 x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erf}(bx)\sinh\left(c-b^2x^2\right)\,dx &= \frac{1}{2}\int e^{c-b^2x^2}\operatorname{erf}(bx)\,dx-\frac{1}{2}\int e^{-c+b^2x^2}\operatorname{erf}(bx)\,dx\\ &= -\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(e^c\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erf}(bx))}{4b}\\ &= \frac{e^c\sqrt{\pi}\operatorname{erf}(bx)^2}{8b}-\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.07, size = 61, normalized size = 1.09

$$\frac{(\cosh(c)-\sinh(c))\left(\pi\operatorname{erf}(bx)^2(\sinh(2c)+\cosh(2c))-4b^2x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)\right)}{8\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erf[b*x]*Sinh[c - b^2*x^2],x]
```

```
[Out] ((Cosh[c] - Sinh[c])*(-4*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^
2] + Pi*Erf[b*x]^2*(Cosh[2*c] + Sinh[2*c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 1.03, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-\operatorname{erf}(bx)\sinh\left(b^2x^2-c\right),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erf(b*x)*sinh(b^2*x^2-c),x, algorithm="fricas")
```

```
[Out] integral(-erf(b*x)*sinh(b^2*x^2 - c), x)
```

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

$$\int -\operatorname{erf}(bx)\sinh\left(b^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erf(b*x)*sinh(b^2*x^2-c),x, algorithm="giac")
[Out] integrate(-erf(b*x)*sinh(b^2*x^2 - c), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int -\operatorname{erf}(bx)\sinh\left(b^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-erf(b*x)*sinh(b^2*x^2-c),x)
[Out] int(-erf(b*x)*sinh(b^2*x^2-c),x)
```

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

$$\frac{\sqrt{\pi}\,\operatorname{erf}(bx)^2 e^c}{8\,b}-\frac{1}{2}\int \operatorname{erf}(bx)\,e^{\left(b^2x^2-c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erf(b*x)*sinh(b^2*x^2-c),x, algorithm="maxima")
[Out] 1/8*sqrt(pi)*erf(b*x)^2*e^c/b - 1/2*integrate(erf(b*x)*e^(b^2*x^2 - c), x)
```

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

$$\int \sinh\left(c-b^2\,x^2\right)\,\operatorname{erf}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(c - b^2*x^2)*erf(b*x),x)
[Out] int(sinh(c - b^2*x^2)*erf(b*x), x)
```

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

$$-\int \sinh\left(b^2x^2-c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erf(b*x)*sinh(b**2*x**2-c),x)
[Out] -Integral(sinh(b**2*x**2 - c)*erf(b*x), x)
```

3.102 $\int \cosh\left(c+b^2x^2\right) \mathbf{erf}(bx)\,dx$

Optimal. Leaf size=56

$$\frac{be^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{-c}\mathrm{erf}(bx)^2}{8b}$$

```
[Out] 1/2*b*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)+1/8*er
f(b*x)^2*Pi^(1/2)/b/exp(c)
```

Rubi [A] time = 0.05, antiderivative size = 56, 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 = {6413, 6376, 6373, 30}

$$\frac{be^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{-c}\mathrm{Erf}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[c + b^2*x^2]*Erf[b*x],x]
```

```
[Out] (Sqrt[Pi]*Erf[b*x]^2)/(8*b*E^c) + (b*E^c*x^2*HypergeometricPFQ[{1, 1}, {3/2
, 2}, b^2*x^2])/(2*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6413

```
Int[Cosh[(c_.) + (d_.)*(x_)^2]*Erf[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int[
E^(c + d*x^2)*Erf[b*x], x], x] + Dist[1/2, Int[E^(-c - d*x^2)*Erf[b*x], x],
 x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\begin{aligned}\int \cosh\left(c+b^2x^2\right)\operatorname{erf}(bx)\,dx &= \frac{1}{2}\int e^{-c-b^2x^2}\operatorname{erf}(bx)\,dx+\frac{1}{2}\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx\\ &= \frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(e^{-c}\sqrt{\pi}\right)\operatorname{Subst}\left(\int x\,dx,x,\operatorname{erf}(bx)\right)}{4b}\\ &= \frac{e^{-c}\sqrt{\pi}\operatorname{erf}(bx)^2}{8b}+\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.30, size = 93, normalized size = 1.66

$$\frac{4b^2x^2\sinh(c)\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)-4b^2x^2\cosh(c)\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)+\pi\operatorname{erf}(bx)(\operatorname{erf}(bx)(\cosh(c)-\sinh(c))+2}{8\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Cosh[c + b^2*x^2]*Erf[b*x],x]
```

```
[Out] (-4*b^2*x^2*Cosh[c]*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)] + Pi*Er
f[b*x]*(2*Cosh[c]*Erfi[b*x] + Erf[b*x]*(Cosh[c] - Sinh[c])) + 4*b^2*x^2*Hyp
ergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2]*Sinh[c])/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.52, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\cosh\left(b^2x^2+c\right)\operatorname{erf}(bx),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(cosh(b^2*x^2 + c)*erf(b*x), x)
```

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

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(cosh(b^2*x^2 + c)*erf(b*x), x)
```

maple [F] time = 0.04, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(b^2*x^2+c)*erf(b*x),x)
```

```
[Out] int(cosh(b^2*x^2+c)*erf(b*x),x)
```

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

$$\frac{\sqrt{\pi}\operatorname{erf}(bx)^2e^{(-c)}}{8\,b}+\frac{1}{2}\int \operatorname{erf}(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/8*sqrt(pi)*erf(b*x)^2*e^(-c)/b + 1/2*integrate(erf(b*x)*e^(b^2*x^2 + c),
x)
```

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

$$\int \cosh\left(b^2\,x^2+c\right)\,\operatorname{erf}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(c + b^2*x^2)*erf(b*x),x)
```

```
[Out] int(cosh(c + b^2*x^2)*erf(b*x), x)
```

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

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b**2*x**2+c)*erf(b*x),x)
```

```
[Out] Integral(cosh(b**2*x**2 + c)*erf(b*x), x)
```

3.103 $\int \cosh\left(c-b^2x^2\right) \mathbf{erf}(bx)\,dx$

Optimal. Leaf size=56

$$\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^c\mathrm{erf}(bx)^2}{8b}$$

```
[Out] 1/2*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/exp(c)/Pi^(1/2)+1/8*ex
p(c)*erf(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.05, antiderivative size = 56, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6413, 6373, 30, 6376}

$$\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^c\mathrm{Erf}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[c - b^2*x^2]*Erf[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erf[b*x]^2)/(8*b) + (b*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}
, b^2*x^2])/(2*E^c*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6373

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c*
Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erf[b*x]], x] /; FreeQ[{b, c, d, n},
 x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6413

```
Int[Cosh[(c_.) + (d_.)*(x_)^2]*Erf[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int[
E^(c + d*x^2)*Erf[b*x], x], x] + Dist[1/2, Int[E^(-c - d*x^2)*Erf[b*x], x],
 x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\begin{aligned}\int \cosh\left(c-b^2x^2\right)\operatorname{erf}(bx)\,dx &= \frac{1}{2}\int e^{c-b^2x^2}\operatorname{erf}(bx)\,dx+\frac{1}{2}\int e^{-c+b^2x^2}\operatorname{erf}(bx)\,dx\\ &= \frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(e^c\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erf}(bx))}{4b}\\ &= \frac{e^c\sqrt{\pi}\operatorname{erf}(bx)^2}{8b}+\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.11, size = 91, normalized size = 1.62

$$\frac{-4b^2x^2\sinh(c)\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)-4b^2x^2\cosh(c)\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)+\pi\operatorname{erf}(bx)(\operatorname{erf}(bx)(\sinh(c)+\cosh(c))}{8\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Cosh[c - b^2*x^2]*Erf[b*x],x]
```

```
[Out] (-4*b^2*x^2*Cosh[c]*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)] - 4*b^2
*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2]*Sinh[c] + Pi*Erf[b*x]*(2*
Cosh[c]*Erfi[b*x] + Erf[b*x]*(Cosh[c] + Sinh[c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.39, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\cosh\left(b^2x^2-c\right)\operatorname{erf}(bx),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2-c)*erf(b*x),x, algorithm="fricas")
```

```
[Out] integral(cosh(b^2*x^2 - c)*erf(b*x), x)
```

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

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2-c)*erf(b*x),x, algorithm="giac")
[Out] integrate(cosh(b^2*x^2 - c)*erf(b*x), x)
```

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

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(b^2*x^2-c)*erf(b*x),x)
[Out] int(cosh(b^2*x^2-c)*erf(b*x),x)
```

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

$$\frac{\sqrt{\pi}\,\operatorname{erf}(bx)^2 e^c}{8\,b}+\frac{1}{2}\int \operatorname{erf}(bx)\,e^{\left(b^2x^2-c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2-c)*erf(b*x),x, algorithm="maxima")
[Out] 1/8*sqrt(pi)*erf(b*x)^2*e^c/b + 1/2*integrate(erf(b*x)*e^(b^2*x^2 - c), x)
```

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

$$\int \cosh\left(c-b^2\,x^2\right)\,\operatorname{erf}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(c - b^2*x^2)*erf(b*x),x)
[Out] int(cosh(c - b^2*x^2)*erf(b*x), x)
```

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

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erf}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b**2*x**2-c)*erf(b*x),x)
[Out] Integral(cosh(b**2*x**2 - c)*erf(b*x), x)
```

3.104 $\int x^5 \mathbf{erfc}(bx)\, dx$

Optimal. Leaf size=96

$$\frac{5\text{erf}(bx)}{16b^6} - \frac{x^5 e^{-b^2x^2}}{6\sqrt{\pi}\, b} - \frac{5xe^{-b^2x^2}}{8\sqrt{\pi}\, b^5} - \frac{5x^3 e^{-b^2x^2}}{12\sqrt{\pi}\, b^3} + \frac{1}{6}x^6\text{erfc}(bx)$$

```
[Out] 5/16*erf(b*x)/b^6+1/6*x^6*erfc(b*x)-5/8*x/b^5/exp(b^2*x^2)/Pi^(1/2)-5/12*x^
3/b^3/exp(b^2*x^2)/Pi^(1/2)-1/6*x^5/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 96, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2212, 2205}

$$\frac{5\text{Erf}(bx)}{16b^6} - \frac{x^5 e^{-b^2x^2}}{6\sqrt{\pi}\, b} - \frac{5x^3 e^{-b^2x^2}}{12\sqrt{\pi}\, b^3} - \frac{5xe^{-b^2x^2}}{8\sqrt{\pi}\, b^5} + \frac{1}{6}x^6\text{Erfc}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^5*Erfc[b*x],x]
```

```
[Out] (-5*x)/(8*b^5*E^(b^2*x^2)*Sqrt[Pi]) - (5*x^3)/(12*b^3*E^(b^2*x^2)*Sqrt[Pi])
 - x^5/(6*b*E^(b^2*x^2)*Sqrt[Pi]) + (5*Erf[b*x])/(16*b^6) + (x^6*Erfc[b*x])
/6
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6362

```
Int[Erfc[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfc[a + b*x])/(d*(m + 1)), x] + Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int x^5 \text{erfc}(bx)\,dx &= \frac{1}{6}x^6\text{erfc}(bx) + \frac{b\int e^{-b^2x^2}x^6\,dx}{3\sqrt{\pi}}\\
&= -\frac{e^{-b^2x^2}x^5}{6b\sqrt{\pi}} + \frac{1}{6}x^6\text{erfc}(bx) + \frac{5\int e^{-b^2x^2}x^4\,dx}{6b\sqrt{\pi}}\\
&= -\frac{5e^{-b^2x^2}x^3}{12b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^5}{6b\sqrt{\pi}} + \frac{1}{6}x^6\text{erfc}(bx) + \frac{5\int e^{-b^2x^2}x^2\,dx}{4b^3\sqrt{\pi}}\\
&= -\frac{5e^{-b^2x^2}x}{8b^5\sqrt{\pi}} - \frac{5e^{-b^2x^2}x^3}{12b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^5}{6b\sqrt{\pi}} + \frac{1}{6}x^6\text{erfc}(bx) + \frac{5\int e^{-b^2x^2}\,dx}{8b^5\sqrt{\pi}}\\
&= -\frac{5e^{-b^2x^2}x}{8b^5\sqrt{\pi}} - \frac{5e^{-b^2x^2}x^3}{12b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^5}{6b\sqrt{\pi}} + \frac{5\text{erf}(bx)}{16b^6} + \frac{1}{6}x^6\text{erfc}(bx)
\end{aligned}$$

Mathematica [A] time = 0.08, size = 62, normalized size = 0.65

$$\frac{1}{48}\left(\frac{15\text{erf}(bx)}{b^6} - \frac{2xe^{-b^2x^2}\left(4b^4x^4+10b^2x^2+15\right)}{\sqrt{\pi}\,b^5} + 8x^6\text{erfc}(bx)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*Erfc[b*x],x]
```

```
[Out] ((-2*x*(15 + 10*b^2*x^2 + 4*b^4*x^4))/(b^5*E^(b^2*x^2)*Sqrt[Pi]) + (15*Erf[
b*x])/b^6 + 8*x^6*Erfc[b*x])/48
```

fricas [A] time = 0.40, size = 71, normalized size = 0.74

$$\frac{8\,\pi b^6x^6 - 2\,\sqrt{\pi}\left(4\,b^5x^5 + 10\,b^3x^3 + 15\,bx\right)e^{\left(-b^2x^2\right)} + \left(15\,\pi - 8\,\pi b^6x^6\right)\text{erf}\left(bx\right)}{48\,\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfc(b*x),x, algorithm="fricas")
```

```
[Out] 1/48*(8*pi*b^6*x^6 - 2*sqrt(pi)*(4*b^5*x^5 + 10*b^3*x^3 + 15*b*x)*e^(-b^2*x
^2) + (15*pi - 8*pi*b^6*x^6)*erf(b*x))/(pi*b^6)
```

giac [A] time = 0.65, size = 69, normalized size = 0.72

$$-\frac{1}{6}\,x^{6}\operatorname{erf}\left(bx\right)+\frac{1}{6}\,x^{6}-\frac{b\left(\frac{2\,\left(4\,b^{4}x^{5}+10\,b^{2}x^{3}+15\,x\right)e^{\left(-b^{2}x^{2}\right)}}{b^{6}}+\frac{15\,\sqrt{\pi}\operatorname{erf}\left(-bx\right)}{b^{7}}\right)}{48\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfc(b*x),x, algorithm="giac")
```

```
[Out] -1/6*x^6*erf(b*x) + 1/6*x^6 - 1/48*b*(2*(4*b^4*x^5 + 10*b^2*x^3 + 15*x)*e^(
-b^2*x^2)/b^6 + 15*sqrt(pi)*erf(-b*x)/b^7)/sqrt(pi)
```

maple [A] time = 0.01, size = 83, normalized size = 0.86

$$\frac{\frac{b^{6}x^{6}\operatorname{erfc}(bx)}{6}+\frac{-\frac{e^{-b^{2}x^{2}}b^{5}x^{5}}{2}-\frac{5b^{3}x^{3}e^{-b^{2}x^{2}}}{4}-\frac{15\,e^{-b^{2}x^{2}}bx}{8}+\frac{15\,\sqrt{\pi}\operatorname{erf}(bx)}{16}}{3\sqrt{\pi}}}{b^{6}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfc(b*x),x)
```

```
[Out] 1/b^6*(1/6*b^6*x^6*erfc(b*x)+1/3/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^5*x^5-5/4*b^
3*x^3/exp(b^2*x^2)-15/8*b*x/exp(b^2*x^2)+15/16*Pi^(1/2)*erf(b*x)))
```

maxima [A] time = 0.40, size = 63, normalized size = 0.66

$$\frac{1}{6}\,x^{6}\operatorname{erfc}\left(bx\right)-\frac{b\left(\frac{2\,\left(4\,b^{4}x^{5}+10\,b^{2}x^{3}+15\,x\right)e^{\left(-b^{2}x^{2}\right)}}{b^{6}}-\frac{15\,\sqrt{\pi}\operatorname{erf}\left(bx\right)}{b^{7}}\right)}{48\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/6*x^6*erfc(b*x) - 1/48*b*(2*(4*b^4*x^5 + 10*b^2*x^3 + 15*x)*e^(-b^2*x^2)/
b^6 - 15*sqrt(pi)*erf(b*x)/b^7)/sqrt(pi)
```

mupad [B] time = 0.27, size = 78, normalized size = 0.81

$$\frac{x^{6}\operatorname{erfc}\left(b\,x\right)}{6}-\frac{\frac{5\operatorname{erfc}(b\,x)}{16}+\frac{5\,b^{3}\,x^{3}\,e^{-b^{2}\,x^{2}}}{12\,\sqrt{\pi}}+\frac{b^{5}\,x^{5}\,e^{-b^{2}\,x^{2}}}{6\,\sqrt{\pi}}+\frac{5\,b\,x\,e^{-b^{2}\,x^{2}}}{8\,\sqrt{\pi}}}{b^{6}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfc(b*x),x)
```

```
[Out] (x^6*erfc(b*x))/6 - ((5*erfc(b*x))/16 + (5*b^3*x^3*exp(-b^2*x^2))/(12*pi^(1
/2)) + (b^5*x^5*exp(-b^2*x^2))/(6*pi^(1/2)) + (5*b*x*exp(-b^2*x^2))/(8*pi^(
1/2)))/b^6
```

sympy [A] time = 2.90, size = 92, normalized size = 0.96

$$\begin{cases} \frac{x^6 \operatorname{erfc}(bx)}{6} - \frac{x^5 e^{-b^2x^2}}{6\sqrt{\pi}\, b} - \frac{5x^3 e^{-b^2x^2}}{12\sqrt{\pi}\, b^3} - \frac{5x e^{-b^2x^2}}{8\sqrt{\pi}\, b^5} - \frac{5 \operatorname{erfc}(bx)}{16b^6} & \text{for } b \neq 0 \\ \frac{x^6}{6} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*erfc(b*x),x)
```

```
[Out] Piecewise((x**6*erfc(b*x)/6 - x**5*exp(-b**2*x**2)/(6*sqrt(pi)*b) - 5*x**3*
exp(-b**2*x**2)/(12*sqrt(pi)*b**3) - 5*x*exp(-b**2*x**2)/(8*sqrt(pi)*b**5)
- 5*erfc(b*x)/(16*b**6), Ne(b, 0)), (x**6/6, True))
```

3.105 $\int x^3 \mathbf{erfc}(bx) \, dx$

Optimal. Leaf size=71

$$\frac{3\text{erf}(bx)}{16b^4} - \frac{x^3 e^{-b^2x^2}}{4\sqrt{\pi}\, b} - \frac{3xe^{-b^2x^2}}{8\sqrt{\pi}\, b^3} + \frac{1}{4}x^4\text{erfc}(bx)$$

```
[Out] 3/16*erf(b*x)/b^4+1/4*x^4*erfc(b*x)-3/8*x/b^3/exp(b^2*x^2)/Pi^(1/2)-1/4*x^3
/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2212, 2205}

$$\frac{3\text{Erf}(bx)}{16b^4} - \frac{x^3 e^{-b^2x^2}}{4\sqrt{\pi}\, b} - \frac{3xe^{-b^2x^2}}{8\sqrt{\pi}\, b^3} + \frac{1}{4}x^4\text{Erfc}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^3*Erfc[b*x],x]
```

```
[Out] (-3*x)/(8*b^3*E^(b^2*x^2)*Sqrt[Pi]) - x^3/(4*b*E^(b^2*x^2)*Sqrt[Pi]) + (3*E
rf[b*x])/(16*b^4) + (x^4*Erfc[b*x])/4
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6362

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

Rubi steps

$$
\begin{aligned}
\int x^3\text{erfc}(bx)\,dx &= \frac{1}{4}x^4\text{erfc}(bx)+\frac{b\int e^{-b^2x^2}x^4\,dx}{2\sqrt{\pi}}\\
&= -\frac{e^{-b^2x^2}x^3}{4b\sqrt{\pi}}+\frac{1}{4}x^4\text{erfc}(bx)+\frac{3\int e^{-b^2x^2}x^2\,dx}{4b\sqrt{\pi}}\\
&= -\frac{3e^{-b^2x^2}x}{8b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}x^3}{4b\sqrt{\pi}}+\frac{1}{4}x^4\text{erfc}(bx)+\frac{3\int e^{-b^2x^2}\,dx}{8b^3\sqrt{\pi}}\\
&= -\frac{3e^{-b^2x^2}x}{8b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}x^3}{4b\sqrt{\pi}}+\frac{3\text{erf}(bx)}{16b^4}+\frac{1}{4}x^4\text{erfc}(bx)
\end{aligned}
$$

Mathematica [A] time = 0.06, size = 54, normalized size = 0.76

$$
\frac{1}{16}\left(\frac{3\text{erf}(bx)}{b^4}-\frac{2xe^{-b^2x^2}\left(2b^2x^2+3\right)}{\sqrt{\pi}\,b^3}+4x^4\text{erfc}(bx)\right)
$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*Erfc[b*x],x]
```

```
[Out] ((-2*x*(3 + 2*b^2*x^2))/(b^3*E^(b^2*x^2)*Sqrt[Pi]) + (3*Erf[b*x])/b^4 + 4*x
^4*Erfc[b*x])/16
```

fricas [A] time = 0.47, size = 63, normalized size = 0.89

$$
\frac{4\,\pi b^4x^4-2\,\sqrt{\pi}\left(2\,b^3x^3+3\,bx\right)e^{\left(-b^2x^2\right)}+\left(3\,\pi-4\,\pi b^4x^4\right)\text{erf}\left(bx\right)}{16\,\pi b^4}
$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/16*(4*pi*b^4*x^4 - 2*sqrt(pi)*(2*b^3*x^3 + 3*b*x)*e^(-b^2*x^2) + (3*pi -
4*pi*b^4*x^4)*erf(b*x))/(pi*b^4)
```

giac [A] time = 0.38, size = 61, normalized size = 0.86

$$
-\frac{1}{4}\,x^4\,\text{erf}\left(bx\right)+\frac{1}{4}\,x^4-\frac{b\left(\frac{2\left(2\,b^2x^3+3\,x\right)e^{\left(-b^2x^2\right)}}{b^4}+\frac{3\,\sqrt{\pi}\,\text{erf}\left(-bx\right)}{b^5}\right)}{16\,\sqrt{\pi}}
$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/4*x^4*erf(b*x) + 1/4*x^4 - 1/16*b*(2*(2*b^2*x^3 + 3*x)*e^(-b^2*x^2)/b^4
+ 3*sqrt(pi)*erf(-b*x)/b^5)/sqrt(pi)
```

maple [A] time = 0.00, size = 65, normalized size = 0.92

$$\frac{\frac{b^4x^4\operatorname{erfc}(bx)}{4}+\frac{-\frac{b^3x^3\mathrm{e}^{-b^2x^2}}{2}-\frac{3\,\mathrm{e}^{-b^2x^2}bx}{4}+\frac{3\sqrt{\pi}\;\operatorname{erf}(bx)}{8}}{2\sqrt{\pi}}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfc(b*x),x)
```

```
[Out] 1/b^4*(1/4*b^4*x^4*erfc(b*x)+1/2/Pi^(1/2)*(-1/2*b^3*x^3/exp(b^2*x^2)-3/4*b*
x/exp(b^2*x^2)+3/8*Pi^(1/2)*erf(b*x)))
```

maxima [A] time = 0.58, size = 55, normalized size = 0.77

$$\frac{1}{4}\,x^4\operatorname{erfc}\left(bx\right)-\frac{b\left(\frac{2\left(2\,b^2x^3+3\,x\right)e^{\left(-b^2x^2\right)}}{b^4}-\frac{3\sqrt{\pi}\;\operatorname{erf}(bx)}{b^5}\right)}{16\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*x^4*erfc(b*x) - 1/16*b*(2*(2*b^2*x^3 + 3*x)*e^(-b^2*x^2)/b^4 - 3*sqrt(p
i)*erf(b*x)/b^5)/sqrt(pi)
```

mupad [B] time = 0.14, size = 58, normalized size = 0.82

$$\frac{x^4\operatorname{erfc}\left(b\,x\right)}{4}-\frac{\frac{3\operatorname{erfc}(b\,x)}{16}+\frac{b^3\,x^3\,\mathrm{e}^{-b^2\,x^2}}{4\sqrt{\pi}}+\frac{3\,b\,x\,\mathrm{e}^{-b^2\,x^2}}{8\sqrt{\pi}}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfc(b*x),x)
```

```
[Out] (x^4*erfc(b*x))/4 - ((3*erfc(b*x))/16 + (b^3*x^3*exp(-b^2*x^2))/(4*pi^(1/2)
) + (3*b*x*exp(-b^2*x^2))/(8*pi^(1/2)))/b^4
```

sympy [A] time = 1.04, size = 68, normalized size = 0.96

$$\begin{cases} \frac{x^4 \operatorname{erfc}(bx)}{4} - \frac{x^3 e^{-b^2 x^2}}{4\sqrt{\pi}\, b} - \frac{3x e^{-b^2 x^2}}{8\sqrt{\pi}\, b^3} - \frac{3 \operatorname{erfc}(bx)}{16 b^4} & \text{for } b \neq 0 \\ \frac{x^4}{4} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*erfc(b*x),x)
```

```
[Out] Piecewise((x**4*erfc(b*x)/4 - x**3*exp(-b**2*x**2)/(4*sqrt(pi)*b) - 3*x*exp
(-b**2*x**2)/(8*sqrt(pi)*b**3) - 3*erfc(b*x)/(16*b**4), Ne(b, 0)), (x**4/4,
 True))
```

3.106 $\int x\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=46

$$\frac{\operatorname{erf}(bx)}{4b^2}-\frac{xe^{-b^2x^2}}{2\sqrt{\pi}\,b}+\frac{1}{2}x^2\operatorname{erfc}(bx)$$

```
[Out] 1/4*erf(b*x)/b^2+1/2*x^2*erfc(b*x)-1/2*x/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [**A**] time = 0.03, antiderivative size = 46, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6362, 2212, 2205}

$$\frac{\operatorname{Erf}(bx)}{4b^2}-\frac{xe^{-b^2x^2}}{2\sqrt{\pi}\,b}+\frac{1}{2}x^2\operatorname{Erfc}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x*Erfc[b*x],x]
```

```
[Out] -x/(2*b*E^(b^2*x^2)*Sqrt[Pi]) + Erf[b*x]/(4*b^2) + (x^2*Erfc[b*x])/2
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6362

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

Rubi steps

$$\int x\text{erfc}(bx)\,dx = \frac{1}{2}x^2\text{erfc}(bx) + \frac{b\int e^{-b^2x^2}x^2\,dx}{\sqrt{\pi}}$$
$$= -\frac{e^{-b^2x^2}x}{2b\sqrt{\pi}} + \frac{1}{2}x^2\text{erfc}(bx) + \frac{\int e^{-b^2x^2}\,dx}{2b\sqrt{\pi}}$$
$$= -\frac{e^{-b^2x^2}x}{2b\sqrt{\pi}} + \frac{\text{erf}(bx)}{4b^2} + \frac{1}{2}x^2\text{erfc}(bx)$$

Mathematica [**A**] time = 0.06, size = 43, normalized size = 0.93

$$\frac{1}{4}\left(\frac{\text{erf}(bx)}{b^2} + 2x\left(x\text{erfc}(bx) - \frac{e^{-b^2x^2}}{\sqrt{\pi}\,b}\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Erfc[b*x],x]
```

```
[Out] (Erf[b*x]/b^2 + 2*x*(-(1/(b*E^(b^2*x^2)*Sqrt[Pi])) + x*Erfc[b*x]))/4
```

fricas [**A**] time = 0.40, size = 50, normalized size = 1.09

$$\frac{2\,\pi b^2x^2 - 2\,\sqrt{\pi}\,bxe^{\left(-b^2x^2\right)} + \left(\pi - 2\,\pi b^2x^2\right)\text{erf}\left(bx\right)}{4\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x),x, algorithm="fricas")
```

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

giac [**A**] time = 0.49, size = 49, normalized size = 1.07

$$-\frac{1}{2}\,x^2\,\text{erf}\left(bx\right) + \frac{1}{2}\,x^2 - \frac{b\left(\frac{2\,xe^{\left(-b^2x^2\right)}}{b^2} + \frac{\sqrt{\pi}\,\text{erf}\left(-bx\right)}{b^3}\right)}{4\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x),x, algorithm="giac")
```

```
[Out] -1/2*x^2*erf(b*x) + 1/2*x^2 - 1/4*b*(2*x*e^(-b^2*x^2)/b^2 + sqrt(pi)*erf(-b
*x)/b^3)/sqrt(pi)
```

maple [A] time = 0.00, size = 46, normalized size = 1.00

$$\frac{\frac{b^2x^2\mathrm{erfc}(bx)}{2}+\frac{-\frac{\mathrm{e}^{-b^2x^2}bx}{2}+\frac{\sqrt{\pi}\ \mathrm{erf}(bx)}{4}}{\sqrt{\pi}}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfc(b*x),x)
```

```
[Out] 1/b^2*(1/2*b^2*x^2*erfc(b*x)+1/Pi^(1/2)*(-1/2*b*x/exp(b^2*x^2)+1/4*Pi^(1/2)
*erf(b*x)))
```

maxima [A] time = 0.31, size = 44, normalized size = 0.96

$$\frac{1}{2}\,x^2\,\mathrm{erfc}\,(bx)-\frac{b\left(\frac{2\,xe^{\left(-b^2x^2\right)}}{b^2}-\frac{\sqrt{\pi}\ \mathrm{erf}(bx)}{b^3}\right)}{4\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*erfc(b*x) - 1/4*b*(2*x*e^(-b^2*x^2)/b^2 - sqrt(pi)*erf(b*x)/b^3)/sq
rt(pi)
```

mupad [B] time = 0.12, size = 38, normalized size = 0.83

$$\frac{x^2\,\mathrm{erfc}\,(b\,x)}{2}-\frac{\frac{\mathrm{erfc}(b\,x)}{4}+\frac{b\,x\,\mathrm{e}^{-b^2\,x^2}}{2\,\sqrt{\pi}}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfc(b*x),x)
```

```
[Out] (x^2*erfc(b*x))/2 - (erfc(b*x)/4 + (b*x*exp(-b^2*x^2))/(2*pi^(1/2)))/b^2
```

sympy [A] time = 0.37, size = 42, normalized size = 0.91

$$\begin{cases}\frac{x^2\,\mathrm{erfc}\,(bx)}{2}-\frac{xe^{-b^2x^2}}{2\sqrt{\pi}\,b}-\frac{\mathrm{erfc}\,(bx)}{4b^2} & \text{for } b\neq 0\\ \frac{x^2}{2} & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x),x)
```

```
[Out] Piecewise((x**2*erfc(b*x)/2 - x*exp(-b**2*x**2)/(2*sqrt(pi)*b) - erfc(b*x)/
(4*b**2), Ne(b, 0)), (x**2/2, True))
```

3.107 $\int \frac{\mathbf{erfc}(bx)}{x}\,dx$

Optimal. Leaf size=35

$$\log(x)-\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

```
[Out] ln(x)-2*b*x*HypergeometricPFQ([1/2, 1/2],[3/2, 3/2],-b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.02, antiderivative size = 35, 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 = {6359, 6358}

$$\log(x)-\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/x,x]
```

```
[Out] (-2*b*x*HypergeometricPFQ[{1/2, 1/2}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi] + L
og[x]
```

Rule 6358

```
Int[Erf[(b_.)*(x_)]/(x_), x_Symbol] :> Simp[(2*b*x*HypergeometricPFQ[{1/2,
1/2}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[b, x]
```

Rule 6359

```
Int[Erfc[(b_.)*(x_)]/(x_), x_Symbol] :> Simp[Log[x], x] - Int[Erf[b*x]/x, x
] /; FreeQ[b, x]
```

Rubi steps

$$\begin{aligned}\int \frac{\text{erfc}(bx)}{x}\,dx &= \log(x)-\int \frac{\text{erf}(bx)}{x}\,dx\\ &= -\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}+\log(x)\end{aligned}$$

Mathematica [A] time = 0.03, size = 45, normalized size = 1.29

$$\log(x)(\mathrm{erf}(bx)+\mathrm{erfc}(bx))-\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/x,x]
```

```
[Out] (-2*b*x*HypergeometricPFQ[{1/2, 1/2}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi] + (
Erf[b*x] + Erfc[b*x])*Log[x]
```

fricas [F] time = 0.48, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(-\frac{\mathrm{erf}\,(bx)-1}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x,x, algorithm="fricas")
```

```
[Out] integral(-(erf(b*x) - 1)/x, x)
```

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

$$\int \frac{\mathrm{erfc}\,(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)/x, x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfc}\,(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x,x)
```

```
[Out] int(erfc(b*x)/x,x)
```

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

$$\int \frac{\mathrm{erfc}\,(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)/x, x)
```

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

$$\int \frac{\operatorname{erfc}(b\,x)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x,x)
```

```
[Out] int(erfc(b*x)/x, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x,x)
```

```
[Out] Exception raised: AttributeError
```

3.108 $\int \frac{\text{erfc}(bx)}{x^3}\,dx$

Optimal. Leaf size=40

$$b^2\text{erf}(bx)+\frac{be^{-b^2x^2}}{\sqrt{\pi}\,x}-\frac{\text{erfc}(bx)}{2x^2}$$

```
[Out] b^2*erf(b*x)-1/2*erfc(b*x)/x^2+b/exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.04, antiderivative size = 40, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2214, 2205}

$$b^2\text{Erf}(bx)+\frac{be^{-b^2x^2}}{\sqrt{\pi}\,x}-\frac{\text{Erfc}(bx)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/x^3,x]
```

```
[Out] b/(E^(b^2*x^2)*Sqrt[Pi]*x) + b^2*Erf[b*x] - Erfc[b*x]/(2*x^2)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6362

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

Rubi steps

$$\int \frac{\operatorname{erfc}(bx)}{x^3}\,dx = -\frac{\operatorname{erfc}(bx)}{2x^2} - \frac{b\int \frac{e^{-b^2x^2}}{x^2}\,dx}{\sqrt{\pi}}$$
$$= \frac{be^{-b^2x^2}}{\sqrt{\pi}\,x} - \frac{\operatorname{erfc}(bx)}{2x^2} + \frac{(2b^3)\int e^{-b^2x^2}\,dx}{\sqrt{\pi}}$$
$$= \frac{be^{-b^2x^2}}{\sqrt{\pi}\,x} + b^2\operatorname{erf}(bx) - \frac{\operatorname{erfc}(bx)}{2x^2}$$

Mathematica [A] time = 0.05, size = 40, normalized size = 1.00

$$b^2\operatorname{erf}(bx) + \frac{be^{-b^2x^2}}{\sqrt{\pi}\,x} - \frac{\operatorname{erfc}(bx)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/x^3,x]
[Out] b/(E^(b^2*x^2)*Sqrt[Pi]*x) + b^2*Erf[b*x] - Erfc[b*x]/(2*x^2)
```

fricas [A] time = 0.59, size = 43, normalized size = 1.08

$$-\frac{\pi - 2\sqrt{\pi}\,bxe^{\left(-b^2x^2\right)} - \left(\pi + 2\,\pi b^2x^2\right)\operatorname{erf}(bx)}{2\,\pi x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x^3,x, algorithm="fricas")
[Out] -1/2*(pi - 2*sqrt(pi)*b*x*e^(-b^2*x^2) - (pi + 2*pi*b^2*x^2)*erf(b*x))/(pi*
x^2)
```

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

$$\int \frac{\operatorname{erfc}(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x^3,x, algorithm="giac")
[Out] integrate(erfc(b*x)/x^3, x)
```

maple [A] time = 0.01, size = 51, normalized size = 1.28

$$b^2\left(-\frac{\operatorname{erfc}(bx)}{2b^2x^2}-\frac{-\frac{e^{-b^2x^2}}{bx}-\sqrt{\pi}\ \operatorname{erf}(bx)}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^3,x)
```

```
[Out] b^2*(-1/2/b^2/x^2*erfc(b*x)-1/Pi^(1/2)*(-1/exp(b^2*x^2)/b/x-Pi^(1/2)*erf(b*
x)))
```

maxima [A] time = 0.65, size = 35, normalized size = 0.88

$$\frac{b^2\sqrt{x^2}\,\Gamma\left(-\frac{1}{2},b^2x^2\right)}{2\sqrt{\pi}\,x}-\frac{\operatorname{erfc}(bx)}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*b^2*sqrt(x^2)*gamma(-1/2, b^2*x^2)/(sqrt(pi)*x) - 1/2*erfc(b*x)/x^2
```

mupad [B] time = 0.13, size = 38, normalized size = 0.95

$$-b^2\operatorname{erfc}(b\,x)-\frac{\frac{\operatorname{erfc}(b\,x)}{2}-\frac{b\,x\,e^{-b^2\,x^2}}{\sqrt{\pi}}}{x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^3,x)
```

```
[Out] - b^2*erfc(b*x) - (erfc(b*x)/2 - (b*x*exp(-b^2*x^2))/pi^(1/2))/x^2
```

sympy [A] time = 0.47, size = 34, normalized size = 0.85

$$-b^2\operatorname{erfc}(bx)+\frac{be^{-b^2x^2}}{\sqrt{\pi}\,x}-\frac{\operatorname{erfc}(bx)}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x**3,x)
```

```
[Out] -b**2*erfc(b*x) + b*exp(-b**2*x**2)/(sqrt(pi)*x) - erfc(b*x)/(2*x**2)
```

3.109 $\int \frac{\text{erfc}(bx)}{x^5}\,dx$

Optimal. Leaf size=71

$$-\frac{1}{3}b^4\text{erf}(bx)+\frac{be^{-b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{b^3e^{-b^2x^2}}{3\sqrt{\pi}\,x}-\frac{\text{erfc}(bx)}{4x^4}$$

```
[Out] -1/3*b^4*erf(b*x)-1/4*erfc(b*x)/x^4+1/6*b/exp(b^2*x^2)/x^3/Pi^(1/2)-1/3*b^3
/exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2214, 2205}

$$-\frac{1}{3}b^4\text{Erf}(bx)-\frac{b^3e^{-b^2x^2}}{3\sqrt{\pi}\,x}+\frac{be^{-b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{\text{Erfc}(bx)}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/x^5,x]
```

```
[Out] b/(6*E^(b^2*x^2)*Sqrt[Pi]*x^3) - b^3/(3*E^(b^2*x^2)*Sqrt[Pi]*x) - (b^4*Erf[
b*x])/3 - Erfc[b*x]/(4*x^4)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6362

```
Int[Erfc[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfc[a + b*x])/(d*(m + 1)), x] + Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\text{erfc}(bx)}{x^5}\,dx = -\frac{\text{erfc}(bx)}{4x^4} - \frac{b\int \frac{e^{-b^2x^2}}{x^4}\,dx}{2\sqrt{\pi}}$$
$$= \frac{be^{-b^2x^2}}{6\sqrt{\pi}\,x^3} - \frac{\text{erfc}(bx)}{4x^4} + \frac{b^3\int \frac{e^{-b^2x^2}}{x^2}\,dx}{3\sqrt{\pi}}$$
$$= \frac{be^{-b^2x^2}}{6\sqrt{\pi}\,x^3} - \frac{b^3e^{-b^2x^2}}{3\sqrt{\pi}\,x} - \frac{\text{erfc}(bx)}{4x^4} - \frac{\left(2b^5\right)\int e^{-b^2x^2}\,dx}{3\sqrt{\pi}}$$
$$= \frac{be^{-b^2x^2}}{6\sqrt{\pi}\,x^3} - \frac{b^3e^{-b^2x^2}}{3\sqrt{\pi}\,x} - \frac{1}{3}b^4\text{erf}(bx) - \frac{\text{erfc}(bx)}{4x^4}$$

Mathematica [A] time = 0.04, size = 53, normalized size = 0.75

$$\frac{1}{12}\left(-4b^4\text{erf}(bx) + \frac{2e^{-b^2x^2}\left(b-2b^3x^2\right)}{\sqrt{\pi}\,x^3} - \frac{3\text{erfc}(bx)}{x^4}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/x^5,x]
```

```
[Out] ((2*(b - 2*b^3*x^2))/(E^(b^2*x^2)*Sqrt[Pi]*x^3) - 4*b^4*Erf[b*x] - (3*Erfc[
b*x])/x^4)/12
```

fricas [A] time = 0.50, size = 58, normalized size = 0.82

$$-\frac{3\,\pi + 2\,\sqrt{\pi}\left(2\,b^3x^3 - bx\right)e^{\left(-b^2x^2\right)} - \left(3\,\pi - 4\,\pi b^4x^4\right)\text{erf}\left(bx\right)}{12\,\pi x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/12*(3*pi + 2*sqrt(pi)*(2*b^3*x^3 - b*x)*e^(-b^2*x^2) - (3*pi - 4*pi*b^4*
x^4)*erf(b*x))/(pi*x^4)
```

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

$$\int \frac{\text{erfc}\left(bx\right)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erfc(b*x)/x^5, x)
```

maple [A] time = 0.00, size = 69, normalized size = 0.97

$$b^{4}\left(-\frac{\operatorname{erfc}\left(bx\right)}{4b^{4}x^{4}}-\frac{-\frac{\mathrm{e}^{-b^{2}x^{2}}}{3b^{3}x^{3}}+\frac{2\,\mathrm{e}^{-b^{2}x^{2}}}{3bx}+\frac{2\sqrt{\pi}\ \operatorname{erf}(bx)}{3}}{2\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^5,x)
```

```
[Out] b^4*(-1/4/b^4/x^4*erfc(b*x)-1/2/Pi^(1/2)*(-1/3/exp(b^2*x^2)/b^3/x^3+2/3/exp
(b^2*x^2)/b/x+2/3*Pi^(1/2)*erf(b*x)))
```

maxima [A] time = 1.31, size = 35, normalized size = 0.49

$$\frac{b^{4}\left(x^{2}\right)^{\frac{3}{2}}\Gamma\left(-\frac{3}{2},b^{2}x^{2}\right)}{4\sqrt{\pi}\,x^{3}}-\frac{\operatorname{erfc}\left(bx\right)}{4\,x^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*b^4*(x^2)^(3/2)*gamma(-3/2, b^2*x^2)/(sqrt(pi)*x^3) - 1/4*erfc(b*x)/x^4
```

mupad [B] time = 0.19, size = 71, normalized size = 1.00

$$-\frac{\frac{\operatorname{erfc}(b\,x)}{4}+\frac{b^{3}\,x^{3}\,\mathrm{e}^{-b^{2}\,x^{2}}}{3\,\sqrt{\pi}}-\frac{b\,x\,\mathrm{e}^{-b^{2}\,x^{2}}}{6\,\sqrt{\pi}}}{x^{4}}-\frac{b^{5}\,\operatorname{erfi}\left(x\,\sqrt{-b^{2}}\right)}{3\,\sqrt{-b^{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^5,x)
```

```
[Out] - (erfc(b*x)/4 + (b^3*x^3*exp(-b^2*x^2))/(3*pi^(1/2)) - (b*x*exp(-b^2*x^2))
/(6*pi^(1/2)))/x^4 - (b^5*erfi(x*(-b^2)^(1/2)))/(3*(-b^2)^(1/2))
```

sympy [A] time = 1.14, size = 60, normalized size = 0.85

$$\frac{b^{4}\operatorname{erfc}\left(bx\right)}{3}-\frac{b^{3}e^{-b^{2}x^{2}}}{3\sqrt{\pi}\,x}+\frac{be^{-b^{2}x^{2}}}{6\sqrt{\pi}\,x^{3}}-\frac{\operatorname{erfc}\left(bx\right)}{4x^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x**5,x)
```

```
[Out] b**4*erfc(b*x)/3 - b**3*exp(-b**2*x**2)/(3*sqrt(pi)*x) + b*exp(-b**2*x**2)/
(6*sqrt(pi)*x**3) - erfc(b*x)/(4*x**4)
```

3.110 $\int \frac{\text{erfc}(bx)}{x^7}\,dx$

Optimal. Leaf size=96

$$\frac{4}{45}b^6\text{erf}(bx)+\frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5}+\frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x}-\frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3}-\frac{\text{erfc}(bx)}{6x^6}$$

```
[Out] 4/45*b^6*erf(b*x)-1/6*erfc(b*x)/x^6+1/15*b/exp(b^2*x^2)/x^5/Pi^(1/2)-2/45*b
^3/exp(b^2*x^2)/x^3/Pi^(1/2)+4/45*b^5/exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 96, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2214, 2205}

$$\frac{4}{45}b^6\text{Erf}(bx)+\frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x}-\frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3}+\frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5}-\frac{\text{Erfc}(bx)}{6x^6}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/x^7,x]
```

```
[Out] b/(15*E^(b^2*x^2)*Sqrt[Pi]*x^5) - (2*b^3)/(45*E^(b^2*x^2)*Sqrt[Pi]*x^3) + (
4*b^5)/(45*E^(b^2*x^2)*Sqrt[Pi]*x) + (4*b^6*Erf[b*x])/45 - Erfc[b*x]/(6*x^6
)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6362

```
Int[Erfc[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfc[a + b*x])/(d*(m + 1)), x] + Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\text{erfc}(bx)}{x^7}\,dx &= -\frac{\text{erfc}(bx)}{6x^6} - \frac{b\int \frac{e^{-b^2x^2}}{x^6}\,dx}{3\sqrt{\pi}} \\
&= \frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} - \frac{\text{erfc}(bx)}{6x^6} + \frac{\left(2b^3\right)\int \frac{e^{-b^2x^2}}{x^4}\,dx}{15\sqrt{\pi}} \\
&= \frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} - \frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3} - \frac{\text{erfc}(bx)}{6x^6} - \frac{\left(4b^5\right)\int \frac{e^{-b^2x^2}}{x^2}\,dx}{45\sqrt{\pi}} \\
&= \frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} - \frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3} + \frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x} - \frac{\text{erfc}(bx)}{6x^6} + \frac{\left(8b^7\right)\int e^{-b^2x^2}\,dx}{45\sqrt{\pi}} \\
&= \frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5} - \frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3} + \frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x} + \frac{4}{45}b^6\text{erf}(bx) - \frac{\text{erfc}(bx)}{6x^6}
\end{aligned}$$

Mathematica [A] time = 0.06, size = 62, normalized size = 0.65

$$\frac{1}{90}\left(8b^6\text{erf}(bx) + \frac{2be^{-b^2x^2}\left(4b^4x^4 - 2b^2x^2 + 3\right)}{\sqrt{\pi}\,x^5} - \frac{15\text{erfc}(bx)}{x^6}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/x^7,x]
```

```
[Out] ((2*b*(3 - 2*b^2*x^2 + 4*b^4*x^4))/(E^(b^2*x^2)*Sqrt[Pi]*x^5) + 8*b^6*Erf[b
*x] - (15*Erfc[b*x])/x^6)/90
```

fricas [A] time = 0.47, size = 66, normalized size = 0.69

$$-\frac{15\,\pi - 2\,\sqrt{\pi}\left(4\,b^5x^5 - 2\,b^3x^3 + 3\,bx\right)e^{\left(-b^2x^2\right)} - \left(15\,\pi + 8\,\pi b^6x^6\right)\text{erf}\,(bx)}{90\,\pi x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x^7,x, algorithm="fricas")
```

```
[Out] -1/90*(15*pi - 2*sqrt(pi)*(4*b^5*x^5 - 2*b^3*x^3 + 3*b*x)*e^(-b^2*x^2) - (1
5*pi + 8*pi*b^6*x^6)*erf(b*x))/(pi*x^6)
```

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

$$\int \frac{\operatorname{erfc}(bx)}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x^7,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)/x^7, x)
```

maple [A] time = 0.01, size = 87, normalized size = 0.91

$$b^6\left(-\frac{\operatorname{erfc}(bx)}{6b^6x^6}-\frac{-\frac{e^{-b^2x^2}}{5b^5x^5}+\frac{2\,e^{-b^2x^2}}{15b^3x^3}-\frac{4\,e^{-b^2x^2}}{15bx}-\frac{4\sqrt{\pi}\ \operatorname{erf}(bx)}{15}}{3\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^7,x)
```

```
[Out] b^6*(-1/6/b^6/x^6*erfc(b*x)-1/3/Pi^(1/2)*(-1/5/exp(b^2*x^2)/b^5/x^5+2/15/ex
p(b^2*x^2)/b^3/x^3-4/15/exp(b^2*x^2)/b/x-4/15*Pi^(1/2)*erf(b*x)))
```

maxima [A] time = 0.61, size = 35, normalized size = 0.36

$$\frac{b^6\left(x^2\right)^{\frac{5}{2}}\Gamma\left(-\frac{5}{2},b^2x^2\right)}{6\sqrt{\pi}\,x^5}-\frac{\operatorname{erfc}(bx)}{6\,x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x^7,x, algorithm="maxima")
```

```
[Out] 1/6*b^6*(x^2)^(5/2)*gamma(-5/2, b^2*x^2)/(sqrt(pi)*x^5) - 1/6*erfc(b*x)/x^6
```

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

$$\int \frac{\operatorname{erfc}(b\,x)}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^7,x)
```

```
[Out] int(erfc(b*x)/x^7, x)
```

sympy [A] time = 2.85, size = 87, normalized size = 0.91

$$-\frac{4b^6\operatorname{erfc}(bx)}{45}+\frac{4b^5e^{-b^2x^2}}{45\sqrt{\pi}\,x}-\frac{2b^3e^{-b^2x^2}}{45\sqrt{\pi}\,x^3}+\frac{be^{-b^2x^2}}{15\sqrt{\pi}\,x^5}-\frac{\operatorname{erfc}(bx)}{6x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x**7,x)
```

```
[Out] -4*b**6*erfc(b*x)/45 + 4*b**5*exp(-b**2*x**2)/(45*sqrt(pi)*x) - 2*b**3*exp(
-b**2*x**2)/(45*sqrt(pi)*x**3) + b*exp(-b**2*x**2)/(15*sqrt(pi)*x**5) - erf
c(b*x)/(6*x**6)
```

3.111 $\int x^6 \mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=109

$$-\frac{x^6e^{-b^2x^2}}{7\sqrt{\pi}\,b}-\frac{6e^{-b^2x^2}}{7\sqrt{\pi}\,b^7}-\frac{6x^2e^{-b^2x^2}}{7\sqrt{\pi}\,b^5}-\frac{3x^4e^{-b^2x^2}}{7\sqrt{\pi}\,b^3}+\frac{1}{7}x^7\text{erfc}(bx)$$

```
[Out] 1/7*x^7*erfc(b*x)-6/7/b^7/exp(b^2*x^2)/Pi^(1/2)-6/7*x^2/b^5/exp(b^2*x^2)/Pi
^(1/2)-3/7*x^4/b^3/exp(b^2*x^2)/Pi^(1/2)-1/7*x^6/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 109, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2212, 2209}

$$-\frac{x^6e^{-b^2x^2}}{7\sqrt{\pi}\,b}-\frac{3x^4e^{-b^2x^2}}{7\sqrt{\pi}\,b^3}-\frac{6x^2e^{-b^2x^2}}{7\sqrt{\pi}\,b^5}-\frac{6e^{-b^2x^2}}{7\sqrt{\pi}\,b^7}+\frac{1}{7}x^7\text{Erfc}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^6*Erfc[b*x],x]
```

```
[Out] -6/(7*b^7*E^(b^2*x^2)*Sqrt[Pi]) - (6*x^2)/(7*b^5*E^(b^2*x^2)*Sqrt[Pi]) - (3
*x^4)/(7*b^3*E^(b^2*x^2)*Sqrt[Pi]) - x^6/(7*b*E^(b^2*x^2)*Sqrt[Pi]) + (x^7*
Erfc[b*x])/7
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6362

```
Int[Erfc[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfc[a + b*x])/(d*(m + 1)), x] + Dist[(2*b)/(Sqrt[Pi]*d*
```

```
(m + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int x^6\text{erfc}(bx)\,dx &= \frac{1}{7}x^7\text{erfc}(bx) + \frac{(2b)\int e^{-b^2x^2}x^7\,dx}{7\sqrt{\pi}} \\
&= -\frac{e^{-b^2x^2}x^6}{7b\sqrt{\pi}} + \frac{1}{7}x^7\text{erfc}(bx) + \frac{6\int e^{-b^2x^2}x^5\,dx}{7b\sqrt{\pi}} \\
&= -\frac{3e^{-b^2x^2}x^4}{7b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^6}{7b\sqrt{\pi}} + \frac{1}{7}x^7\text{erfc}(bx) + \frac{12\int e^{-b^2x^2}x^3\,dx}{7b^3\sqrt{\pi}} \\
&= -\frac{6e^{-b^2x^2}x^2}{7b^5\sqrt{\pi}} - \frac{3e^{-b^2x^2}x^4}{7b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^6}{7b\sqrt{\pi}} + \frac{1}{7}x^7\text{erfc}(bx) + \frac{12\int e^{-b^2x^2}x\,dx}{7b^5\sqrt{\pi}} \\
&= -\frac{6e^{-b^2x^2}}{7b^7\sqrt{\pi}} - \frac{6e^{-b^2x^2}x^2}{7b^5\sqrt{\pi}} - \frac{3e^{-b^2x^2}x^4}{7b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^6}{7b\sqrt{\pi}} + \frac{1}{7}x^7\text{erfc}(bx)
\end{aligned}$$

Mathematica [A] time = 0.02, size = 73, normalized size = 0.67

$$\frac{e^{-b^2x^2}\left(-b^6x^6 - 3b^4x^4 - 6b^2x^2 + \sqrt{\pi}\,b^7x^7e^{b^2x^2}\text{erfc}(bx) - 6\right)}{7\sqrt{\pi}\,b^7}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^6*Erfc[b*x],x]
```

```
[Out] (-6 - 6*b^2*x^2 - 3*b^4*x^4 - b^6*x^6 + b^7*E^(b^2*x^2)*Sqrt[Pi]*x^7*Erfc[b
*x])/(7*b^7*E^(b^2*x^2)*Sqrt[Pi])
```

fricas [A] time = 0.55, size = 68, normalized size = 0.62

$$-\frac{\pi b^7x^7\,\text{erf}\,(bx) - \pi b^7x^7 + \sqrt{\pi}\left(b^6x^6 + 3\,b^4x^4 + 6\,b^2x^2 + 6\right)e^{\left(-b^2x^2\right)}}{7\,\pi b^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erfc(b*x),x, algorithm="fricas")
```

```
[Out] -1/7*(pi*b^7*x^7*erf(b*x) - pi*b^7*x^7 + sqrt(pi)*(b^6*x^6 + 3*b^4*x^4 + 6*
b^2*x^2 + 6)*e^(-b^2*x^2))/(pi*b^7)
```

giac [A] time = 0.54, size = 57, normalized size = 0.52

$$-\frac{1}{7}\,x^{7}\operatorname{erf}\left(bx\right)+\frac{1}{7}\,x^{7}-\frac{\left(b^{6}x^{6}+3\,b^{4}x^{4}+6\,b^{2}x^{2}+6\right)e^{\left(-b^{2}x^{2}\right)}}{7\,\sqrt{\pi}\,b^{7}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erfc(b*x),x, algorithm="giac")
```

```
[Out] -1/7*x^7*erf(b*x) + 1/7*x^7 - 1/7*(b^6*x^6 + 3*b^4*x^4 + 6*b^2*x^2 + 6)*e^(
-b^2*x^2)/(sqrt(pi)*b^7)
```

maple [A] time = 0.00, size = 90, normalized size = 0.83

$$\frac{\frac{b^{7}x^{7}\operatorname{erfc}(bx)}{7}+\frac{-\frac{\mathrm{e}^{-b^{2}x^{2}}b^{6}x^{6}}{7}-\frac{3\,\mathrm{e}^{-b^{2}x^{2}}b^{4}x^{4}}{7}-\frac{6\,\mathrm{e}^{-b^{2}x^{2}}b^{2}x^{2}}{7}-\frac{6\,\mathrm{e}^{-b^{2}x^{2}}}{7}}{\sqrt{\pi}}}{b^{7}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*erfc(b*x),x)
```

```
[Out] 1/b^7*(1/7*b^7*x^7*erfc(b*x)+2/7/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^6*x^6-3/2/ex
p(b^2*x^2)*b^4*x^4-3/exp(b^2*x^2)*b^2*x^2-3/exp(b^2*x^2)))
```

maxima [A] time = 0.33, size = 52, normalized size = 0.48

$$\frac{1}{7}\,x^{7}\operatorname{erfc}\left(bx\right)-\frac{\left(b^{6}x^{6}+3\,b^{4}x^{4}+6\,b^{2}x^{2}+6\right)e^{\left(-b^{2}x^{2}\right)}}{7\,\sqrt{\pi}\,b^{7}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erfc(b*x),x, algorithm="maxima")
```

```
[Out] 1/7*x^7*erfc(b*x) - 1/7*(b^6*x^6 + 3*b^4*x^4 + 6*b^2*x^2 + 6)*e^(-b^2*x^2)/
(sqrt(pi)*b^7)
```

mupad [B] time = 0.29, size = 90, normalized size = 0.83

$$\frac{x^{7}\operatorname{erfc}\left(b\,x\right)}{7}-\frac{\frac{6\,\mathrm{e}^{-b^{2}\,x^{2}}}{7\,\sqrt{\pi}}+\frac{6\,b^{2}\,x^{2}\,\mathrm{e}^{-b^{2}\,x^{2}}}{7\,\sqrt{\pi}}+\frac{3\,b^{4}\,x^{4}\,\mathrm{e}^{-b^{2}\,x^{2}}}{7\,\sqrt{\pi}}+\frac{b^{6}\,x^{6}\,\mathrm{e}^{-b^{2}\,x^{2}}}{7\,\sqrt{\pi}}}{b^{7}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*erfc(b*x),x)
```

```
[Out] (x^7*erfc(b*x))/7 - ((6*exp(-b^2*x^2))/(7*pi^(1/2)) + (6*b^2*x^2*exp(-b^2*x
^2))/(7*pi^(1/2)) + (3*b^4*x^4*exp(-b^2*x^2))/(7*pi^(1/2)) + (b^6*x^6*exp(-
b^2*x^2))/(7*pi^(1/2)))/b^7
```

sympy [A] time = 4.63, size = 102, normalized size = 0.94

$$\begin{cases} \frac{x^7 \operatorname{erfc}(bx)}{7} - \frac{x^6 e^{-b^2x^2}}{7\sqrt{\pi}\,b} - \frac{3x^4 e^{-b^2x^2}}{7\sqrt{\pi}\,b^3} - \frac{6x^2 e^{-b^2x^2}}{7\sqrt{\pi}\,b^5} - \frac{6e^{-b^2x^2}}{7\sqrt{\pi}\,b^7} & \text{for } b \neq 0 \\ \frac{x^7}{7} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**6*erfc(b*x),x)
```

```
[Out] Piecewise((x**7*erfc(b*x)/7 - x**6*exp(-b**2*x**2)/(7*sqrt(pi)*b) - 3*x**4*
exp(-b**2*x**2)/(7*sqrt(pi)*b**3) - 6*x**2*exp(-b**2*x**2)/(7*sqrt(pi)*b**5
) - 6*exp(-b**2*x**2)/(7*sqrt(pi)*b**7), Ne(b, 0)), (x**7/7, True))
```

3.112 $\int x^4 \mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=84

$$-\frac{x^4 e^{-b^2x^2}}{5\sqrt{\pi}\,b}-\frac{2e^{-b^2x^2}}{5\sqrt{\pi}\,b^5}-\frac{2x^2e^{-b^2x^2}}{5\sqrt{\pi}\,b^3}+\frac{1}{5}x^5\mathrm{erfc}(bx)$$

```
[Out] 1/5*x^5*erfc(b*x)-2/5/b^5/exp(b^2*x^2)/Pi^(1/2)-2/5*x^2/b^3/exp(b^2*x^2)/Pi
^(1/2)-1/5*x^4/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.07, antiderivative size = 84, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2212, 2209}

$$-\frac{x^4 e^{-b^2x^2}}{5\sqrt{\pi}\,b}-\frac{2x^2e^{-b^2x^2}}{5\sqrt{\pi}\,b^3}-\frac{2e^{-b^2x^2}}{5\sqrt{\pi}\,b^5}+\frac{1}{5}x^5\mathrm{Erfc}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^4*Erfc[b*x],x]
```

```
[Out] -2/(5*b^5*E^(b^2*x^2)*Sqrt[Pi]) - (2*x^2)/(5*b^3*E^(b^2*x^2)*Sqrt[Pi]) - x^
4/(5*b*E^(b^2*x^2)*Sqrt[Pi]) + (x^5*Erfc[b*x])/5
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6362

```
Int[Erfc[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfc[a + b*x])/(d*(m + 1)), x] + Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int x^4\text{erfc}(bx)\,dx &= \frac{1}{5}x^5\text{erfc}(bx) + \frac{(2b)\int e^{-b^2x^2}x^5\,dx}{5\sqrt{\pi}}\\ &= -\frac{e^{-b^2x^2}x^4}{5b\sqrt{\pi}} + \frac{1}{5}x^5\text{erfc}(bx) + \frac{4\int e^{-b^2x^2}x^3\,dx}{5b\sqrt{\pi}}\\ &= -\frac{2e^{-b^2x^2}x^2}{5b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^4}{5b\sqrt{\pi}} + \frac{1}{5}x^5\text{erfc}(bx) + \frac{4\int e^{-b^2x^2}x\,dx}{5b^3\sqrt{\pi}}\\ &= -\frac{2e^{-b^2x^2}}{5b^5\sqrt{\pi}} - \frac{2e^{-b^2x^2}x^2}{5b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^4}{5b\sqrt{\pi}} + \frac{1}{5}x^5\text{erfc}(bx)\end{aligned}$$

Mathematica [A] time = 0.03, size = 66, normalized size = 0.79

$$e^{-b^2x^2}\left(-\frac{2}{5\sqrt{\pi}\,b^5} - \frac{2x^2}{5\sqrt{\pi}\,b^3} - \frac{x^4}{5\sqrt{\pi}\,b}\right) + \frac{1}{5}x^5\text{erfc}(bx)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*Erfc[b*x],x]
```

```
[Out] (-2/(5*b^5*Sqrt[Pi]) - (2*x^2)/(5*b^3*Sqrt[Pi]) - x^4/(5*b*Sqrt[Pi]))/E^(b^
2*x^2) + (x^5*Erfc[b*x])/5
```

fricas [A] time = 0.56, size = 60, normalized size = 0.71

$$-\frac{\pi b^5x^5\,\text{erf}\,(bx) - \pi b^5x^5 + \sqrt{\pi}\left(b^4x^4 + 2\,b^2x^2 + 2\right)e^{\left(-b^2x^2\right)}}{5\,\pi b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/5*(pi*b^5*x^5*erf(b*x) - pi*b^5*x^5 + sqrt(pi)*(b^4*x^4 + 2*b^2*x^2 + 2)
*e^(-b^2*x^2))/(pi*b^5)
```

giac [A] time = 0.35, size = 49, normalized size = 0.58

$$-\frac{1}{5}\,x^5\,\text{erf}\,(bx) + \frac{1}{5}\,x^5 - \frac{\left(b^4x^4 + 2\,b^2x^2 + 2\right)e^{\left(-b^2x^2\right)}}{5\,\sqrt{\pi}\,b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/5*x^5*erf(b*x) + 1/5*x^5 - 1/5*(b^4*x^4 + 2*b^2*x^2 + 2)*e^(-b^2*x^2)/(s
qrt(pi)*b^5)
```

maple [A] time = 0.00, size = 72, normalized size = 0.86

$$\frac{\frac{b^5x^5\operatorname{erfc}(bx)}{5}+\frac{-\frac{e^{-b^2x^2}b^4x^4}{5}-\frac{2\,e^{-b^2x^2}b^2x^2}{5}-\frac{2\,e^{-b^2x^2}}{5}}{\sqrt{\pi}}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfc(b*x),x)
```

```
[Out] 1/b^5*(1/5*b^5*x^5*erfc(b*x)+2/5/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^4*x^4-1/exp(
b^2*x^2)*b^2*x^2-1/exp(b^2*x^2)))
```

maxima [A] time = 0.62, size = 44, normalized size = 0.52

$$\frac{1}{5}\,x^5\operatorname{erfc}\left(bx\right)-\frac{\left(b^4x^4+2\,b^2x^2+2\right)e^{\left(-b^2x^2\right)}}{5\,\sqrt{\pi}\,b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/5*x^5*erfc(b*x) - 1/5*(b^4*x^4 + 2*b^2*x^2 + 2)*e^(-b^2*x^2)/(sqrt(pi)*b^
5)
```

mupad [B] time = 0.23, size = 70, normalized size = 0.83

$$\frac{x^5\operatorname{erfc}\left(b\,x\right)}{5}-\frac{\frac{2\,e^{-b^2\,x^2}}{5\,\sqrt{\pi}}+\frac{2\,b^2\,x^2\,e^{-b^2\,x^2}}{5\,\sqrt{\pi}}+\frac{b^4\,x^4\,e^{-b^2\,x^2}}{5\,\sqrt{\pi}}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfc(b*x),x)
```

```
[Out] (x^5*erfc(b*x))/5 - ((2*exp(-b^2*x^2))/(5*pi^(1/2)) + (2*b^2*x^2*exp(-b^2*x
^2))/(5*pi^(1/2)) + (b^4*x^4*exp(-b^2*x^2))/(5*pi^(1/2)))/b^5
```

sympy [A] time = 1.74, size = 78, normalized size = 0.93

$$\begin{cases} \frac{x^5 \operatorname{erfc}(bx)}{5} - \frac{x^4 e^{-b^2 x^2}}{5\sqrt{\pi}\, b} - \frac{2x^2 e^{-b^2 x^2}}{5\sqrt{\pi}\, b^3} - \frac{2e^{-b^2 x^2}}{5\sqrt{\pi}\, b^5} & \text{for } b \neq 0 \\ \frac{x^5}{5} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*erfc(b*x),x)
```

```
[Out] Piecewise((x**5*erfc(b*x)/5 - x**4*exp(-b**2*x**2)/(5*sqrt(pi)*b) - 2*x**2*
exp(-b**2*x**2)/(5*sqrt(pi)*b**3) - 2*exp(-b**2*x**2)/(5*sqrt(pi)*b**5), Ne
(b, 0)), (x**5/5, True))
```

3.113 $\int x^2 \mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=59

$$-\frac{x^2 e^{-b^2x^2}}{3\sqrt{\pi}\,b}-\frac{e^{-b^2x^2}}{3\sqrt{\pi}\,b^3}+\frac{1}{3}x^3\text{erfc}(bx)$$

```
[Out] 1/3*x^3*erfc(b*x)-1/3/b^3/exp(b^2*x^2)/Pi^(1/2)-1/3*x^2/b/exp(b^2*x^2)/Pi^(
1/2)
```

Rubi [A] time = 0.05, antiderivative size = 59, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2212, 2209}

$$-\frac{x^2 e^{-b^2x^2}}{3\sqrt{\pi}\,b}-\frac{e^{-b^2x^2}}{3\sqrt{\pi}\,b^3}+\frac{1}{3}x^3\text{Erfc}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Erfc[b*x],x]
```

```
[Out] -1/(3*b^3*E^(b^2*x^2)*Sqrt[Pi]) - x^2/(3*b*E^(b^2*x^2)*Sqrt[Pi]) + (x^3*Erf
c[b*x])/3
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6362

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

Rubi steps

$$\begin{aligned}\int x^2\text{erfc}(bx)\,dx &= \frac{1}{3}x^3\text{erfc}(bx) + \frac{(2b)\int e^{-b^2x^2}x^3\,dx}{3\sqrt{\pi}}\\ &= -\frac{e^{-b^2x^2}x^2}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erfc}(bx) + \frac{2\int e^{-b^2x^2}x\,dx}{3b\sqrt{\pi}}\\ &= -\frac{e^{-b^2x^2}}{3b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^2}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erfc}(bx)\end{aligned}$$

Mathematica [**A**] time = 0.03, size = 42, normalized size = 0.71

$$\frac{1}{3}\left(x^3\text{erfc}(bx) - \frac{e^{-b^2x^2}\left(b^2x^2+1\right)}{\sqrt{\pi}\,b^3}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*Erfc[b*x],x]
```

```
[Out] (-((1 + b^2*x^2)/(b^3*E^(b^2*x^2)*Sqrt[Pi])) + x^3*Erfc[b*x])/3
```

fricas [**A**] time = 0.40, size = 52, normalized size = 0.88

$$-\frac{\pi b^3x^3\,\text{erf}\,(bx) - \pi b^3x^3 + \sqrt{\pi}\left(b^2x^2+1\right)e^{\left(-b^2x^2\right)}}{3\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfc(b*x),x, algorithm="fricas")
```

```
[Out] -1/3*(pi*b^3*x^3*erf(b*x) - pi*b^3*x^3 + sqrt(pi)*(b^2*x^2 + 1)*e^(-b^2*x^2
))/(pi*b^3)
```

giac [**A**] time = 0.42, size = 41, normalized size = 0.69

$$-\frac{1}{3}\,x^3\,\text{erf}\,(bx) + \frac{1}{3}\,x^3 - \frac{\left(b^2x^2+1\right)e^{\left(-b^2x^2\right)}}{3\,\sqrt{\pi}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfc(b*x),x, algorithm="giac")
```

```
[Out] -1/3*x^3*erf(b*x) + 1/3*x^3 - 1/3*(b^2*x^2 + 1)*e^(-b^2*x^2)/(sqrt(pi)*b^3)
```

maple [A] time = 0.00, size = 54, normalized size = 0.92

$$\frac{\frac{b^3x^3\operatorname{erfc}(bx)}{3}+\frac{-\frac{e^{-b^2x^2}b^2x^2}{3}-\frac{e^{-b^2x^2}}{3}}{\sqrt{\pi}}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfc(b*x),x)
[Out] 1/b^3*(1/3*b^3*x^3*erfc(b*x)+2/3/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^2*x^2-1/2/ex
p(b^2*x^2)))
```

maxima [A] time = 0.33, size = 36, normalized size = 0.61

$$\frac{1}{3}\,x^3\operatorname{erfc}(bx)-\frac{\left(b^2x^2+1\right)e^{\left(-b^2x^2\right)}}{3\sqrt{\pi}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfc(b*x),x, algorithm="maxima")
[Out] 1/3*x^3*erfc(b*x) - 1/3*(b^2*x^2 + 1)*e^(-b^2*x^2)/(sqrt(pi)*b^3)
```

mupad [B] time = 0.15, size = 50, normalized size = 0.85

$$\frac{x^3\operatorname{erfc}(b\,x)}{3}-\frac{\frac{e^{-b^2\,x^2}}{3\,\sqrt{\pi}}+\frac{b^2\,x^2\,e^{-b^2\,x^2}}{3\,\sqrt{\pi}}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfc(b*x),x)
[Out] (x^3*erfc(b*x))/3 - (exp(-b^2*x^2)/(3*pi^(1/2)) + (b^2*x^2*exp(-b^2*x^2))/(
3*pi^(1/2)))/b^3
```

sympy [A] time = 0.55, size = 54, normalized size = 0.92

$$\begin{cases}\frac{x^3\operatorname{erfc}(bx)}{3}-\frac{x^2e^{-b^2x^2}}{3\sqrt{\pi}\,b}-\frac{e^{-b^2x^2}}{3\sqrt{\pi}\,b^3} & \text{for } b\neq 0\\ \frac{x^3}{3} & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erfc(b*x),x)

[Out] Piecewise((x**3*erfc(b*x)/3 - x**2*exp(-b**2*x**2)/(3*sqrt(pi)*b) - exp(-b*
*2*x**2)/(3*sqrt(pi)*b**3), Ne(b, 0)), (x**3/3, True))
```

3.114 $\int \text{erfc}(bx)\,dx$

Optimal. Leaf size=27

$$x\text{erfc}(bx)-\frac{e^{-b^2x^2}}{\sqrt{\pi}\,b}$$

```
[Out] x*erfc(b*x)-1/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.00, antiderivative size = 27, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6350}

$$x\text{Erfc}(bx)-\frac{e^{-b^2x^2}}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x],x]
```

```
[Out] -(1/(b*E^(b^2*x^2)*Sqrt[Pi])) + x*Erfc[b*x]
```

Rule 6350

```
Int[Erfc[(a_.) + (b_.)*(x_)], x_Symbol] :> Simp[((a + b*x)*Erfc[a + b*x])/b
, x] - Simp[1/(b*Sqrt[Pi]*E^(a + b*x)^2), x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\int \text{erfc}(bx)\,dx=-\frac{e^{-b^2x^2}}{b\sqrt{\pi}}+x\text{erfc}(bx)$$

Mathematica [A] time = 0.00, size = 27, normalized size = 1.00

$$x\text{erfc}(bx)-\frac{e^{-b^2x^2}}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x],x]
```

```
[Out] -(1/(b*E^(b^2*x^2)*Sqrt[Pi])) + x*Erfc[b*x]
```

fricas [A] time = 0.45, size = 35, normalized size = 1.30

$$-\frac{\pi bx\operatorname{erf}(bx) - \pi bx + \sqrt{\pi}\, e^{\left(-b^2x^2\right)}}{\pi b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x),x, algorithm="fricas")
[Out] -(pi*b*x*erf(b*x) - pi*b*x + sqrt(pi)*e^(-b^2*x^2))/(pi*b)
```

giac [A] time = 0.55, size = 26, normalized size = 0.96

$$-x\operatorname{erf}(bx) + x - \frac{e^{\left(-b^2x^2\right)}}{\sqrt{\pi}\, b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x),x, algorithm="giac")
[Out] -x*erf(b*x) + x - e^(-b^2*x^2)/(sqrt(pi)*b)
```

maple [A] time = 0.01, size = 27, normalized size = 1.00

$$\frac{bx\operatorname{erfc}(bx) - \frac{\mathrm{e}^{-b^2x^2}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x),x)
[Out] 1/b*(b*x*erfc(b*x)-1/Pi^(1/2)*exp(-b^2*x^2))
```

maxima [A] time = 1.15, size = 26, normalized size = 0.96

$$\frac{bx\operatorname{erfc}(bx) - \frac{e^{\left(-b^2x^2\right)}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x),x, algorithm="maxima")
[Out] (b*x*erfc(b*x) - e^(-b^2*x^2)/sqrt(pi))/b
```

mupad [B] time = 0.10, size = 24, normalized size = 0.89

$$x \operatorname{erfc}(b x) - \frac{e^{-b^2 x^2}}{b \sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x),x)
```

```
[Out] x*erfc(b*x) - exp(-b^2*x^2)/(b*pi^(1/2))
```

sympy [A] time = 0.27, size = 24, normalized size = 0.89

$$\begin{cases} x \operatorname{erfc}(bx) - \frac{e^{-b^2x^2}}{\sqrt{\pi} b} & \text{for } b \neq 0 \\ x & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x),x)
```

```
[Out] Piecewise((x*erfc(b*x) - exp(-b**2*x**2)/(sqrt(pi)*b), Ne(b, 0)), (x, True)
)
```

3.115 $\int \frac{\text{erfc}(bx)}{x^2} \, dx$

Optimal. Leaf size=27

$$-\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{erfc}(bx)}{x}$$

```
[Out] -erfc(b*x)/x-b*Ei(-b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 27, 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 = {6362, 2210}

$$-\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{Erfc}(bx)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/x^2,x]
```

```
[Out] -(Erfc[b*x]/x) - (b*ExpIntegralEi[-(b^2*x^2)])/Sqrt[Pi]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6362

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

Rubi steps

$$\begin{aligned}\int \frac{\text{erfc}(bx)}{x^2} \, dx &= -\frac{\text{erfc}(bx)}{x}-\frac{(2b)\int \frac{e^{-b^2x^2}}{x} \, dx}{\sqrt{\pi}}\\ &= -\frac{\text{erfc}(bx)}{x}-\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.01, size = 27, normalized size = 1.00

$$-\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{erfc}(bx)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/x^2,x]
[Out] -(Erfc[b*x]/x) - (b*ExpIntegralEi[-(b^2*x^2)])/Sqrt[Pi]
```

fricas [A] time = 0.47, size = 32, normalized size = 1.19

$$-\frac{\pi+\sqrt{\pi}\,bx\text{Ei}\left(-b^2x^2\right)-\pi\,\text{erf}\left(bx\right)}{\pi x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x^2,x, algorithm="fricas")
[Out] -(pi + sqrt(pi)*b*x*Ei(-b^2*x^2) - pi*erf(b*x))/(pi*x)
```

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

$$\int\frac{\text{erfc}\left(bx\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.00, size = 29, normalized size = 1.07

$$b\left(-\frac{\text{erfc}\left(bx\right)}{bx}+\frac{\text{Ei}\left(1,b^2x^2\right)}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^2,x)
[Out] b*(-erfc(b*x)/b/x+1/Pi^(1/2)*Ei(1,b^2*x^2))
```

maxima [A] time = 3.00, size = 25, normalized size = 0.93

$$-\frac{b\text{Ei}\left(-b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{erfc}\left(bx\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -b*Ei(-b^2*x^2)/sqrt(pi) - erfc(b*x)/x
```

mupad [B] time = 0.15, size = 25, normalized size = 0.93

$$-\frac{\operatorname{erfc}(b\,x)}{x}-\frac{b\operatorname{ei}\left(-b^2\,x^2\right)}{\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^2,x)
```

```
[Out] - erfc(b*x)/x - (b*ei(-b^2*x^2))/pi^(1/2)
```

sympy [A] time = 0.98, size = 20, normalized size = 0.74

$$\frac{b\operatorname{E}_1\left(b^2x^2\right)}{\sqrt{\pi}}-\frac{\operatorname{erfc}(bx)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x**2,x)
```

```
[Out] b*expint(1, b**2*x**2)/sqrt(pi) - erfc(b*x)/x
```

3.116 $\int \frac{\text{erfc}(bx)}{x^4} \, dx$

Optimal. Leaf size=56

$$\frac{be^{-b^2x^2}}{3\sqrt{\pi}\,x^2} + \frac{b^3\text{Ei}\left(-b^2x^2\right)}{3\sqrt{\pi}} - \frac{\text{erfc}(bx)}{3x^3}$$

```
[Out] -1/3*erfc(b*x)/x^3+1/3*b/exp(b^2*x^2)/x^2/Pi^(1/2)+1/3*b^3*Ei(-b^2*x^2)/Pi^
(1/2)
```

Rubi [A] time = 0.05, antiderivative size = 56, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2214, 2210}

$$\frac{b^3\text{Ei}\left(-b^2x^2\right)}{3\sqrt{\pi}} + \frac{be^{-b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{\text{Erfc}(bx)}{3x^3}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/x^4,x]
```

```
[Out] b/(3*E^(b^2*x^2)*Sqrt[Pi]*x^2) - Erfc[b*x]/(3*x^3) + (b^3*ExpIntegralEi[-(b
^2*x^2)])/(3*Sqrt[Pi])
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6362

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

Rubi steps

$$\int \frac{\text{erfc}(bx)}{x^4}\,dx = -\frac{\text{erfc}(bx)}{3x^3} - \frac{(2b)\int \frac{e^{-b^2x^2}}{x^3}\,dx}{3\sqrt{\pi}}$$
$$= \frac{be^{-b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{\text{erfc}(bx)}{3x^3} + \frac{\left(2b^3\right)\int \frac{e^{-b^2x^2}}{x}\,dx}{3\sqrt{\pi}}$$
$$= \frac{be^{-b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{\text{erfc}(bx)}{3x^3} + \frac{b^3\text{Ei}\left(-b^2x^2\right)}{3\sqrt{\pi}}$$

Mathematica [A] time = 0.04, size = 49, normalized size = 0.88

$$\frac{1}{3}\left(\frac{b\left(b^2\text{Ei}\left(-b^2x^2\right) + \frac{e^{-b^2x^2}}{x^2}\right)}{\sqrt{\pi}} - \frac{\text{erfc}(bx)}{x^3}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/x^4,x]
```

```
[Out] (-(Erfc[b*x]/x^3) + (b*(1/(E^(b^2*x^2)*x^2) + b^2*ExpIntegralEi[-(b^2*x^2)]
))/Sqrt[Pi])/3
```

fricas [A] time = 0.57, size = 51, normalized size = 0.91

$$-\frac{\pi - \pi\,\text{erf}\,(bx) - \sqrt{\pi}\left(b^3x^3\text{Ei}\left(-b^2x^2\right) + bxe^{\left(-b^2x^2\right)}\right)}{3\,\pi x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/3*(pi - pi*erf(b*x) - sqrt(pi)*(b^3*x^3*Ei(-b^2*x^2) + b*x*e^(-b^2*x^2))
)/(pi*x^3)
```

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

$$\int \frac{\text{erfc}\,(bx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erfc(b*x)/x^4, x)
```

maple [A] time = 0.00, size = 53, normalized size = 0.95

$$b^{3}\left(-\frac{\operatorname{erfc}(bx)}{3b^{3}x^{3}}-\frac{2\left(-\frac{\mathrm{e}^{-b^{2}x^{2}}}{2b^{2}x^{2}}+\frac{\operatorname{Ei}\left(1,b^{2}x^{2}\right)}{2}\right)}{3\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^4,x)
```

```
[Out] b^3*(-1/3*erfc(b*x)/b^3/x^3-2/3/Pi^(1/2)*(-1/2/exp(b^2*x^2)/b^2/x^2+1/2*Ei(
1,b^2*x^2)))
```

maxima [A] time = 1.96, size = 27, normalized size = 0.48

$$\frac{b^{3}\Gamma\left(-1,b^{2}x^{2}\right)}{3\sqrt{\pi}}-\frac{\operatorname{erfc}(bx)}{3x^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/3*b^3*gamma(-1, b^2*x^2)/sqrt(pi) - 1/3*erfc(b*x)/x^3
```

mupad [B] time = 0.18, size = 46, normalized size = 0.82

$$\frac{b^{3}\operatorname{ei}\left(-b^{2}x^{2}\right)}{3\sqrt{\pi}}-\frac{\frac{\operatorname{erfc}(bx)}{3}-\frac{bx\,\mathrm{e}^{-b^{2}x^{2}}}{3\sqrt{\pi}}}{x^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^4,x)
```

```
[Out] (b^3*ei(-b^2*x^2))/(3*pi^(1/2)) - (erfc(b*x)/3 - (b*x*exp(-b^2*x^2))/(3*pi^
(1/2)))/x^3
```

sympy [A] time = 1.75, size = 48, normalized size = 0.86

$$-\frac{b^{3}E_{1}\left(b^{2}x^{2}\right)}{3\sqrt{\pi}}+\frac{be^{-b^{2}x^{2}}}{3\sqrt{\pi}\,x^{2}}-\frac{\operatorname{erfc}(bx)}{3x^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x**4,x)
```

```
[Out] -b**3*expint(1, b**2*x**2)/(3*sqrt(pi)) + b*exp(-b**2*x**2)/(3*sqrt(pi)*x**
2) - erfc(b*x)/(3*x**3)
```

3.117 $\int \frac{\textbf{erfc}(bx)}{x^6}\, dx$

Optimal. Leaf size=81

$$\frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4} - \frac{b^5\text{Ei}\left(-b^2x^2\right)}{10\sqrt{\pi}} - \frac{b^3e^{-b^2x^2}}{10\sqrt{\pi}\,x^2} - \frac{\text{erfc}(bx)}{5x^5}$$

```
[Out] -1/5*erfc(b*x)/x^5+1/10*b/exp(b^2*x^2)/x^4/Pi^(1/2)-1/10*b^3/exp(b^2*x^2)/x
^2/Pi^(1/2)-1/10*b^5*Ei(-b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.07, antiderivative size = 81, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6362, 2214, 2210}

$$-\frac{b^5\text{Ei}\left(-b^2x^2\right)}{10\sqrt{\pi}} - \frac{b^3e^{-b^2x^2}}{10\sqrt{\pi}\,x^2} + \frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4} - \frac{\text{Erfc}(bx)}{5x^5}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/x^6,x]
```

```
[Out] b/(10*E^(b^2*x^2)*Sqrt[Pi]*x^4) - b^3/(10*E^(b^2*x^2)*Sqrt[Pi]*x^2) - Erfc[
b*x]/(5*x^5) - (b^5*ExpIntegralEi[-(b^2*x^2)])/(10*Sqrt[Pi])
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6362

```
Int[Erfc[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfc[a + b*x])/(d*(m + 1)), x] + Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)/E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\operatorname{erfc}(bx)}{x^6}\,dx &= -\frac{\operatorname{erfc}(bx)}{5x^5}-\frac{(2b)\int \frac{e^{-b^2x^2}}{x^5}\,dx}{5\sqrt{\pi}}\\
&= \frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4}-\frac{\operatorname{erfc}(bx)}{5x^5}+\frac{b^3\int \frac{e^{-b^2x^2}}{x^3}\,dx}{5\sqrt{\pi}}\\
&= \frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4}-\frac{b^3e^{-b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{\operatorname{erfc}(bx)}{5x^5}-\frac{b^5\int \frac{e^{-b^2x^2}}{x}\,dx}{5\sqrt{\pi}}\\
&= \frac{be^{-b^2x^2}}{10\sqrt{\pi}\,x^4}-\frac{b^3e^{-b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{\operatorname{erfc}(bx)}{5x^5}-\frac{b^5\operatorname{Ei}\left(-b^2x^2\right)}{10\sqrt{\pi}}
\end{aligned}$$

Mathematica [A] time = 0.02, size = 73, normalized size = 0.90

$$-\frac{b^5\operatorname{Ei}\left(-b^2x^2\right)}{10\sqrt{\pi}}+e^{-b^2x^2}\left(\frac{b}{10\sqrt{\pi}\,x^4}-\frac{b^3}{10\sqrt{\pi}\,x^2}\right)-\frac{\operatorname{erfc}(bx)}{5x^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/x^6,x]
```

```
[Out] (b/(10*Sqrt[Pi]*x^4) - b^3/(10*Sqrt[Pi]*x^2))/E^(b^2*x^2) - Erfc[b*x]/(5*x^
5) - (b^5*ExpIntegralEi[-(b^2*x^2)])/(10*Sqrt[Pi])
```

fricas [A] time = 0.50, size = 62, normalized size = 0.77

$$-\frac{2\,\pi-2\,\pi\operatorname{erf}(bx)+\sqrt{\pi}\left(b^5x^5\operatorname{Ei}\left(-b^2x^2\right)+\left(b^3x^3-bx\right)e^{\left(-b^2x^2\right)}\right)}{10\,\pi x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x^6,x, algorithm="fricas")
```

```
[Out] -1/10*(2*pi - 2*pi*erf(b*x) + sqrt(pi)*(b^5*x^5*Ei(-b^2*x^2) + (b^3*x^3 - b
*x)*e^(-b^2*x^2)))/(pi*x^5)
```

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

$$\int \frac{\operatorname{erfc}(bx)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x^6,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)/x^6, x)
```

maple [A] time = 0.00, size = 71, normalized size = 0.88

$$b^{5}\left(-\frac{\operatorname{erfc}\left(bx\right)}{5b^{5}x^{5}}-\frac{2\left(-\frac{\mathrm{e}^{-b^{2}x^{2}}}{4b^{4}x^{4}}+\frac{\mathrm{e}^{-b^{2}x^{2}}}{4b^{2}x^{2}}-\frac{\operatorname{Ei}\left(1,b^{2}x^{2}\right)}{4}\right)}{5\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^6,x)
```

```
[Out] b^5*(-1/5*erfc(b*x)/b^5/x^5-2/5/Pi^(1/2)*(-1/4/exp(b^2*x^2)/b^4/x^4+1/4/exp
(b^2*x^2)/b^2/x^2-1/4*Ei(1,b^2*x^2)))
```

maxima [A] time = 3.05, size = 27, normalized size = 0.33

$$\frac{b^{5}\Gamma\left(-2,b^{2}x^{2}\right)}{5\sqrt{\pi}}-\frac{\operatorname{erfc}\left(bx\right)}{5\,x^{5}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x^6,x, algorithm="maxima")
```

```
[Out] 1/5*b^5*gamma(-2, b^2*x^2)/sqrt(pi) - 1/5*erfc(b*x)/x^5
```

mupad [B] time = 0.19, size = 66, normalized size = 0.81

$$-\frac{\frac{\operatorname{erfc}(b\,x)}{5}+\frac{b^{3}\,x^{3}\,\mathrm{e}^{-b^{2}\,x^{2}}}{10\,\sqrt{\pi}}-\frac{b\,x\,\mathrm{e}^{-b^{2}\,x^{2}}}{10\,\sqrt{\pi}}}{x^{5}}-\frac{b^{5}\,\operatorname{ei}\left(-b^{2}\,x^{2}\right)}{10\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/x^6,x)
```

```
[Out] - (erfc(b*x)/5 + (b^3*x^3*exp(-b^2*x^2))/(10*pi^(1/2)) - (b*x*exp(-b^2*x^2)
)/(10*pi^(1/2)))/x^5 - (b^5*ei(-b^2*x^2))/(10*pi^(1/2))
```

sympy [A] time = 2.98, size = 70, normalized size = 0.86

$$\frac{b^{5}\operatorname{E}_{1}\left(b^{2}x^{2}\right)}{10\sqrt{\pi}}-\frac{b^{3}e^{-b^{2}x^{2}}}{10\sqrt{\pi}\,x^{2}}+\frac{be^{-b^{2}x^{2}}}{10\sqrt{\pi}\,x^{4}}-\frac{\operatorname{erfc}\left(bx\right)}{5x^{5}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/x**6,x)
```

```
[Out] b**5*expint(1, b**2*x**2)/(10*sqrt(pi)) - b**3*exp(-b**2*x**2)/(10*sqrt(pi)
*x**2) + b*exp(-b**2*x**2)/(10*sqrt(pi)*x**4) - erfc(b*x)/(5*x**5)
```

3.118 $\int (c+dx)^3 \mathbf{erfc}(a+bx)\,dx$

Optimal. Leaf size=292

$$-\frac{d^2 e^{-(a+bx)^2}(a+bx)^2(bc-ad)}{\sqrt{\pi}\,b^4}-\frac{d^2 e^{-(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^4}+\frac{(bc-ad)^4\text{erf}(a+bx)}{4b^4 d}+\frac{3d(bc-ad)^2\text{erf}(a+bx)}{4b^4}-\frac{e^{-(a+bx)^2}(b}{\sqrt{\pi}}$$

```
[Out] 3/16*d^3*erf(b*x+a)/b^4+3/4*d*(-a*d+b*c)^2*erf(b*x+a)/b^4+1/4*(-a*d+b*c)^4*
erf(b*x+a)/b^4/d+1/4*(d*x+c)^4*erfc(b*x+a)/d-d^2*(-a*d+b*c)/b^4/exp((b*x+a)
^2)/Pi^(1/2)-(-a*d+b*c)^3/b^4/exp((b*x+a)^2)/Pi^(1/2)-3/8*d^3*(b*x+a)/b^4/e
xp((b*x+a)^2)/Pi^(1/2)-3/2*d*(-a*d+b*c)^2*(b*x+a)/b^4/exp((b*x+a)^2)/Pi^(1/
2)-d^2*(-a*d+b*c)*(b*x+a)^2/b^4/exp((b*x+a)^2)/Pi^(1/2)-1/4*d^3*(b*x+a)^3/b
^4/exp((b*x+a)^2)/Pi^(1/2)
```

Rubi [A] time = 0.27, antiderivative size = 292, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 5, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}} = 0.357$, Rules used = {6362, 2226, 2205, 2209, 2212}

$$-\frac{d^2 e^{-(a+bx)^2}(a+bx)^2(bc-ad)}{\sqrt{\pi}\,b^4}-\frac{d^2 e^{-(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^4}+\frac{(bc-ad)^4\text{Erf}(a+bx)}{4b^4 d}+\frac{3d(bc-ad)^2\text{Erf}(a+bx)}{4b^4}-\frac{e^{-(a+bx)^2}(}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

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

```
[Out] -((d^2*(b*c - a*d))/(b^4*E^(a + b*x)^2*Sqrt[Pi])) - (b*c - a*d)^3/(b^4*E^(a
 + b*x)^2*Sqrt[Pi]) - (3*d^3*(a + b*x))/(8*b^4*E^(a + b*x)^2*Sqrt[Pi]) - (3
*d*(b*c - a*d)^2*(a + b*x))/(2*b^4*E^(a + b*x)^2*Sqrt[Pi]) - (d^2*(b*c - a*
d)*(a + b*x)^2)/(b^4*E^(a + b*x)^2*Sqrt[Pi]) - (d^3*(a + b*x)^3)/(4*b^4*E^(
a + b*x)^2*Sqrt[Pi]) + (3*d^3*Erf[a + b*x])/(16*b^4) + (3*d*(b*c - a*d)^2*E
rf[a + b*x])/(4*b^4) + ((b*c - a*d)^4*Erf[a + b*x])/(4*b^4*d) + ((c + d*x)^
4*Erfc[a + b*x])/(4*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 2226

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*(u_), x_Symbol] :> Int[E
xpandLinearProduct[F^(a + b*(c + d*x)^n), u, c, d, x], x] /; FreeQ[{F, a, b
, c, d, n}, x] && PolynomialQ[u, x]
```

Rule 6362

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

Rubi steps

$$\int (c+dx)^3\operatorname{erfc}(a+bx)\,dx = \frac{(c+dx)^4\operatorname{erfc}(a+bx)}{4d} + \frac{b\int e^{-(a+bx)^2}(c+dx)^4\,dx}{2d\sqrt{\pi}}$$

$$= \frac{(c+dx)^4\operatorname{erfc}(a+bx)}{4d} + \frac{b\int\left(\frac{(bc-ad)^4e^{-(a+bx)^2}}{b^4} + \frac{4d(bc-ad)^3e^{-(a+bx)^2}(a+bx)}{b^4} + \frac{6d^2(bc-ad)^2e^{-(a+b}}{b^4}\right.}{2d\sqrt{\pi}}$$

$$= \frac{(c+dx)^4\operatorname{erfc}(a+bx)}{4d} + \frac{d^3\int e^{-(a+bx)^2}(a+bx)^4\,dx}{2b^3\sqrt{\pi}} + \frac{\left(2d^2(bc-ad)\right)\int e^{-(a+bx)^2}(a+b}{b^3\sqrt{\pi}}$$

$$= -\frac{(bc-ad)^3e^{-(a+bx)^2}}{b^4\sqrt{\pi}} - \frac{3d(bc-ad)^2e^{-(a+bx)^2}(a+bx)}{2b^4\sqrt{\pi}} - \frac{d^2(bc-ad)e^{-(a+bx)^2}(a+bx)^2}{b^4\sqrt{\pi}}$$

$$= -\frac{d^2(bc-ad)e^{-(a+bx)^2}}{b^4\sqrt{\pi}} - \frac{(bc-ad)^3e^{-(a+bx)^2}}{b^4\sqrt{\pi}} - \frac{3d^3e^{-(a+bx)^2}(a+bx)}{8b^4\sqrt{\pi}} - \frac{3d(bc-ad)^2e^{-(}}{2b^4\sqrt{}}$$

$$= -\frac{d^2(bc-ad)e^{-(a+bx)^2}}{b^4\sqrt{\pi}} - \frac{(bc-ad)^3e^{-(a+bx)^2}}{b^4\sqrt{\pi}} - \frac{3d^3e^{-(a+bx)^2}(a+bx)}{8b^4\sqrt{\pi}} - \frac{3d(bc-ad)^2e^{-(}}{2b^4\sqrt{}}$$

Mathematica [A] time = 0.39, size = 268, normalized size = 0.92

$$\frac{e^{-(a+bx)^2}\left(-2bd^2\left(8\left(a^2+1\right)c+\left(2a^2+3\right)dx\right)+2a\left(2a^2+5\right)d^3+\sqrt{\pi}\,e^{(a+bx)^2}\left(4a^4d^3-16a^3bcd^2+12a^2\left(2b^2c^2d\right.\right.\right.}{}$$

Antiderivative was successfully verified.

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

```
[Out] (2*a*(5 + 2*a^2)*d^3 - 2*b*d^2*(8*(1 + a^2)*c + (3 + 2*a^2)*d*x) + 4*a*b^2*
d*(6*c^2 + 4*c*d*x + d^2*x^2) - 4*b^3*(4*c^3 + 6*c^2*d*x + 4*c*d^2*x^2 + d^
3*x^3) + (-16*a^3*b*c*d^2 + 4*a^4*d^3 - 8*a*(2*b^3*c^3 + 3*b*c*d^2) + 12*a^
2*(2*b^2*c^2*d + d^3) + 3*(4*b^2*c^2*d + d^3))*E^(a + b*x)^2*Sqrt[Pi]*Erf[a
 + b*x] + 4*b^4*E^(a + b*x)^2*Sqrt[Pi]*x*(4*c^3 + 6*c^2*d*x + 4*c*d^2*x^2 +
 d^3*x^3)*Erfc[a + b*x])/(16*b^4*E^(a + b*x)^2*Sqrt[Pi])
```

fricas [A] time = 0.73, size = 314, normalized size = 1.08

$$\frac{4\,\pi b^4d^3x^4+16\,\pi b^4cd^2x^3+24\,\pi b^4c^2dx^2+16\,\pi b^4c^3x-2\,\sqrt{\pi}\left(2\,b^3d^3x^3+8\,b^3c^3-12\,ab^2c^2d+8\left(a^2+1\right)bcd^2-\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/16*(4*pi*b^4*d^3*x^4 + 16*pi*b^4*c*d^2*x^3 + 24*pi*b^4*c^2*d*x^2 + 16*pi*
b^4*c^3*x - 2*sqrt(pi)*(2*b^3*d^3*x^3 + 8*b^3*c^3 - 12*a*b^2*c^2*d + 8*(a^2
 + 1)*b*c*d^2 - (2*a^3 + 5*a)*d^3 + 2*(4*b^3*c*d^2 - a*b^2*d^3)*x^2 + (12*b
^3*c^2*d - 8*a*b^2*c*d^2 + (2*a^2 + 3)*b*d^3)*x)*e^(-b^2*x^2 - 2*a*b*x - a^
2) - (4*pi*b^4*d^3*x^4 + 16*pi*b^4*c*d^2*x^3 + 24*pi*b^4*c^2*d*x^2 + 16*pi*
b^4*c^3*x + pi*(16*a*b^3*c^3 - 12*(2*a^2 + 1)*b^2*c^2*d + 8*(2*a^3 + 3*a)*b
*c*d^2 - (4*a^4 + 12*a^2 + 3)*d^3))*erf(b*x + a))/(pi*b^4)
```

giac [A] time = 1.16, size = 435, normalized size = 1.49

$$\frac{1}{4}\,d^3x^4+cd^2x^3+\frac{3}{2}\,c^2dx^2-\left(x\,\mathrm{erf}\left(bx+a\right)-\frac{\frac{\sqrt{\pi}\,a\,\mathrm{erf}\left(-b\left(x+\frac{a}{b}\right)\right)}{b}-\frac{e^{\left(-b^2x^2-2\,abx-a^2\right)}}{b}}{\sqrt{\pi}}\right)c^3-\frac{3}{4}\left(2\,x^2\,\mathrm{erf}\left(bx+a\right)+\frac{\frac{\sqrt{\pi}\left(2\,a^2+1\right)\mathrm{erf}}{b}}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*d^3*x^4 + c*d^2*x^3 + 3/2*c^2*d*x^2 - (x*erf(b*x + a) - (sqrt(pi)*a*erf
(-b*(x + a/b))/b - e^(-b^2*x^2 - 2*a*b*x - a^2)/b)/sqrt(pi))*c^3 - 3/4*(2*x
```

```
^2*erf(b*x + a) + (sqrt(pi)*(2*a^2 + 1)*erf(-b*(x + a/b))/b + 2*(b*(x + a/b
) - 2*a)*e^(-b^2*x^2 - 2*a*b*x - a^2)/b)/(sqrt(pi)*b))*c^2*d - 1/2*(2*x^3*e
rf(b*x + a) - (sqrt(pi)*(2*a^3 + 3*a)*erf(-b*(x + a/b))/b - 2*(b^2*(x + a/b
)^2 - 3*a*b*(x + a/b) + 3*a^2 + 1)*e^(-b^2*x^2 - 2*a*b*x - a^2)/b)/(sqrt(pi
)*b^2))*c*d^2 - 1/16*(4*x^4*erf(b*x + a) + (sqrt(pi)*(4*a^4 + 12*a^2 + 3)*e
rf(-b*(x + a/b))/b + 2*(2*b^3*(x + a/b)^3 - 8*a*b^2*(x + a/b)^2 + 12*a^2*b*
(x + a/b) - 8*a^3 + 3*b*(x + a/b) - 8*a)*e^(-b^2*x^2 - 2*a*b*x - a^2)/b)/(s
qrt(pi)*b^3))*d^3 + c^3*x
```

maple [B] time = 0.00, size = 729, normalized size = 2.50

$$\frac{\frac{d^3\operatorname{erfc}(bx+a)(bx+a)^4}{4b^3} - \frac{d^3\operatorname{erfc}(bx+a)(bx+a)^3 a}{b^3} + \frac{d^2\operatorname{erfc}(bx+a)(bx+a)^3 c}{b^2} + \frac{3d^3\operatorname{erfc}(bx+a)(bx+a)^2 a^2}{2b^3} - \frac{3d^2\operatorname{erfc}(bx+a)(bx+a)^2 ac}{b^2} + \frac{3d\operatorname{erfc}(bx+a)(\cdots}{2b}}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/b*(1/4/b^3*d^3*erfc(b*x+a)*(b*x+a)^4-1/b^3*d^3*erfc(b*x+a)*(b*x+a)^3*a+1/
b^2*d^2*erfc(b*x+a)*(b*x+a)^3*c+3/2/b^3*d^3*erfc(b*x+a)*(b*x+a)^2*a^2-3/b^2
*d^2*erfc(b*x+a)*(b*x+a)^2*a*c+3/2/b*d*erfc(b*x+a)*(b*x+a)^2*c^2-1/b^3*d^3*
erfc(b*x+a)*(b*x+a)*a^3+3/b^2*d^2*erfc(b*x+a)*(b*x+a)*a^2*c-3/b*d*erfc(b*x+
a)*(b*x+a)*a*c^2+erfc(b*x+a)*(b*x+a)*c^3+1/4/b^3*d^3*erfc(b*x+a)*a^4-1/b^2*
d^2*erfc(b*x+a)*a^3*c+3/2/b*d*erfc(b*x+a)*a^2*c^2-erfc(b*x+a)*a*c^3+1/4*b/d
*erfc(b*x+a)*c^4+1/2/Pi^(1/2)/b^3/d*(d^4*(-1/2*(b*x+a)^3/exp((b*x+a)^2)-3/4
*(b*x+a)/exp((b*x+a)^2)+3/8*Pi^(1/2)*erf(b*x+a))+1/2*a^4*d^4*Pi^(1/2)*erf(b
*x+a)+1/2*b^4*c^4*Pi^(1/2)*erf(b*x+a)+2*a^3*d^4/exp((b*x+a)^2)+6*a^2*d^4*(-
1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*x+a))-4*a*d^4*(-1/2/exp((b*x+
a)^2)*(b*x+a)^2-1/2/exp((b*x+a)^2))-2*b^3*c^3*d/exp((b*x+a)^2)+6*b^2*c^2*d^
2*(-1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*x+a))+4*b*c*d^3*(-1/2/exp
((b*x+a)^2)*(b*x+a)^2-1/2/exp((b*x+a)^2))-2*a*b^3*c^3*d*Pi^(1/2)*erf(b*x+a)
+3*a^2*b^2*c^2*d^2*Pi^(1/2)*erf(b*x+a)-2*a^3*b*c*d^3*Pi^(1/2)*erf(b*x+a)+6*
a*b^2*c^2*d^2/exp((b*x+a)^2)-6*a^2*b*c*d^3/exp((b*x+a)^2)-12*a*b*c*d^3*(-1/
2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*x+a))))
```

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

$$\int (dx+c)^3 \operatorname{erfc}(bx+a)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 0.39, size = 352, normalized size = 1.21

$$\frac{d^3\,x^4\,\mathrm{erfc}\left(a+b\,x\right)}{4}-\frac{\mathrm{erfc}\left(a+b\,x\right)\,\left(b^2\,\left(\frac{3\,d\,a^2\,c^2}{2}+\frac{3\,d\,c^2}{4}\right)-b\,\left(c\,a^3\,d^2+\frac{3\,c\,a\,d^2}{2}\right)+\frac{3\,d^3}{16}+\frac{3\,a^2\,d^3}{4}+\frac{a^4\,d^3}{4}-a\,b^3\,c^3\right)}{b^4}+c^3$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (d^3*x^4*erfc(a + b*x))/4 - (erfc(a + b*x)*(b^2*((3*c^2*d)/4 + (3*a^2*c^2*d
)/2) - b*(a^3*c*d^2 + (3*a*c*d^2)/2) + (3*d^3)/16 + (3*a^2*d^3)/4 + (a^4*d^
3)/4 - a*b^3*c^3))/b^4 + c^3*x*erfc(a + b*x) + (exp(- a^2 - b^2*x^2 - 2*a*b
*x)*(5*a*d^3 + 2*a^3*d^3 - 8*b^3*c^3 - 8*b*c*d^2 + 12*a*b^2*c^2*d - 8*a^2*b
*c*d^2))/(8*b^4*pi^(1/2)) + (3*c^2*d*x^2*erfc(a + b*x))/2 + c*d^2*x^3*erfc(
a + b*x) - (x*exp(- a^2 - b^2*x^2 - 2*a*b*x)*(3*d^3 + 2*a^2*d^3 + 12*b^2*c^
2*d - 8*a*b*c*d^2))/(8*b^3*pi^(1/2)) - (d^3*x^3*exp(- a^2 - b^2*x^2 - 2*a*b
*x))/(4*b*pi^(1/2)) + (x^2*exp(- a^2 - b^2*x^2 - 2*a*b*x)*(a*d^3 - 4*b*c*d^
2))/(4*b^2*pi^(1/2))
```

sympy [A] time = 9.14, size = 746, normalized size = 2.55

$$\begin{cases} -\frac{a^4d^3\,\mathrm{erfc}\,(a+bx)}{4b^4}+\frac{a^3cd^2\,\mathrm{erfc}\,(a+bx)}{b^3}+\frac{a^3d^3e^{-a^2}e^{-b^2x^2}e^{-2abx}}{4\sqrt{\pi}\,b^4}-\frac{3a^2c^2d\,\mathrm{erfc}\,(a+bx)}{2b^2}-\frac{a^2cd^2e^{-a^2}e^{-b^2x^2}e^{-2abx}}{\sqrt{\pi}\,b^3}-\frac{a^2d^3xe^{-a^2}e^{-b^2x^2}e^{-2abx}}{4\sqrt{\pi}\,b^3}-3 \\ \left(c^3x+\frac{3c^2dx^2}{2}+cd^2x^3+\frac{d^3x^4}{4}\right)\mathrm{erfc}\,(a) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Piecewise((-a**4*d**3*erfc(a + b*x)/(4*b**4) + a**3*c*d**2*erfc(a + b*x)/b*
*3 + a**3*d**3*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(4*sqrt(pi)*b**4) -
 3*a**2*c**2*d*erfc(a + b*x)/(2*b**2) - a**2*c*d**2*exp(-a**2)*exp(-b**2*x*
*2)*exp(-2*a*b*x)/(sqrt(pi)*b**3) - a**2*d**3*x*exp(-a**2)*exp(-b**2*x**2)*
exp(-2*a*b*x)/(4*sqrt(pi)*b**3) - 3*a**2*d**3*erfc(a + b*x)/(4*b**4) + a*c*
*3*erfc(a + b*x)/b + 3*a*c**2*d*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(2
*sqrt(pi)*b**2) + a*c*d**2*x*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt
(pi)*b**2) + a*d**3*x**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(4*sqrt(p
i)*b**2) + 3*a*c*d**2*erfc(a + b*x)/(2*b**3) + 5*a*d**3*exp(-a**2)*exp(-b**
2*x**2)*exp(-2*a*b*x)/(8*sqrt(pi)*b**4) + c**3*x*erfc(a + b*x) + 3*c**2*d*x
**2*erfc(a + b*x)/2 + c*d**2*x**3*erfc(a + b*x) + d**3*x**4*erfc(a + b*x)/4
 - c**3*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)*b) - 3*c**2*d*x*
exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(2*sqrt(pi)*b) - c*d**2*x**2*exp(-
a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)*b) - d**3*x**3*exp(-a**2)*exp
```

```
(-b**2*x**2)*exp(-2*a*b*x)/(4*sqrt(pi)*b) - 3*c**2*d*erfc(a + b*x)/(4*b**2)
 - c*d**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(pi)*b**3) - 3*d**3
*x*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(8*sqrt(pi)*b**3) - 3*d**3*erfc
(a + b*x)/(16*b**4), Ne(b, 0)), ((c**3*x + 3*c**2*d*x**2/2 + c*d**2*x**3 +
d**3*x**4/4)*erfc(a), True))
```

3.119 $\int (c+dx)^2 \mathbf{erfc}(a+bx)\,dx$

Optimal. Leaf size=194

$$\frac{(bc-ad)^3\mathrm{erf}(a+bx)}{3b^3d}+\frac{d(bc-ad)\mathrm{erf}(a+bx)}{2b^3}-\frac{e^{-(a+bx)^2}(bc-ad)^2}{\sqrt{\pi}\,b^3}-\frac{de^{-(a+bx)^2}(a+bx)(bc-ad)}{\sqrt{\pi}\,b^3}-\frac{d^2e^{-(a+bx)^2}(a+b}{3\sqrt{\pi}\,b^3}$$

```
[Out] 1/2*d*(-a*d+b*c)*erf(b*x+a)/b^3+1/3*(-a*d+b*c)^3*erf(b*x+a)/b^3/d+1/3*(d*x+
c)^3*erfc(b*x+a)/d-1/3*d^2/b^3/exp((b*x+a)^2)/Pi^(1/2)-(-a*d+b*c)^2/b^3/exp
((b*x+a)^2)/Pi^(1/2)-d*(-a*d+b*c)*(b*x+a)/b^3/exp((b*x+a)^2)/Pi^(1/2)-1/3*d
^2*(b*x+a)^2/b^3/exp((b*x+a)^2)/Pi^(1/2)
```

Rubi [A] time = 0.18, antiderivative size = 194, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.357, Rules used = {6362, 2226, 2205, 2209, 2212}

$$\frac{(bc-ad)^3\mathrm{Erf}(a+bx)}{3b^3d}+\frac{d(bc-ad)\mathrm{Erf}(a+bx)}{2b^3}-\frac{e^{-(a+bx)^2}(bc-ad)^2}{\sqrt{\pi}\,b^3}-\frac{de^{-(a+bx)^2}(a+bx)(bc-ad)}{\sqrt{\pi}\,b^3}-\frac{d^2e^{-(a+bx)^2}(a+b}{3\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

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

```
[Out] -d^2/(3*b^3*E^(a + b*x)^2*Sqrt[Pi]) - (b*c - a*d)^2/(b^3*E^(a + b*x)^2*Sqrt
[Pi]) - (d*(b*c - a*d)*(a + b*x))/(b^3*E^(a + b*x)^2*Sqrt[Pi]) - (d^2*(a +
b*x)^2)/(3*b^3*E^(a + b*x)^2*Sqrt[Pi]) + (d*(b*c - a*d)*Erf[a + b*x])/(2*b^
3) + ((b*c - a*d)^3*Erf[a + b*x])/(3*b^3*d) + ((c + d*x)^3*Erfc[a + b*x])/(
3*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
```

```
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 2226

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*(u_), x_Symbol] :> Int[E
xpandLinearProduct[F^(a + b*(c + d*x)^n), u, c, d, x], x] /; FreeQ[{F, a, b
, c, d, n}, x] && PolynomialQ[u, x]
```

Rule 6362

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

Rubi steps

$$\int (c+dx)^2\text{erfc}(a+bx)\,dx = \frac{(c+dx)^3\text{erfc}(a+bx)}{3d} + \frac{(2b)\int e^{-(a+bx)^2}(c+dx)^3\,dx}{3d\sqrt{\pi}}$$

$$= \frac{(c+dx)^3\text{erfc}(a+bx)}{3d} + \frac{(2b)\int\left(\frac{(bc-ad)^3e^{-(a+bx)^2}}{b^3} + \frac{3d(bc-ad)^2e^{-(a+bx)^2}(a+bx)}{b^3} + \frac{3d^2(bc-ad)e^{-(a}}{b^3}\right.}{3d\sqrt{\pi}}$$

$$= \frac{(c+dx)^3\text{erfc}(a+bx)}{3d} + \frac{\left(2d^2\right)\int e^{-(a+bx)^2}(a+bx)^3\,dx}{3b^2\sqrt{\pi}} + \frac{(2d(bc-ad))\int e^{-(a+bx)^2}(a+}{b^2\sqrt{\pi}}$$

$$= -\frac{(bc-ad)^2e^{-(a+bx)^2}}{b^3\sqrt{\pi}} - \frac{d(bc-ad)e^{-(a+bx)^2}(a+bx)}{b^3\sqrt{\pi}} - \frac{d^2e^{-(a+bx)^2}(a+bx)^2}{3b^3\sqrt{\pi}} + \frac{(bc-ad)}{3}$$

$$= -\frac{d^2e^{-(a+bx)^2}}{3b^3\sqrt{\pi}} - \frac{(bc-ad)^2e^{-(a+bx)^2}}{b^3\sqrt{\pi}} - \frac{d(bc-ad)e^{-(a+bx)^2}(a+bx)}{b^3\sqrt{\pi}} - \frac{d^2e^{-(a+bx)^2}(a+bx}{3b^3\sqrt{\pi}}$$

Mathematica [**A**] time = 0.31, size = 159, normalized size = 0.82

$$\frac{\frac{2e^{-(a+bx)^2}\left(-\left(a^2+1\right)d^2+\sqrt{\pi}\,b^3xe^{(a+bx)^2}\left(3c^2+3cdx+d^2x^2\right)\text{erfc}(a+bx)+abd(3c+dx)-b^2\left(3c^2+3cdx+d^2x^2\right)\right)}{\sqrt{\pi}} - \left(2a^3d^2-6a^2bcd+3a\left(2b^2c^2+d^2\right.\right.}{6b^3}$$

Antiderivative was successfully verified.

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

```
[Out] (-((-3*b*c*d - 6*a^2*b*c*d + 2*a^3*d^2 + 3*a*(2*b^2*c^2 + d^2))*Erf[a + b*x
]) + (2*(-((1 + a^2)*d^2) + a*b*d*(3*c + d*x) - b^2*(3*c^2 + 3*c*d*x + d^2*
x^2) + b^3*E^(a + b*x)^2*Sqrt[Pi]*x*(3*c^2 + 3*c*d*x + d^2*x^2)*Erfc[a + b*
x]))/(E^(a + b*x)^2*Sqrt[Pi]))/(6*b^3)
```

fricas [A] time = 0.40, size = 197, normalized size = 1.02

$$\frac{2\,\pi b^3 d^2 x^3 + 6\,\pi b^3 c d x^2 + 6\,\pi b^3 c^2 x - 2\,\sqrt{\pi}\left(b^2 d^2 x^2 + 3\,b^2 c^2 - 3\,abcd + \left(a^2+1\right)d^2 + \left(3\,b^2 cd - abd^2\right)x\right)e^{\left(-b^2 x^2 - 2\,ab\right.}}{6\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/6*(2*pi*b^3*d^2*x^3 + 6*pi*b^3*c*d*x^2 + 6*pi*b^3*c^2*x - 2*sqrt(pi)*(b^2
*d^2*x^2 + 3*b^2*c^2 - 3*a*b*c*d + (a^2 + 1)*d^2 + (3*b^2*c*d - a*b*d^2)*x)
*e^(-b^2*x^2 - 2*a*b*x - a^2) - (2*pi*b^3*d^2*x^3 + 6*pi*b^3*c*d*x^2 + 6*pi
*b^3*c^2*x + pi*(6*a*b^2*c^2 - 3*(2*a^2 + 1)*b*c*d + (2*a^3 + 3*a)*d^2))*er
f(b*x + a))/(pi*b^3)
```

giac [A] time = 1.88, size = 280, normalized size = 1.44

$$\frac{1}{3}\,d^2 x^3 + cdx^2 - \left(x\operatorname{erf}\left(bx+a\right) - \frac{\frac{\sqrt{\pi}\,a\operatorname{erf}\left(-b\left(x+\frac{a}{b}\right)\right)}{b} - \frac{e^{\left(-b^2 x^2 - 2\,abx - a^2\right)}}{b}}{\sqrt{\pi}}\right)c^2 - \frac{1}{2}\left(2\,x^2\operatorname{erf}\left(bx+a\right) + \frac{\frac{\sqrt{\pi}\left(2\,a^2+1\right)\operatorname{erf}\left(-b\left(x+\frac{a}{b}\right)\right)}{b} +}{\sqrt{}}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [B] time = 0.01, size = 428, normalized size = 2.21

$$\frac{\frac{d^2\operatorname{erfc}(bx+a)(bx+a)^3}{3b^2} - \frac{d^2\operatorname{erfc}(bx+a)(bx+a)^2 a}{b^2} + \frac{d\operatorname{erfc}(bx+a)(bx+a)^2 c}{b} + \frac{d^2\operatorname{erfc}(bx+a)(bx+a)a^2}{b^2} - \frac{2d\operatorname{erfc}(bx+a)(bx+a)ac}{b} + \operatorname{erfc}\left(bx+a\right)(}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/b*(1/3/b^2*d^2*erfc(b*x+a)*(b*x+a)^3-1/b^2*d^2*erfc(b*x+a)*(b*x+a)^2*a+1/
b*d*erfc(b*x+a)*(b*x+a)^2*c+1/b^2*d^2*erfc(b*x+a)*(b*x+a)*a^2-2/b*d*erfc(b*
x+a)*(b*x+a)*a*c+erfc(b*x+a)*(b*x+a)*c^2-1/3/b^2*d^2*erfc(b*x+a)*a^3+1/b*d*
erfc(b*x+a)*a^2*c-erfc(b*x+a)*a*c^2+1/3*b/d*erfc(b*x+a)*c^3+2/3/Pi^(1/2)/b^
2/d*(d^3*(-1/2/exp((b*x+a)^2)*(b*x+a)^2-1/2/exp((b*x+a)^2))+1/2*b^3*c^3*Pi^
(1/2)*erf(b*x+a)-1/2*a^3*d^3*Pi^(1/2)*erf(b*x+a)-3/2*a^2*d^3/exp((b*x+a)^2)
-3*a*d^3*(-1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*x+a))-3/2*b^2*c^2*
d/exp((b*x+a)^2)+3*b*c*d^2*(-1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*
x+a))-3/2*a*b^2*c^2*d*Pi^(1/2)*erf(b*x+a)+3/2*a^2*b*c*d^2*Pi^(1/2)*erf(b*x+
a)+3*a*b*c*d^2/exp((b*x+a)^2)))
```

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

$$\int (dx+c)^2 \operatorname{erfc}(bx+a)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 0.31, size = 220, normalized size = 1.13

$$\frac{d^2\,x^3\,\mathrm{erfc}\left(a+b\,x\right)}{3}-\frac{{\mathrm{e}}^{-a^2-2\,a\,b\,x-b^2\,x^2}\,\left(\frac{b^2\,c^2}{\sqrt{\pi }}-\frac{a\,d\,b\,c}{\sqrt{\pi }}+\frac{a^2\,d^2+d^2}{3\,\sqrt{\pi }}\right)}{b^3}+\frac{\mathrm{erfc}\left(a+b\,x\right)\,\left(\frac{a\,d^2}{2}-b\,\left(c\,d\,a^2+\frac{c\,d}{2}\right)+\frac{a^3\,d^2}{3}+a\,b^2\,c^2\right)}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (d^2*x^3*erfc(a + b*x))/3 - (exp(- a^2 - b^2*x^2 - 2*a*b*x)*((d^2 + a^2*d^2
)/(3*pi^(1/2)) + (b^2*c^2)/pi^(1/2) - (a*b*c*d)/pi^(1/2)))/b^3 + (erfc(a +
b*x)*((a*d^2)/2 - b*((c*d)/2 + a^2*c*d) + (a^3*d^2)/3 + a*b^2*c^2))/b^3 + c
^2*x*erfc(a + b*x) + c*d*x^2*erfc(a + b*x) + (x*exp(- a^2 - b^2*x^2 - 2*a*b
*x)*(a*d^2 - 3*b*c*d))/(3*b^2*pi^(1/2)) - (d^2*x^2*exp(- a^2 - b^2*x^2 - 2*
a*b*x))/(3*b*pi^(1/2))
```

sympy [A] time = 3.78, size = 398, normalized size = 2.05

$$\begin{cases} \frac{a^3d^2\operatorname{erfc}(a+bx)}{3b^3} - \frac{a^2cd\operatorname{erfc}(a+bx)}{b^2} - \frac{a^2d^2e^{-a^2}e^{-b^2x^2}e^{-2abx}}{3\sqrt{\pi}\,b^3} + \frac{ac^2\operatorname{erfc}(a+bx)}{b} + \frac{acde^{-a^2}e^{-b^2x^2}e^{-2abx}}{\sqrt{\pi}\,b^2} + \frac{ad^2xe^{-a^2}e^{-b^2x^2}e^{-2abx}}{3\sqrt{\pi}\,b^2} + \frac{ad^2\operatorname{erfc}(a+b}{2b^3} \\ \left(c^2x + cdx^2 + \frac{d^2x^3}{3}\right)\operatorname{erfc}(a) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Piecewise((a**3*d**2*erfc(a + b*x)/(3*b**3) - a**2*c*d*erfc(a + b*x)/b**2 -
 a**2*d**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(3*sqrt(pi)*b**3) + a*c
**2*erfc(a + b*x)/b + a*c*d*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(
pi)*b**2) + a*d**2*x*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(3*sqrt(pi)*b
**2) + a*d**2*erfc(a + b*x)/(2*b**3) + c**2*x*erfc(a + b*x) + c*d*x**2*erfc
(a + b*x) + d**2*x**3*erfc(a + b*x)/3 - c**2*exp(-a**2)*exp(-b**2*x**2)*exp
(-2*a*b*x)/(sqrt(pi)*b) - c*d*x*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(s
qrt(pi)*b) - d**2*x**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(3*sqrt(pi)
*b) - c*d*erfc(a + b*x)/(2*b**2) - d**2*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a
*b*x)/(3*sqrt(pi)*b**3), Ne(b, 0)), ((c**2*x + c*d*x**2 + d**2*x**3/3)*erfc
(a), True))
```

3.120 $\int (c+dx)\,\mathbf{erfc}(a+bx)\,dx$

Optimal. Leaf size=119

$$\frac{(bc-ad)^2\mathrm{erf}(a+bx)}{2b^2d}-\frac{e^{-(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^2}+\frac{d\,\mathrm{erf}(a+bx)}{4b^2}-\frac{de^{-(a+bx)^2}(a+bx)}{2\sqrt{\pi}\,b^2}+\frac{(c+dx)^2\mathrm{erfc}(a+bx)}{2d}$$

```
[Out] 1/4*d*erf(b*x+a)/b^2+1/2*(-a*d+b*c)^2*erf(b*x+a)/b^2/d+1/2*(d*x+c)^2*erfc(b
*x+a)/d+(a*d-b*c)/b^2/exp((b*x+a)^2)/Pi^(1/2)-1/2*d*(b*x+a)/b^2/exp((b*x+a)
^2)/Pi^(1/2)
```

Rubi [A] time = 0.12, antiderivative size = 119, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {6362, 2226, 2205, 2209, 2212}

$$\frac{(bc-ad)^2\mathrm{Erf}(a+bx)}{2b^2d}-\frac{e^{-(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^2}+\frac{d\mathrm{Erf}(a+bx)}{4b^2}-\frac{de^{-(a+bx)^2}(a+bx)}{2\sqrt{\pi}\,b^2}+\frac{(c+dx)^2\mathrm{Erfc}(a+bx)}{2d}$$

Antiderivative was successfully verified.

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

```
[Out] -((b*c - a*d)/(b^2*E^(a + b*x)^2*Sqrt[Pi])) - (d*(a + b*x))/(2*b^2*E^(a + b
*x)^2*Sqrt[Pi]) + (d*Erf[a + b*x])/(4*b^2) + ((b*c - a*d)^2*Erf[a + b*x])/(
2*b^2*d) + ((c + d*x)^2*Erfc[a + b*x])/(2*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
```

```
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 2226

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*(u_), x_Symbol] :> Int[E
xpandLinearProduct[F^(a + b*(c + d*x)^n), u, c, d, x], x] /; FreeQ[{F, a, b
, c, d, n}, x] && PolynomialQ[u, x]
```

Rule 6362

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

Rubi steps

$$\begin{aligned}\int (c+dx)\operatorname{erfc}(a+bx)\,dx &= \frac{(c+dx)^2\operatorname{erfc}(a+bx)}{2d}+\frac{b\int e^{-(a+bx)^2}(c+dx)^2\,dx}{d\sqrt{\pi}}\\ &= \frac{(c+dx)^2\operatorname{erfc}(a+bx)}{2d}+\frac{b\int\left(\frac{(bc-ad)^2e^{-(a+bx)^2}}{b^2}+\frac{2d(bc-ad)e^{-(a+bx)^2}(a+bx)}{b^2}+\frac{d^2e^{-(a+bx)^2}(a+bx)^2}{b^2}\right.}{d\sqrt{\pi}}\\ &= \frac{(c+dx)^2\operatorname{erfc}(a+bx)}{2d}+\frac{d\int e^{-(a+bx)^2}(a+bx)^2\,dx}{b\sqrt{\pi}}+\frac{(2(bc-ad))\int e^{-(a+bx)^2}(a+bx)}{b\sqrt{\pi}}\\ &= -\frac{(bc-ad)e^{-(a+bx)^2}}{b^2\sqrt{\pi}}-\frac{de^{-(a+bx)^2}(a+bx)}{2b^2\sqrt{\pi}}+\frac{(bc-ad)^2\operatorname{erf}(a+bx)}{2b^2d}+\frac{(c+dx)^2\operatorname{erfc}(a}{2d}\\ &= -\frac{(bc-ad)e^{-(a+bx)^2}}{b^2\sqrt{\pi}}-\frac{de^{-(a+bx)^2}(a+bx)}{2b^2\sqrt{\pi}}+\frac{d\operatorname{erf}(a+bx)}{4b^2}+\frac{(bc-ad)^2\operatorname{erf}(a+bx)}{2b^2d}+\end{aligned}$$

Mathematica [A] time = 0.15, size = 104, normalized size = 0.87

$$\frac{e^{-(a+bx)^2}\left(\sqrt{\pi}\,e^{(a+bx)^2}\left(2a^2d-4abc+d\right)\operatorname{erf}(a+bx)+2\sqrt{\pi}\,b^2xe^{(a+bx)^2}(2c+dx)\operatorname{erfc}(a+bx)+2ad-4bc-2bdx\right)}{4\sqrt{\pi}\,b^2}$$

Antiderivative was successfully verified.

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

```
[Out] (-4*b*c + 2*a*d - 2*b*d*x + (-4*a*b*c + d + 2*a^2*d)*E^(a + b*x)^2*Sqrt[Pi]
*Erf[a + b*x] + 2*b^2*E^(a + b*x)^2*Sqrt[Pi]*x*(2*c + d*x)*Erfc[a + b*x])/(
4*b^2*E^(a + b*x)^2*Sqrt[Pi])
```

fricas [A] time = 0.53, size = 110, normalized size = 0.92

$$\frac{2\,\pi b^2 dx^2 + 4\,\pi b^2 cx - 2\,\sqrt{\pi}\,(bdx + 2\,bc - ad)e^{\left(-b^2x^2-2\,abx-a^2\right)} - \left(2\,\pi b^2 dx^2 + 4\,\pi b^2 cx + \pi\left(4\,abc - \left(2\,a^2+1\right)d\right)\right)\operatorname{erf}}{4\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*(2*pi*b^2*d*x^2 + 4*pi*b^2*c*x - 2*sqrt(pi)*(b*d*x + 2*b*c - a*d)*e^(-b
^2*x^2 - 2*a*b*x - a^2) - (2*pi*b^2*d*x^2 + 4*pi*b^2*c*x + pi*(4*a*b*c - (2
*a^2 + 1)*d))*erf(b*x + a))/(pi*b^2)
```

giac [A] time = 1.30, size = 158, normalized size = 1.33

$$\frac{1}{2}\,dx^2 - \left(x\operatorname{erf}\left(bx+a\right) - \frac{\frac{\sqrt{\pi}\,a\operatorname{erf}\left(-b\left(x+\frac{a}{b}\right)\right)}{b} - \frac{e^{\left(-b^2x^2-2\,abx-a^2\right)}}{b}}{\sqrt{\pi}}\right)c - \frac{1}{4}\left(2\,x^2\operatorname{erf}\left(bx+a\right) + \frac{\frac{\sqrt{\pi}\left(2\,a^2+1\right)\operatorname{erf}\left(-b\left(x+\frac{a}{b}\right)\right)}{b} + \frac{2\left(b\left(x+\frac{a}{b}\right)-\right.}{}}{\sqrt{\pi}\,b}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*d*x^2 - (x*erf(b*x + a) - (sqrt(pi)*a*erf(-b*(x + a/b))/b - e^(-b^2*x^2
 - 2*a*b*x - a^2)/b)/sqrt(pi))*c - 1/4*(2*x^2*erf(b*x + a) + (sqrt(pi)*(2*a
^2 + 1)*erf(-b*(x + a/b))/b + 2*(b*(x + a/b) - 2*a)*e^(-b^2*x^2 - 2*a*b*x -
 a^2)/b)/(sqrt(pi)*b))*d + c*x
```

maple [A] time = 0.00, size = 122, normalized size = 1.03

$$\frac{\frac{\operatorname{erfc}(bx+a)(bx+a)^2 d}{2b} - \frac{\operatorname{erfc}(bx+a)ad(bx+a)}{b} + \operatorname{erfc}\left(bx+a\right)c\left(bx+a\right) + \frac{d\left(-\frac{(bx+a)\mathrm{e}^{-(bx+a)^2}}{2}+\frac{\sqrt{\pi}\ \operatorname{erf}(bx+a)}{4}\right)+ad\,\mathrm{e}^{-(bx+a)^2}-\mathrm{e}^{-(bx+a)^2}bc}{\sqrt{\pi}\ b}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/b*(1/2/b*erfc(b*x+a)*(b*x+a)^2*d-1/b*erfc(b*x+a)*a*d*(b*x+a)+erfc(b*x+a)*
c*(b*x+a)+1/Pi^(1/2)/b*(d*(-1/2*(b*x+a)/exp((b*x+a)^2)+1/4*Pi^(1/2)*erf(b*x
+a))+a*d/exp((b*x+a)^2)-b*c/exp((b*x+a)^2)))
```

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

$$\int (dx + c) \operatorname{erfc}(bx + a)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 0.22, size = 119, normalized size = 1.00

$$c\,x\,\operatorname{erfc}(a+b\,x) - e^{-a^2-2\,a\,b\,x-b^2\,x^2}\left(\frac{c}{b\,\sqrt{\pi}} - \frac{a\,d}{2\,b^2\,\sqrt{\pi}}\right) - \frac{\operatorname{erfc}(a+b\,x)\left(\frac{d\,a^2}{2} - b\,c\,a + \frac{d}{4}\right)}{b^2} + \frac{d\,x^2\,\operatorname{erfc}(a+b\,x)}{2} - \frac{d\,x\,e^{-}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] c*x*erfc(a + b*x) - exp(- a^2 - b^2*x^2 - 2*a*b*x)*(c/(b*pi^(1/2)) - (a*d)/
(2*b^2*pi^(1/2))) - (erfc(a + b*x)*(d/4 + (a^2*d)/2 - a*b*c))/b^2 + (d*x^2*
erfc(a + b*x))/2 - (d*x*exp(- a^2 - b^2*x^2 - 2*a*b*x))/(2*b*pi^(1/2))
```

sympy [A] time = 1.45, size = 178, normalized size = 1.50

$$\begin{cases} -\frac{a^2 d \operatorname{erfc}(a+bx)}{2b^2} + \frac{ac \operatorname{erfc}(a+bx)}{b} + \frac{ade^{-a^2}e^{-b^2x^2}e^{-2abx}}{2\sqrt{\pi}\,b^2} + cx \operatorname{erfc}(a+bx) + \frac{dx^2 \operatorname{erfc}(a+bx)}{2} - \frac{ce^{-a^2}e^{-b^2x^2}e^{-2abx}}{\sqrt{\pi}\,b} - \frac{dxe^{-a^2}e^{-b^2x^2}e^{-2ab}}{2\sqrt{\pi}\,b} \\ \left(cx + \frac{dx^2}{2}\right)\operatorname{erfc}(a) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Piecewise((-a**2*d*erfc(a + b*x)/(2*b**2) + a*c*erfc(a + b*x)/b + a*d*exp(-
a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(2*sqrt(pi)*b**2) + c*x*erfc(a + b*x) +
 d*x**2*erfc(a + b*x)/2 - c*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(sqrt(
pi)*b) - d*x*exp(-a**2)*exp(-b**2*x**2)*exp(-2*a*b*x)/(2*sqrt(pi)*b) - d*er
fc(a + b*x)/(4*b**2), Ne(b, 0)), ((c*x + d*x**2/2)*erfc(a), True))
```

3.121 $\int \mathrm{erfc}(a+bx)\,dx$

Optimal. Leaf size=37

$$\frac{(a+bx)\mathrm{erfc}(a+bx)}{b}-\frac{e^{-(a+bx)^2}}{\sqrt{\pi}\,b}$$

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

Rubi [A] time = 0.01, antiderivative size = 37, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6350}

$$\frac{(a+bx)\mathrm{Erfc}(a+bx)}{b}-\frac{e^{-(a+bx)^2}}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[a + b*x],x]
[Out] -(1/(b*E^(a + b*x)^2*Sqrt[Pi])) + ((a + b*x)*Erfc[a + b*x])/b
```

Rule 6350

```
Int[Erfc[(a_.) + (b_.)*(x_)], x_Symbol] :> Simp[((a + b*x)*Erfc[a + b*x])/b
, x] - Simp[1/(b*Sqrt[Pi]*E^(a + b*x)^2), x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\int \mathrm{erfc}(a+bx)\,dx=-\frac{e^{-(a+bx)^2}}{b\sqrt{\pi}}+\frac{(a+bx)\mathrm{erfc}(a+bx)}{b}$$

Mathematica [A] time = 0.05, size = 42, normalized size = 1.14

$$-\frac{a\mathrm{erf}(a+bx)}{b}+x\mathrm{erfc}(a+bx)-\frac{e^{-(a+bx)^2}}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[a + b*x],x]
[Out] -(1/(b*E^(a + b*x)^2*Sqrt[Pi])) - (a*Erf[a + b*x])/b + x*Erfc[a + b*x]
```

fricas [A] time = 0.58, size = 53, normalized size = 1.43

$$\frac{\pi bx - (\pi bx + \pi a)\operatorname{erf}(bx + a) - \sqrt{\pi}\, e^{\left(-b^2x^2 - 2\,abx - a^2\right)}}{\pi b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.40, size = 60, normalized size = 1.62

$$-x\operatorname{erf}(bx + a) + x + \frac{\frac{\sqrt{\pi}\, a \operatorname{erf}\left(-b\left(x + \frac{a}{b}\right)\right)}{b} - \frac{e^{\left(-b^2x^2 - 2\,abx - a^2\right)}}{b}}{\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.00, size = 33, normalized size = 0.89

$$\frac{(bx + a)\operatorname{erfc}(bx + a) - \frac{\mathrm{e}^{-(bx+a)^2}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 1.13, size = 32, normalized size = 0.86

$$\frac{(bx + a)\operatorname{erfc}(bx + a) - \frac{e^{\left(-(bx+a)^2\right)}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 0.11, size = 49, normalized size = 1.32

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

sympy [A] time = 0.61, size = 53, normalized size = 1.43

$$\begin{cases} \frac{a\,\mathrm{erfc}\,(a+bx)}{b}+x\,\mathrm{erfc}\,(a+bx)-\frac{e^{-a^2}e^{-b^2x^2}e^{-2abx}}{\sqrt{\pi}\,b} & \text{for } b\neq 0 \\ x\,\mathrm{erfc}\,(a) & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Piecewise((a*erfc(a + b*x)/b + x*erfc(a + b*x) - exp(-a**2)*exp(-b**2*x**2)
*exp(-2*a*b*x)/(sqrt(pi)*b), Ne(b, 0)), (x*erfc(a), True))
```

3.122 $\int \frac{\text{erfc}(a+bx)}{c+dx} dx$

Optimal. Leaf size=17

$$\text{Int}\left(\frac{\text{erfc}(a+bx)}{c+dx}, x\right)$$

```
[Out] Unintegrable(erfc(b*x+a)/(d*x+c),x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfc}(a+bx)}{c+dx} dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfc[a + b*x]/(c + d*x),x]
[Out] Defer[Int][Erfc[a + b*x]/(c + d*x), x]
```

Rubi steps

$$\int \frac{\text{erfc}(a+bx)}{c+dx} dx = \int \frac{\text{erfc}(a+bx)}{c+dx} dx$$

Mathematica [A] time = 0.14, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(a+bx)}{c+dx} dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfc[a + b*x]/(c + d*x),x]
[Out] Integrate[Erfc[a + b*x]/(c + d*x), x]
```

fricas [A] time = 0.46, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{\text{erf}(bx+a)-1}{dx+c}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(-(erf(b*x + a) - 1)/(d*x + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x+a)/(d*x+c),x)
[Out] int(erfc(b*x+a)/(d*x+c),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

mupad [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{\operatorname{erfc}(a+b\,x)}{c+d\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(a + b*x)/(c + d*x),x)
[Out] int(erfc(a + b*x)/(c + d*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(a+bx)}{c+dx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.123 $\int \frac{\mathrm{erfc}(a+bx)}{(c+dx)^2} \, dx$

Optimal. Leaf size=52

$$-\frac{2b\mathrm{Int}\left(\frac{e^{-(a+bx)^2}}{c+dx},x\right)}{\sqrt{\pi}\,d}-\frac{\mathrm{erfc}(a+bx)}{d(c+dx)}$$

```
[Out] -erfc(b*x+a)/d/(d*x+c)-2*b*Unintegrable(1/exp((b*x+a)^2)/(d*x+c),x)/d/Pi^(1
/2)
```

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\mathrm{Erfc}(a+bx)}{(c+dx)^2} \, dx$$

Verification is Not applicable to the result.

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

```
[Out] -(Erfc[a + b*x]/(d*(c + d*x))) - (2*b*Defer[Int][1/(E^(a + b*x)^2*(c + d*x)
), x])/(d*Sqrt[Pi])
```

Rubi steps

$$\int \frac{\mathrm{erfc}(a+bx)}{(c+dx)^2} \, dx = -\frac{\mathrm{erfc}(a+bx)}{d(c+dx)} - \frac{(2b)\int \frac{e^{-(a+bx)^2}}{c+dx} \, dx}{d\sqrt{\pi}}$$

Mathematica [A] time = 0.54, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfc}(a+bx)}{(c+dx)^2} \, dx$$

Verification is Not applicable to the result.

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

```
[Out] Integrate[Erfc[a + b*x]/(c + d*x)^2, x]
```

fricas [A] time = 0.55, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(-\frac{\mathrm{erf}\left(bx+a\right)-1}{d^2x^2+2\,cdx+c^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(-(erf(b*x + a) - 1)/(d^2*x^2 + 2*c*d*x + c^2), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\operatorname{erfc}(a+b\,x)}{(c+d\,x)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(a+bx)}{(c+dx)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(erfc(a + b*x)/(c + d*x)**2, x)
```

3.124 $\int \frac{\text{erfc}(a+bx)}{(c+dx)^3}\,dx$

Optimal. Leaf size=105

$$-\frac{2b^2(bc-ad)\text{Int}\left(\frac{e^{-(a+bx)^2}}{c+dx},x\right)}{\sqrt{\pi}\,d^3}+\frac{b^2\text{erf}(a+bx)}{d^3}+\frac{be^{-(a+bx)^2}}{\sqrt{\pi}\,d^2(c+dx)}-\frac{\text{erfc}(a+bx)}{2d(c+dx)^2}$$

```
[Out] b^2*erf(b*x+a)/d^3-1/2*erfc(b*x+a)/d/(d*x+c)^2+b/d^2/exp((b*x+a)^2)/(d*x+c)
/Pi^(1/2)-2*b^2*(-a*d+b*c)*Unintegrable(1/exp((b*x+a)^2)/(d*x+c),x)/d^3/Pi^
(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfc}(a+bx)}{(c+dx)^3}\,dx$$

Verification is Not applicable to the result.

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

```
[Out] b/(d^2*E^(a + b*x)^2*Sqrt[Pi]*(c + d*x)) + (b^2*Erf[a + b*x])/d^3 - Erfc[a
+ b*x]/(2*d*(c + d*x)^2) - (2*b^2*(b*c - a*d)*Defer[Int][1/(E^(a + b*x)^2*(
c + d*x)), x])/(d^3*Sqrt[Pi])
```

Rubi steps

$$\begin{aligned}
\int \frac{\text{erfc}(a+bx)}{(c+dx)^3}\,dx &= -\frac{\text{erfc}(a+bx)}{2d(c+dx)^2}-\frac{b\int \frac{e^{-(a+bx)^2}}{(c+dx)^2}\,dx}{d\sqrt{\pi}}\\
&= \frac{be^{-(a+bx)^2}}{d^2\sqrt{\pi}\,(c+dx)}-\frac{\text{erfc}(a+bx)}{2d(c+dx)^2}+\frac{\left(2b^3\right)\int e^{-(a+bx)^2}\,dx}{d^3\sqrt{\pi}}-\frac{\left(2b^2(bc-ad)\right)\int \frac{e^{-(a+bx)^2}}{c+dx}\,dx}{d^3\sqrt{\pi}}\\
&= \frac{be^{-(a+bx)^2}}{d^2\sqrt{\pi}\,(c+dx)}+\frac{b^2\text{erf}(a+bx)}{d^3}-\frac{\text{erfc}(a+bx)}{2d(c+dx)^2}-\frac{\left(2b^2(bc-ad)\right)\int \frac{e^{-(a+bx)^2}}{c+dx}\,dx}{d^3\sqrt{\pi}}
\end{aligned}$$

Mathematica [A] time = 1.21, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(a+bx)}{(c+dx)^3}\,dx$$

Verification is Not applicable to the result.

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

```
[Out] Integrate[Erfc[a + b*x]/(c + d*x)^3, x]
```

fricas [A] time = 0.80, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{\text{erf}\,(bx+a)-1}{d^3x^3+3\,cd^2x^2+3\,c^2dx+c^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(-(erf(b*x + a) - 1)/(d^3*x^3 + 3*c*d^2*x^2 + 3*c^2*d*x + c^3), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx+a)}{(dx+c)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.10, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx+a)}{(dx+c)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx+a)}{(dx+c)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\operatorname{erfc}(a+b\,x)}{(c+d\,x)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(a+bx)}{(c+dx)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x+a)/(d*x+c)**3,x)
[Out] Integral(erfc(a + b*x)/(c + d*x)**3, x)
```

3.125 $\int x^5 \mathbf{erfc}(bx)^2\,dx$

Optimal. Leaf size=178

$$-\frac{5\mathrm{erfc}(bx)^2}{16b^6}-\frac{x^5e^{-b^2x^2}\mathrm{erfc}(bx)}{3\sqrt{\pi}\,b}+\frac{x^4e^{-2b^2x^2}}{6\pi b^2}+\frac{11e^{-2b^2x^2}}{12\pi b^6}-\frac{5xe^{-b^2x^2}\mathrm{erfc}(bx)}{4\sqrt{\pi}\,b^5}+\frac{7x^2e^{-2b^2x^2}}{12\pi b^4}-\frac{5x^3e^{-b^2x^2}\mathrm{erfc}(bx)}{6\sqrt{\pi}\,b^3}+\frac{1}{6}x^6\mathrm{erfc}($$

```
[Out] 11/12/b^6/exp(2*b^2*x^2)/Pi+7/12*x^2/b^4/exp(2*b^2*x^2)/Pi+1/6*x^4/b^2/exp(
2*b^2*x^2)/Pi-5/16*erfc(b*x)^2/b^6+1/6*x^6*erfc(b*x)^2-5/4*x*erfc(b*x)/b^5/
exp(b^2*x^2)/Pi^(1/2)-5/6*x^3*erfc(b*x)/b^3/exp(b^2*x^2)/Pi^(1/2)-1/3*x^5*e
rfc(b*x)/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.28, antiderivative size = 178, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {6365, 6386, 6374, 30, 2209, 2212}

$$-\frac{x^5e^{-b^2x^2}\mathrm{Erfc}(bx)}{3\sqrt{\pi}\,b}-\frac{5x^3e^{-b^2x^2}\mathrm{Erfc}(bx)}{6\sqrt{\pi}\,b^3}-\frac{5xe^{-b^2x^2}\mathrm{Erfc}(bx)}{4\sqrt{\pi}\,b^5}-\frac{5\mathrm{Erfc}(bx)^2}{16b^6}+\frac{x^4e^{-2b^2x^2}}{6\pi b^2}+\frac{7x^2e^{-2b^2x^2}}{12\pi b^4}+\frac{11e^{-2b^2x^2}}{12\pi b^6}+\frac{1}{6}x^6\mathrm{Erfc}$$

Antiderivative was successfully verified.

```
[In] Int[x^5*Erfc[b*x]^2,x]
```

```
[Out] 11/(12*b^6*E^(2*b^2*x^2)*Pi) + (7*x^2)/(12*b^4*E^(2*b^2*x^2)*Pi) + x^4/(6*b
^2*E^(2*b^2*x^2)*Pi) - (5*x*Erfc[b*x])/(4*b^5*E^(b^2*x^2)*Sqrt[Pi]) - (5*x^
3*Erfc[b*x])/(6*b^3*E^(b^2*x^2)*Sqrt[Pi]) - (x^5*Erfc[b*x])/(3*b*E^(b^2*x^2
)*Sqrt[Pi]) - (5*Erfc[b*x]^2)/(16*b^6) + (x^6*Erfc[b*x]^2)/6
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
```

```
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int x^5\text{erfc}(bx)^2\,dx = \frac{1}{6}x^6\text{erfc}(bx)^2 + \frac{(2b)\int e^{-b^2x^2}x^6\text{erfc}(bx)\,dx}{3\sqrt{\pi}}$$
$$= -\frac{e^{-b^2x^2}x^5\text{erfc}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6\text{erfc}(bx)^2 - \frac{2\int e^{-2b^2x^2}x^5\,dx}{3\pi} + \frac{5\int e^{-b^2x^2}x^4\text{erfc}(bx)\,dx}{3b\sqrt{\pi}}$$
$$= \frac{e^{-2b^2x^2}x^4}{6b^2\pi} - \frac{5e^{-b^2x^2}x^3\text{erfc}(bx)}{6b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^5\text{erfc}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6\text{erfc}(bx)^2 - \frac{2\int e^{-2b^2x^2}x^3\,dx}{3b^2\pi} - \frac{5\int e$$
$$= \frac{7e^{-2b^2x^2}x^2}{12b^4\pi} + \frac{e^{-2b^2x^2}x^4}{6b^2\pi} - \frac{5e^{-b^2x^2}x\text{erfc}(bx)}{4b^5\sqrt{\pi}} - \frac{5e^{-b^2x^2}x^3\text{erfc}(bx)}{6b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^5\text{erfc}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6\text{erf}$$
$$= \frac{11e^{-2b^2x^2}}{12b^6\pi} + \frac{7e^{-2b^2x^2}x^2}{12b^4\pi} + \frac{e^{-2b^2x^2}x^4}{6b^2\pi} - \frac{5e^{-b^2x^2}x\text{erfc}(bx)}{4b^5\sqrt{\pi}} - \frac{5e^{-b^2x^2}x^3\text{erfc}(bx)}{6b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^5\text{erfc}(b}{3b\sqrt{\pi}}$$
$$= \frac{11e^{-2b^2x^2}}{12b^6\pi} + \frac{7e^{-2b^2x^2}x^2}{12b^4\pi} + \frac{e^{-2b^2x^2}x^4}{6b^2\pi} - \frac{5e^{-b^2x^2}x\text{erfc}(bx)}{4b^5\sqrt{\pi}} - \frac{5e^{-b^2x^2}x^3\text{erfc}(bx)}{6b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^5\text{erfc}(b}{3b\sqrt{\pi}}$$

Mathematica [A] time = 0.47, size = 173, normalized size = 0.97

$$\frac{1}{24}\left(\left(\frac{15}{b^6}-8x^6\right)\operatorname{erf}(bx)+\frac{e^{-2b^2x^2}\left(8b^4x^4-15\pi e^{2b^2x^2}\operatorname{erf}(bx)^2+28b^2x^2+4\sqrt{\pi}\,bxe^{b^2x^2}\left(4b^4x^4+10b^2x^2+15\right)\operatorname{erf}(b\right.}{2\pi b^6}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^5*Erfc[b*x]^2,x]
```

```
[Out] (4*x^6 - (2*x*(15 + 10*b^2*x^2 + 4*b^4*x^4))/(b^5*E^(b^2*x^2)*Sqrt[Pi]) + (
15/b^6 - 8*x^6)*Erf[b*x] + 4*x^6*Erf[b*x]^2 + (44 + 28*b^2*x^2 + 8*b^4*x^4
+ 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(15 + 10*b^2*x^2 + 4*b^4*x^4)*Erf[b*x] - 15*E^
(2*b^2*x^2)*Pi*Erf[b*x]^2)/(2*b^6*E^(2*b^2*x^2)*Pi))/24
```

fricas [A] time = 0.42, size = 149, normalized size = 0.84

$$\frac{8\,\pi b^6x^6-\left(15\,\pi-8\,\pi b^6x^6\right)\operatorname{erf}(bx)^2-4\,\sqrt{\pi}\left(4\,b^5x^5+10\,b^3x^3+15\,bx-\left(4\,b^5x^5+10\,b^3x^3+15\,bx\right)\operatorname{erf}(bx)\right)e^{\left(-b^2x^2\right.}}{48\,\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfc(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/48*(8*pi*b^6*x^6 - (15*pi - 8*pi*b^6*x^6)*erf(b*x)^2 - 4*sqrt(pi)*(4*b^5*
x^5 + 10*b^3*x^3 + 15*b*x - (4*b^5*x^5 + 10*b^3*x^3 + 15*b*x)*erf(b*x))*e^(
-b^2*x^2) + 2*(15*pi - 8*pi*b^6*x^6)*erf(b*x) + 4*(2*b^4*x^4 + 7*b^2*x^2 +
11)*e^(-2*b^2*x^2))/(pi*b^6)
```

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

$$\int x^5\operatorname{erfc}(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfc(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^5*erfc(b*x)^2, x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int x^5\operatorname{erfc}(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfc(b*x)^2,x)
```

```
[Out] int(x^5*erfc(b*x)^2,x)
```

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

$$\int x^5 \operatorname{erfc}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfc(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x^5*erfc(b*x)^2, x)
```

mupad [B] time = 0.32, size = 143, normalized size = 0.80

$$\frac{x^6 \operatorname{erfc}(b\,x)^2}{6} - \frac{\frac{5\,\pi\,\operatorname{erfc}(b\,x)^2}{16} - \frac{11\,e^{-2\,b^2\,x^2}}{12} - \frac{7\,b^2\,x^2\,e^{-2\,b^2\,x^2}}{12} - \frac{b^4\,x^4\,e^{-2\,b^2\,x^2}}{6} + \frac{5\,b^3\,x^3\,\sqrt{\pi}\,e^{-b^2\,x^2}\,\operatorname{erfc}(b\,x)}{6} + \frac{b^5\,x^5\,\sqrt{\pi}\,e^{-b^2\,x^2}\,\operatorname{erfc}(b\,x)}{3} +}{b^6\,\pi}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfc(b*x)^2,x)
```

```
[Out] (x^6*erfc(b*x)^2)/6 - ((5*pi*erfc(b*x)^2)/16 - (11*exp(-2*b^2*x^2))/12 - (7
*b^2*x^2*exp(-2*b^2*x^2))/12 - (b^4*x^4*exp(-2*b^2*x^2))/6 + (5*b^3*x^3*pi^
(1/2)*exp(-b^2*x^2)*erfc(b*x))/6 + (b^5*x^5*pi^(1/2)*exp(-b^2*x^2)*erfc(b*x
))/3 + (5*b*x*pi^(1/2)*exp(-b^2*x^2)*erfc(b*x))/4)/(b^6*pi)
```

sympy [A] time = 5.09, size = 172, normalized size = 0.97

$$\begin{cases} \frac{x^6 \operatorname{erfc}^2(bx)}{6} - \frac{x^5 e^{-b^2x^2} \operatorname{erfc}(bx)}{3\sqrt{\pi}\,b} + \frac{x^4 e^{-2b^2x^2}}{6\pi b^2} - \frac{5x^3 e^{-b^2x^2} \operatorname{erfc}(bx)}{6\sqrt{\pi}\,b^3} + \frac{7x^2 e^{-2b^2x^2}}{12\pi b^4} - \frac{5x e^{-b^2x^2} \operatorname{erfc}(bx)}{4\sqrt{\pi}\,b^5} - \frac{5\operatorname{erfc}^2(bx)}{16b^6} + \frac{11e^{-2b^2x^2}}{12\pi b^6} & \text{for } b \\ \frac{x^6}{6} & \text{othe} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*erfc(b*x)**2,x)
```

```
[Out] Piecewise((x**6*erfc(b*x)**2/6 - x**5*exp(-b**2*x**2)*erfc(b*x)/(3*sqrt(pi)
*b) + x**4*exp(-2*b**2*x**2)/(6*pi*b**2) - 5*x**3*exp(-b**2*x**2)*erfc(b*x)
/(6*sqrt(pi)*b**3) + 7*x**2*exp(-2*b**2*x**2)/(12*pi*b**4) - 5*x*exp(-b**2*
x**2)*erfc(b*x)/(4*sqrt(pi)*b**5) - 5*erfc(b*x)**2/(16*b**6) + 11*exp(-2*b*
*2*x**2)/(12*pi*b**6), Ne(b, 0)), (x**6/6, True))
```

3.126 $\int x^3 \mathbf{erfc}(bx)^2\,dx$

Optimal. Leaf size=126

$$-\frac{3\text{erfc}(bx)^2}{16b^4}-\frac{x^3e^{-b^2x^2}\text{erfc}(bx)}{2\sqrt{\pi}\,b}+\frac{x^2e^{-2b^2x^2}}{4\pi b^2}+\frac{e^{-2b^2x^2}}{2\pi b^4}-\frac{3xe^{-b^2x^2}\text{erfc}(bx)}{4\sqrt{\pi}\,b^3}+\frac{1}{4}x^4\text{erfc}(bx)^2$$

```
[Out] 1/2/b^4/exp(2*b^2*x^2)/Pi+1/4*x^2/b^2/exp(2*b^2*x^2)/Pi-3/16*erfc(b*x)^2/b^
4+1/4*x^4*erfc(b*x)^2-3/4*x*erfc(b*x)/b^3/exp(b^2*x^2)/Pi^(1/2)-1/2*x^3*erf
c(b*x)/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.17, antiderivative size = 126, 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 = {6365, 6386, 6374, 30, 2209, 2212}

$$-\frac{x^3e^{-b^2x^2}\text{Erfc}(bx)}{2\sqrt{\pi}\,b}-\frac{3xe^{-b^2x^2}\text{Erfc}(bx)}{4\sqrt{\pi}\,b^3}-\frac{3\text{Erfc}(bx)^2}{16b^4}+\frac{x^2e^{-2b^2x^2}}{4\pi b^2}+\frac{e^{-2b^2x^2}}{2\pi b^4}+\frac{1}{4}x^4\text{Erfc}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^3*Erfc[b*x]^2,x]
```

```
[Out] 1/(2*b^4*E^(2*b^2*x^2)*Pi) + x^2/(4*b^2*E^(2*b^2*x^2)*Pi) - (3*x*Erfc[b*x])
/(4*b^3*E^(b^2*x^2)*Sqrt[Pi]) - (x^3*Erfc[b*x])/(2*b*E^(b^2*x^2)*Sqrt[Pi])
- (3*Erfc[b*x]^2)/(16*b^4) + (x^4*Erfc[b*x]^2)/4
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
```

```
0])
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int x^3\text{erfc}(bx)^2\,dx = \frac{1}{4}x^4\text{erfc}(bx)^2 + \frac{b\int e^{-b^2x^2}x^4\text{erfc}(bx)\,dx}{\sqrt{\pi}}$$
$$= -\frac{e^{-b^2x^2}x^3\text{erfc}(bx)}{2b\sqrt{\pi}} + \frac{1}{4}x^4\text{erfc}(bx)^2 - \frac{\int e^{-2b^2x^2}x^3\,dx}{\pi} + \frac{3\int e^{-b^2x^2}x^2\text{erfc}(bx)\,dx}{2b\sqrt{\pi}}$$
$$= \frac{e^{-2b^2x^2}x^2}{4b^2\pi} - \frac{3e^{-b^2x^2}x\text{erfc}(bx)}{4b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^3\text{erfc}(bx)}{2b\sqrt{\pi}} + \frac{1}{4}x^4\text{erfc}(bx)^2 - \frac{\int e^{-2b^2x^2}x\,dx}{2b^2\pi} - \frac{3\int e^{-2b^2}}{2b^2}$$
$$= \frac{e^{-2b^2x^2}}{2b^4\pi} + \frac{e^{-2b^2x^2}x^2}{4b^2\pi} - \frac{3e^{-b^2x^2}x\text{erfc}(bx)}{4b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^3\text{erfc}(bx)}{2b\sqrt{\pi}} + \frac{1}{4}x^4\text{erfc}(bx)^2 - \frac{3\,\text{Subst}(\int x\,dx}{8b^4}$$
$$= \frac{e^{-2b^2x^2}}{2b^4\pi} + \frac{e^{-2b^2x^2}x^2}{4b^2\pi} - \frac{3e^{-b^2x^2}x\text{erfc}(bx)}{4b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^3\text{erfc}(bx)}{2b\sqrt{\pi}} - \frac{3\text{erfc}(bx)^2}{16b^4} + \frac{1}{4}x^4\text{erfc}(bx)^2$$

Mathematica [A] time = 0.43, size = 149, normalized size = 1.18

$$\frac{1}{8}\left(\left(\frac{3}{b^4} - 4x^4\right)\text{erf}(bx) + \frac{e^{-2b^2x^2}\left(4\sqrt{\pi}\,bxe^{b^2x^2}\left(2b^2x^2+3\right)\text{erf}(bx) - 3\pi e^{2b^2x^2}\text{erf}(bx)^2 + 4b^2x^2 + 8\right)}{2\pi b^4} - \frac{2xe^{-b^2x^2}\left(2b\right.}{\sqrt{\pi}\,b}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^3*Erfc[b*x]^2,x]
```

```
[Out] (2*x^4 - (2*x*(3 + 2*b^2*x^2))/(b^3*E^(b^2*x^2)*Sqrt[Pi]) + (3/b^4 - 4*x^4)
*Erf[b*x] + 2*x^4*Erf[b*x]^2 + (8 + 4*b^2*x^2 + 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*
(3 + 2*b^2*x^2)*Erf[b*x] - 3*E^(2*b^2*x^2)*Pi*Erf[b*x]^2)/(2*b^4*E^(2*b^2*x
^2)*Pi))/8
```

fricas [A] time = 0.44, size = 124, normalized size = 0.98

$$\frac{4\,\pi b^4x^4 - \left(3\,\pi - 4\,\pi b^4x^4\right)\operatorname{erf}\left(bx\right)^2 - 4\,\sqrt{\pi}\left(2\,b^3x^3 + 3\,bx - \left(2\,b^3x^3 + 3\,bx\right)\operatorname{erf}\left(bx\right)\right)e^{\left(-b^2x^2\right)} + 2\left(3\,\pi - 4\,\pi b^4x^4\right)\mathrm{er}}{16\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfc(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/16*(4*pi*b^4*x^4 - (3*pi - 4*pi*b^4*x^4)*erf(b*x)^2 - 4*sqrt(pi)*(2*b^3*x
^3 + 3*b*x - (2*b^3*x^3 + 3*b*x)*erf(b*x))*e^(-b^2*x^2) + 2*(3*pi - 4*pi*b^
4*x^4)*erf(b*x) + 4*(b^2*x^2 + 2)*e^(-2*b^2*x^2))/(pi*b^4)
```

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

$$\int x^3 \operatorname{erfc}\left(bx\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfc(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^3*erfc(b*x)^2, x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{erfc}\left(bx\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfc(b*x)^2,x)
```

```
[Out] int(x^3*erfc(b*x)^2,x)
```

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

$$\int x^3 \operatorname{erfc}\left(bx\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfc(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x^3*erfc(b*x)^2, x)
```

mupad [B] time = 0.24, size = 102, normalized size = 0.81

$$\frac{x^4\,\mathrm{erfc}\left(b\,x\right)^2}{4}-\frac{\frac{3\,\pi\,\mathrm{erfc}(b\,x)^2}{16}-\frac{\mathrm{e}^{-2\,b^2\,x^2}}{2}-\frac{b^2\,x^2\,\mathrm{e}^{-2\,b^2\,x^2}}{4}+\frac{b^3\,x^3\,\sqrt{\pi}\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erfc}(b\,x)}{2}+\frac{3\,b\,x\,\sqrt{\pi}\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erfc}(b\,x)}{4}}{b^4\,\pi}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfc(b*x)^2,x)
```

```
[Out] (x^4*erfc(b*x)^2)/4 - ((3*pi*erfc(b*x)^2)/16 - exp(-2*b^2*x^2)/2 - (b^2*x^2
*exp(-2*b^2*x^2))/4 + (b^3*x^3*pi^(1/2)*exp(-b^2*x^2)*erfc(b*x))/2 + (3*b*x
*pi^(1/2)*exp(-b^2*x^2)*erfc(b*x))/4)/(b^4*pi)
```

sympy [A] time = 1.86, size = 121, normalized size = 0.96

$$\begin{cases} \frac{x^4\,\mathrm{erfc}^2\left(bx\right)}{4}-\frac{x^3e^{-b^2x^2}\,\mathrm{erfc}\left(bx\right)}{2\sqrt{\pi}\,b}+\frac{x^2e^{-2b^2x^2}}{4\pi b^2}-\frac{3xe^{-b^2x^2}\,\mathrm{erfc}\left(bx\right)}{4\sqrt{\pi}\,b^3}-\frac{3\,\mathrm{erfc}^2\left(bx\right)}{16b^4}+\frac{e^{-2b^2x^2}}{2\pi b^4} & \text{for}\ b\neq 0 \\ \frac{x^4}{4} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*erfc(b*x)**2,x)
```

```
[Out] Piecewise((x**4*erfc(b*x)**2/4 - x**3*exp(-b**2*x**2)*erfc(b*x)/(2*sqrt(pi)
*b) + x**2*exp(-2*b**2*x**2)/(4*pi*b**2) - 3*x*exp(-b**2*x**2)*erfc(b*x)/(4
*sqrt(pi)*b**3) - 3*erfc(b*x)**2/(16*b**4) + exp(-2*b**2*x**2)/(2*pi*b**4),
 Ne(b, 0)), (x**4/4, True))
```

3.127 $\int x\text{erfc}(bx)^2\,dx$

Optimal. Leaf size=72

$$-\frac{xe^{-b^2x^2}\text{erfc}(bx)}{\sqrt{\pi}\,b}-\frac{\text{erfc}(bx)^2}{4b^2}+\frac{e^{-2b^2x^2}}{2\pi b^2}+\frac{1}{2}x^2\text{erfc}(bx)^2$$

```
[Out] 1/2/b^2/exp(2*b^2*x^2)/Pi-1/4*erfc(b*x)^2/b^2+1/2*x^2*erfc(b*x)^2-x*erfc(b*
x)/b/exp(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 72, 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 = {6365, 6386, 6374, 30, 2209}

$$-\frac{xe^{-b^2x^2}\text{Erfc}(bx)}{\sqrt{\pi}\,b}-\frac{\text{Erfc}(bx)^2}{4b^2}+\frac{e^{-2b^2x^2}}{2\pi b^2}+\frac{1}{2}x^2\text{Erfc}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x*Erfc[b*x]^2,x]
```

```
[Out] 1/(2*b^2*E^(2*b^2*x^2)*Pi) - (x*Erfc[b*x])/(b*E^(b^2*x^2)*Sqrt[Pi]) - Erfc[
b*x]^2/(4*b^2) + (x^2*Erfc[b*x]^2)/2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
```

```
n}, x] && EqQ[d, -b^2]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}
\int x\text{erfc}(bx)^2\,dx &= \frac{1}{2}x^2\text{erfc}(bx)^2 + \frac{(2b)\int e^{-b^2x^2}x^2\text{erfc}(bx)\,dx}{\sqrt{\pi}} \\
&= -\frac{e^{-b^2x^2}x\text{erfc}(bx)}{b\sqrt{\pi}} + \frac{1}{2}x^2\text{erfc}(bx)^2 - \frac{2\int e^{-2b^2x^2}x\,dx}{\pi} + \frac{\int e^{-b^2x^2}\text{erfc}(bx)\,dx}{b\sqrt{\pi}} \\
&= \frac{e^{-2b^2x^2}}{2b^2\pi} - \frac{e^{-b^2x^2}x\text{erfc}(bx)}{b\sqrt{\pi}} + \frac{1}{2}x^2\text{erfc}(bx)^2 - \frac{\text{Subst}(\int x\,dx, x, \text{erfc}(bx))}{2b^2} \\
&= \frac{e^{-2b^2x^2}}{2b^2\pi} - \frac{e^{-b^2x^2}x\text{erfc}(bx)}{b\sqrt{\pi}} - \frac{\text{erfc}(bx)^2}{4b^2} + \frac{1}{2}x^2\text{erfc}(bx)^2
\end{aligned}$$

Mathematica [A] time = 0.16, size = 99, normalized size = 1.38

$$\frac{\pi\left(2b^2x^2-1\right)\text{erf}(bx)^2+\left(4\sqrt{\pi}\,bxe^{-b^2x^2}+\pi\left(2-4b^2x^2\right)\right)\text{erf}(bx)+2e^{-2b^2x^2}\left(\sqrt{\pi}\,bxe^{b^2x^2}-1\right)^2}{4\pi b^2}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x*Erfc[b*x]^2,x]
```

```
[Out] ((2*(-1 + b*E^(b^2*x^2)*Sqrt[Pi]*x)^2)/E^(2*b^2*x^2) + ((4*b*Sqrt[Pi]*x)/E^
(b^2*x^2) + Pi*(2 - 4*b^2*x^2))*Erf[b*x] + Pi*(-1 + 2*b^2*x^2)*Erf[b*x]^2)/
(4*b^2*Pi)
```

fricas [A] time = 0.49, size = 91, normalized size = 1.26

$$\frac{2\,\pi b^2x^2-\left(\pi-2\,\pi b^2x^2\right)\text{erf}\left(bx\right)^2+4\,\sqrt{\pi}\left(bx\,\text{erf}\left(bx\right)-bx\right)e^{\left(-b^2x^2\right)}+2\left(\pi-2\,\pi b^2x^2\right)\text{erf}\left(bx\right)+2\,e^{\left(-2\,b^2x^2\right)}}{4\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x)^2,x, algorithm="fricas")
```

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

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

$$\int x \operatorname{erfc}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x*erfc(b*x)^2, x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int x\mathrm{erfc}\left(bx\right)^{2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfc(b*x)^2,x)
```

```
[Out] int(x*erfc(b*x)^2,x)
```

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

$$\int x \operatorname{erfc}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x*erfc(b*x)^2, x)
```

mupad [B] time = 0.20, size = 68, normalized size = 0.94

$$\frac{\frac{\mathrm{e}^{-2\,b^2\,x^2}}{2}-b\,x\,\sqrt{\pi}\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erfc}\left(b\,x\right)}{b^2\,\pi}-\frac{\frac{\mathrm{erfc}\left(b\,x\right)^2}{4}-\frac{b^2\,x^2\,\mathrm{erfc}\left(b\,x\right)^2}{2}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfc(b*x)^2,x)
```

```
[Out] (exp(-2*b^2*x^2)/2 - b*x*pi^(1/2)*exp(-b^2*x^2)*erfc(b*x))/(b^2*pi) - (erfc
(b*x)^2/4 - (b^2*x^2*erfc(b*x)^2)/2)/b^2
```

sympy [A] time = 0.65, size = 68, normalized size = 0.94

$$\begin{cases} \frac{x^2\,\mathrm{erfc}^2\,(bx)}{2} - \frac{xe^{-b^2x^2}\,\mathrm{erfc}\,(bx)}{\sqrt{\pi}\,b} - \frac{\mathrm{erfc}^2\,(bx)}{4b^2} + \frac{e^{-2b^2x^2}}{2\pi b^2} & \text{for } b \neq 0 \\ \frac{x^2}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x)**2,x)
```

```
[Out] Piecewise((x**2*erfc(b*x)**2/2 - x*exp(-b**2*x**2)*erfc(b*x)/(sqrt(pi)*b) -
 erfc(b*x)**2/(4*b**2) + exp(-2*b**2*x**2)/(2*pi*b**2), Ne(b, 0)), (x**2/2,
 True))
```

3.128 $\int \frac{\mathbf{erfc}(bx)^2}{x}\,dx$

Optimal. Leaf size=13

$$\mathrm{Int}\left(\frac{\mathrm{erfc}(bx)^2}{x},x\right)$$

[Out] Unintegrable(erfc(b*x)^2/x,x)

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\mathrm{Erfc}(bx)^2}{x}\,dx$$

Verification is Not applicable to the result.

[In] Int[Erfc[b*x]^2/x,x]

[Out] Defer[Int][Erfc[b*x]^2/x, x]

Rubi steps

$$\int \frac{\mathrm{erfc}(bx)^2}{x}\,dx = \int \frac{\mathrm{erfc}(bx)^2}{x}\,dx$$

Mathematica [A] time = 0.17, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfc}(bx)^2}{x}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[Erfc[b*x]^2/x,x]

[Out] Integrate[Erfc[b*x]^2/x, x]

fricas [A] time = 0.43, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{erf}\,(bx)^2-2\,\mathrm{erf}\,(bx)+1}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x,x, algorithm="fricas")
[Out] integral((erf(b*x)^2 - 2*erf(b*x) + 1)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x,x)
[Out] int(erfc(b*x)^2/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x,x, algorithm="maxima")
[Out] integrate(erfc(b*x)^2/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erfc}(b\,x)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x,x)
[Out] int(erfc(b*x)^2/x, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}^2(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)**2/x,x)
```

```
[Out] Integral(erfc(b*x)**2/x, x)
```

3.129 $\int \frac{\text{erfc}(bx)^2}{x^3} dx$

Optimal. Leaf size=67

$$\frac{2be^{-b^2x^2}\text{erfc}(bx)}{\sqrt{\pi}x} + b^2\left(-\text{erfc}(bx)^2\right) + \frac{2b^2\text{Ei}\left(-2b^2x^2\right)}{\pi} - \frac{\text{erfc}(bx)^2}{2x^2}$$

```
[Out] 2*b^2*Ei(-2*b^2*x^2)/Pi-b^2*erfc(b*x)^2-1/2*erfc(b*x)^2/x^2+2*b*erfc(b*x)/e
xp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 67, 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 = {6365, 6392, 6374, 30, 2210}

$$\frac{2be^{-b^2x^2}\text{Erfc}(bx)}{\sqrt{\pi}x} + b^2\left(-\text{Erfc}(bx)^2\right) + \frac{2b^2\text{Ei}\left(-2b^2x^2\right)}{\pi} - \frac{\text{Erfc}(bx)^2}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]^2/x^3,x]
```

```
[Out] (2*b*Erfc[b*x])/(E^(b^2*x^2)*Sqrt[Pi]*x) - b^2*Erfc[b*x]^2 - Erfc[b*x]^2/(2
*x^2) + (2*b^2*ExpIntegralEi[-2*b^2*x^2])/Pi
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
```

```
n}, x] && EqQ[d, -b^2]
```

Rule 6392

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

Rubi steps

$$\begin{aligned}
\int \frac{\operatorname{erfc}(bx)^2}{x^3}\,dx &= -\frac{\operatorname{erfc}(bx)^2}{2x^2} - \frac{(2b)\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^2}\,dx}{\sqrt{\pi}} \\
&= \frac{2be^{-b^2x^2}\operatorname{erfc}(bx)}{\sqrt{\pi}\,x} - \frac{\operatorname{erfc}(bx)^2}{2x^2} + \frac{\left(4b^2\right)\int \frac{e^{-2b^2x^2}}{x}\,dx}{\pi} + \frac{\left(4b^3\right)\int e^{-b^2x^2}\operatorname{erfc}(bx)\,dx}{\sqrt{\pi}} \\
&= \frac{2be^{-b^2x^2}\operatorname{erfc}(bx)}{\sqrt{\pi}\,x} - \frac{\operatorname{erfc}(bx)^2}{2x^2} + \frac{2b^2\operatorname{Ei}\left(-2b^2x^2\right)}{\pi} - \left(2b^2\right)\operatorname{Subst}\left(\int x\,dx, x, \operatorname{erfc}(bx)\right) \\
&= \frac{2be^{-b^2x^2}\operatorname{erfc}(bx)}{\sqrt{\pi}\,x} - b^2\operatorname{erfc}(bx)^2 - \frac{\operatorname{erfc}(bx)^2}{2x^2} + \frac{2b^2\operatorname{Ei}\left(-2b^2x^2\right)}{\pi}
\end{aligned}$$

Mathematica [A] time = 0.04, size = 63, normalized size = 0.94

$$\frac{2be^{-b^2x^2}\operatorname{erfc}(bx)}{\sqrt{\pi}\,x} + \left(-b^2 - \frac{1}{2x^2}\right)\operatorname{erfc}(bx)^2 + \frac{2b^2\operatorname{Ei}\left(-2b^2x^2\right)}{\pi}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]^2/x^3,x]
```

```
[Out] (2*b*Erfc[b*x])/(E^(b^2*x^2)*Sqrt[Pi]*x) + (-b^2 - 1/(2*x^2))*Erfc[b*x]^2 +
 (2*b^2*ExpIntegralEi[-2*b^2*x^2])/Pi
```

fricas [A] time = 0.41, size = 98, normalized size = 1.46

$$-\frac{\pi - 4\,\pi\sqrt{b^2}\,bx^2\operatorname{erf}\left(\sqrt{b^2}\,x\right) - 4\,b^2x^2\operatorname{Ei}\left(-2\,b^2x^2\right) + \left(\pi + 2\,\pi b^2x^2\right)\operatorname{erf}(bx)^2 + 4\sqrt{\pi}\,(bx\operatorname{erf}(bx) - bx)e^{\left(-b^2x^2\right)} - 2\,\pi}{2\,\pi x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^3,x, algorithm="fricas")
```

```
[Out] -1/2*(pi - 4*pi*sqrt(b^2)*b*x^2*erf(sqrt(b^2)*x) - 4*b^2*x^2*Ei(-2*b^2*x^2)
 + (pi + 2*pi*b^2*x^2)*erf(b*x)^2 + 4*sqrt(pi)*(b*x*erf(b*x) - b*x)*e^(-b^2
*x^2) - 2*pi*erf(b*x))/(pi*x^2)
```

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

$$\int \frac{\operatorname{erfc}(bx)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^3,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)^2/x^3, x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^3,x)
```

```
[Out] int(erfc(b*x)^2/x^3,x)
```

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

$$\int \frac{\operatorname{erfc}(bx)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^3,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)^2/x^3, x)
```

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

$$\int \frac{\operatorname{erfc}(b\,x)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^3,x)
```

```
[Out] int(erfc(b*x)^2/x^3, x)
```

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

$$\int \frac{\operatorname{erfc}^2(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)**2/x**3,x)
```

```
[Out] Integral(erfc(b*x)**2/x**3, x)
```

3.130 $\int \frac{\mathbf{erfc}(bx)^2}{x^5}\,dx$

Optimal. Leaf size=125

$$\frac{1}{3}b^4\text{erfc}(bx)^2+\frac{be^{-b^2x^2}\text{erfc}(bx)}{3\sqrt{\pi}\,x^3}-\frac{b^2e^{-2b^2x^2}}{3\pi x^2}-\frac{4b^4\text{Ei}\left(-2b^2x^2\right)}{3\pi}-\frac{2b^3e^{-b^2x^2}\text{erfc}(bx)}{3\sqrt{\pi}\,x}-\frac{\text{erfc}(bx)^2}{4x^4}$$

```
[Out] -1/3*b^2/exp(2*b^2*x^2)/Pi/x^2-4/3*b^4*Ei(-2*b^2*x^2)/Pi+1/3*b^4*erfc(b*x)^
2-1/4*erfc(b*x)^2/x^4+1/3*b*erfc(b*x)/exp(b^2*x^2)/x^3/Pi^(1/2)-2/3*b^3*erf
c(b*x)/exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.18, antiderivative size = 125, 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 = {6365, 6392, 6374, 30, 2210, 2214}

$$-\frac{2b^3e^{-b^2x^2}\text{Erfc}(bx)}{3\sqrt{\pi}\,x}+\frac{be^{-b^2x^2}\text{Erfc}(bx)}{3\sqrt{\pi}\,x^3}+\frac{1}{3}b^4\text{Erfc}(bx)^2-\frac{4b^4\text{Ei}\left(-2b^2x^2\right)}{3\pi}-\frac{b^2e^{-2b^2x^2}}{3\pi x^2}-\frac{\text{Erfc}(bx)^2}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]^2/x^5,x]
```

```
[Out] -b^2/(3*E^(2*b^2*x^2)*Pi*x^2) + (b*Erfc[b*x])/(3*E^(b^2*x^2)*Sqrt[Pi]*x^3)
- (2*b^3*Erfc[b*x])/(3*E^(b^2*x^2)*Sqrt[Pi]*x) + (b^4*Erfc[b*x]^2)/3 - Erfc
[b*x]^2/(4*x^4) - (4*b^4*ExpIntegralEi[-2*b^2*x^2])/(3*Pi)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
```

```
] && LeQ[-n, m + 1]))
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6392

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

Rubi steps

$$\int \frac{\operatorname{erfc}(bx)^2}{x^5}\,dx = -\frac{\operatorname{erfc}(bx)^2}{4x^4} - \frac{b\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^4}\,dx}{\sqrt{\pi}}$$

$$= \frac{be^{-b^2x^2}\operatorname{erfc}(bx)}{3\sqrt{\pi}\,x^3} - \frac{\operatorname{erfc}(bx)^2}{4x^4} + \frac{\left(2b^2\right)\int \frac{e^{-2b^2x^2}}{x^3}\,dx}{3\pi} + \frac{\left(2b^3\right)\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^2}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{b^2e^{-2b^2x^2}}{3\pi x^2} + \frac{be^{-b^2x^2}\operatorname{erfc}(bx)}{3\sqrt{\pi}\,x^3} - \frac{2b^3e^{-b^2x^2}\operatorname{erfc}(bx)}{3\sqrt{\pi}\,x} - \frac{\operatorname{erfc}(bx)^2}{4x^4} - 2\frac{\left(4b^4\right)\int \frac{e^{-2b^2x^2}}{x}\,dx}{3\pi} - \frac{\left(4b^5\right)\int e$$

$$= -\frac{b^2e^{-2b^2x^2}}{3\pi x^2} + \frac{be^{-b^2x^2}\operatorname{erfc}(bx)}{3\sqrt{\pi}\,x^3} - \frac{2b^3e^{-b^2x^2}\operatorname{erfc}(bx)}{3\sqrt{\pi}\,x} - \frac{\operatorname{erfc}(bx)^2}{4x^4} - \frac{4b^4\operatorname{Ei}\left(-2b^2x^2\right)}{3\pi} + \frac{1}{3}\left(2b^4\right)\operatorname{Sub}$$

$$= -\frac{b^2e^{-2b^2x^2}}{3\pi x^2} + \frac{be^{-b^2x^2}\operatorname{erfc}(bx)}{3\sqrt{\pi}\,x^3} - \frac{2b^3e^{-b^2x^2}\operatorname{erfc}(bx)}{3\sqrt{\pi}\,x} + \frac{1}{3}b^4\operatorname{erfc}(bx)^2 - \frac{\operatorname{erfc}(bx)^2}{4x^4} - \frac{4b^4\operatorname{Ei}\left(-2b^2x^2\right.}{3\pi}$$

Mathematica [A] time = 0.07, size = 97, normalized size = 0.78

$$\frac{\left(4b^4x^4-3\right)\operatorname{erfc}(bx)^2-\frac{4bxe^{-b^2x^2}\left(2b^2x^2-1\right)\operatorname{erfc}(bx)}{\sqrt{\pi}}-\frac{4b^2x^2\left(4b^2x^2\operatorname{Ei}\left(-2b^2x^2\right)+e^{-2b^2x^2}\right)}{\pi}}{12x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]^2/x^5,x]
```

```
[Out] ((-4*b*x*(-1 + 2*b^2*x^2)*Erfc[b*x])/(E^(b^2*x^2)*Sqrt[Pi]) + (-3 + 4*b^4*x
^4)*Erfc[b*x]^2 - (4*b^2*x^2*(E^(-2*b^2*x^2) + 4*b^2*x^2*ExpIntegralEi[-2*b
^2*x^2]))/Pi)/(12*x^4)
```

fricas [A] time = 0.49, size = 141, normalized size = 1.13

$$-\frac{3\,\pi+8\,\pi\sqrt{b^2}\,b^3x^4\operatorname{erf}\left(\sqrt{b^2}\,x\right)+16\,b^4x^4\operatorname{Ei}\left(-2\,b^2x^2\right)+4\,b^2x^2e^{\left(-2\,b^2x^2\right)}+\left(3\,\pi-4\,\pi b^4x^4\right)\operatorname{erf}\left(bx\right)^2+4\,\sqrt{\pi}\,\left(2\,b^3\right.}{12\,\pi x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^5,x, algorithm="fricas")
```

```
[Out] -1/12*(3*pi + 8*pi*sqrt(b^2)*b^3*x^4*erf(sqrt(b^2)*x) + 16*b^4*x^4*Ei(-2*b^
2*x^2) + 4*b^2*x^2*e^(-2*b^2*x^2) + (3*pi - 4*pi*b^4*x^4)*erf(b*x)^2 + 4*sq
rt(pi)*(2*b^3*x^3 - b*x - (2*b^3*x^3 - b*x)*erf(b*x))*e^(-b^2*x^2) - 6*pi*e
rf(b*x))/(pi*x^4)
```

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

$$\int \frac{\operatorname{erfc}\left(bx\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^5,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)^2/x^5, x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}\left(bx\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^5,x)
```

```
[Out] int(erfc(b*x)^2/x^5,x)
```

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

$$\int \frac{\operatorname{erfc}(bx)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^5,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)^2/x^5, x)
```

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

$$\int \frac{\operatorname{erfc}(b\,x)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^5,x)
```

```
[Out] int(erfc(b*x)^2/x^5, x)
```

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

$$\int \frac{\operatorname{erfc}^2(bx)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)**2/x**5,x)
```

```
[Out] Integral(erfc(b*x)**2/x**5, x)
```

3.131 $\int \frac{\operatorname{erfc}(bx)^2}{x^7}\,dx$

Optimal. Leaf size=177

$$-\frac{4}{45}b^6\operatorname{erfc}(bx)^2+\frac{2be^{-b^2x^2}\operatorname{erfc}(bx)}{15\sqrt{\pi}\,x^5}-\frac{b^2e^{-2b^2x^2}}{15\pi x^4}+\frac{28b^6\operatorname{Ei}\left(-2b^2x^2\right)}{45\pi}+\frac{8b^5e^{-b^2x^2}\operatorname{erfc}(bx)}{45\sqrt{\pi}\,x}+\frac{2b^4e^{-2b^2x^2}}{9\pi x^2}-\frac{4b^3e^{-b^2x^2}\operatorname{erfc}(b}{45\sqrt{\pi}\,x^3}$$

```
[Out] -1/15*b^2/exp(2*b^2*x^2)/Pi/x^4+2/9*b^4/exp(2*b^2*x^2)/Pi/x^2+28/45*b^6*Ei(
-2*b^2*x^2)/Pi-4/45*b^6*erfc(b*x)^2-1/6*erfc(b*x)^2/x^6+2/15*b*erfc(b*x)/ex
p(b^2*x^2)/x^5/Pi^(1/2)-4/45*b^3*erfc(b*x)/exp(b^2*x^2)/x^3/Pi^(1/2)+8/45*b
^5*erfc(b*x)/exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.28, antiderivative size = 177, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {6365, 6392, 6374, 30, 2210, 2214}

$$\frac{8b^5e^{-b^2x^2}\operatorname{Erfc}(bx)}{45\sqrt{\pi}\,x}-\frac{4b^3e^{-b^2x^2}\operatorname{Erfc}(bx)}{45\sqrt{\pi}\,x^3}+\frac{2be^{-b^2x^2}\operatorname{Erfc}(bx)}{15\sqrt{\pi}\,x^5}-\frac{4}{45}b^6\operatorname{Erfc}(bx)^2+\frac{28b^6\operatorname{Ei}\left(-2b^2x^2\right)}{45\pi}+\frac{2b^4e^{-2b^2x^2}}{9\pi x^2}-\frac{b^2e^{-2b^2}}{15\pi x}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]^2/x^7,x]
```

```
[Out] -b^2/(15*E^(2*b^2*x^2)*Pi*x^4) + (2*b^4)/(9*E^(2*b^2*x^2)*Pi*x^2) + (2*b*Er
fc[b*x])/(15*E^(b^2*x^2)*Sqrt[Pi]*x^5) - (4*b^3*Erfc[b*x])/(45*E^(b^2*x^2)*
Sqrt[Pi]*x^3) + (8*b^5*Erfc[b*x])/(45*E^(b^2*x^2)*Sqrt[Pi]*x) - (4*b^6*Erfc
[b*x]^2)/45 - Erfc[b*x]^2/(6*x^6) + (28*b^6*ExpIntegralEi[-2*b^2*x^2])/(45*
Pi)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
```

```
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6392

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

Rubi steps

$$\int \frac{\text{erfc}(bx)^2}{x^7}\,dx = -\frac{\text{erfc}(bx)^2}{6x^6} - \frac{(2b)\int \frac{e^{-b^2x^2}\text{erfc}(bx)}{x^6}\,dx}{3\sqrt{\pi}}$$

$$= \frac{2be^{-b^2x^2}\text{erfc}(bx)}{15\sqrt{\pi}\,x^5} - \frac{\text{erfc}(bx)^2}{6x^6} + \frac{\left(4b^2\right)\int \frac{e^{-2b^2x^2}}{x^5}\,dx}{15\pi} + \frac{\left(4b^3\right)\int \frac{e^{-b^2x^2}\text{erfc}(bx)}{x^4}\,dx}{15\sqrt{\pi}}$$

$$= -\frac{b^2e^{-2b^2x^2}}{15\pi x^4} + \frac{2be^{-b^2x^2}\text{erfc}(bx)}{15\sqrt{\pi}\,x^5} - \frac{4b^3e^{-b^2x^2}\text{erfc}(bx)}{45\sqrt{\pi}\,x^3} - \frac{\text{erfc}(bx)^2}{6x^6} - \frac{\left(8b^4\right)\int \frac{e^{-2b^2x^2}}{x^3}\,dx}{45\pi} - \frac{\left(4b^4\right)\int}{1}$$

$$= -\frac{b^2e^{-2b^2x^2}}{15\pi x^4} + \frac{2b^4e^{-2b^2x^2}}{9\pi x^2} + \frac{2be^{-b^2x^2}\text{erfc}(bx)}{15\sqrt{\pi}\,x^5} - \frac{4b^3e^{-b^2x^2}\text{erfc}(bx)}{45\sqrt{\pi}\,x^3} + \frac{8b^5e^{-b^2x^2}\text{erfc}(bx)}{45\sqrt{\pi}\,x} - \frac{\text{erfc}(b}{6x^6}$$

$$= -\frac{b^2e^{-2b^2x^2}}{15\pi x^4} + \frac{2b^4e^{-2b^2x^2}}{9\pi x^2} + \frac{2be^{-b^2x^2}\text{erfc}(bx)}{15\sqrt{\pi}\,x^5} - \frac{4b^3e^{-b^2x^2}\text{erfc}(bx)}{45\sqrt{\pi}\,x^3} + \frac{8b^5e^{-b^2x^2}\text{erfc}(bx)}{45\sqrt{\pi}\,x} - \frac{\text{erfc}(b}{6x^6}$$

$$= -\frac{b^2e^{-2b^2x^2}}{15\pi x^4} + \frac{2b^4e^{-2b^2x^2}}{9\pi x^2} + \frac{2be^{-b^2x^2}\text{erfc}(bx)}{15\sqrt{\pi}\,x^5} - \frac{4b^3e^{-b^2x^2}\text{erfc}(bx)}{45\sqrt{\pi}\,x^3} + \frac{8b^5e^{-b^2x^2}\text{erfc}(bx)}{45\sqrt{\pi}\,x} - \frac{4}{45}b^6\text{e}$$

Mathematica [A] time = 0.04, size = 133, normalized size = 0.75

$$\frac{e^{-2b^2x^2}\left(20b^4x^4 - 6b^2x^2 - \pi e^{2b^2x^2}\left(8b^6x^6 + 15\right)\text{erfc}(bx)^2 + 56b^6x^6e^{2b^2x^2}\text{Ei}\left(-2b^2x^2\right) + 4\sqrt{\pi}\,bxe^{b^2x^2}\left(4b^4x^4 - 2b^2x\right.\right.}{90\pi x^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]^2/x^7,x]
```

```
[Out] (-6*b^2*x^2 + 20*b^4*x^4 + 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(3 - 2*b^2*x^2 + 4*b^
4*x^4)*Erfc[b*x] - E^(2*b^2*x^2)*Pi*(15 + 8*b^6*x^6)*Erfc[b*x]^2 + 56*b^6*E
^(2*b^2*x^2)*x^6*ExpIntegralEi[-2*b^2*x^2])/(90*E^(2*b^2*x^2)*Pi*x^6)
```

fricas [A] time = 0.53, size = 168, normalized size = 0.95

$$-\frac{15\,\pi - 16\,\pi\sqrt{b^2}\,b^5x^6\,\text{erf}\left(\sqrt{b^2}\,x\right) - 56\,b^6x^6\text{Ei}\left(-2\,b^2x^2\right) + \left(15\,\pi + 8\,\pi b^6x^6\right)\text{erf}\left(bx\right)^2 - 4\,\sqrt{\pi}\left(4\,b^5x^5 - 2\,b^3x^3 + \right.}{90\,\pi x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^7,x, algorithm="fricas")
```

```
[Out] -1/90*(15*pi - 16*pi*sqrt(b^2)*b^5*x^6*erf(sqrt(b^2)*x) - 56*b^6*x^6*Ei(-2*
b^2*x^2) + (15*pi + 8*pi*b^6*x^6)*erf(b*x)^2 - 4*sqrt(pi)*(4*b^5*x^5 - 2*b^
```

```
3*x^3 + 3*b*x - (4*b^5*x^5 - 2*b^3*x^3 + 3*b*x)*erf(b*x))*e^(-b^2*x^2) - 30
*pi*erf(b*x) - 2*(10*b^4*x^4 - 3*b^2*x^2)*e^(-2*b^2*x^2))/(pi*x^6)
```

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

$$\int \frac{\operatorname{erfc}(bx)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^7,x, algorithm="giac")
[Out] integrate(erfc(b*x)^2/x^7, x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^7,x)
[Out] int(erfc(b*x)^2/x^7,x)
```

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

$$\int \frac{\operatorname{erfc}(bx)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^7,x, algorithm="maxima")
[Out] integrate(erfc(b*x)^2/x^7, x)
```

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

$$\int \frac{\operatorname{erfc}(b\,x)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^7,x)
[Out] int(erfc(b*x)^2/x^7, x)
```

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

$$\int \frac{\operatorname{erfc}^2(bx)}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)**2/x**7,x)
```

```
[Out] Integral(erfc(b*x)**2/x**7, x)
```

3.132 $\int x^4 \mathbf{erfc}(bx)^2\,dx$

Optimal. Leaf size=165

$$-\frac{43\text{erf}\left(\sqrt{2}\,bx\right)}{40\sqrt{2\pi}\,b^5}-\frac{2x^4e^{-b^2x^2}\text{erfc}(bx)}{5\sqrt{\pi}\,b}+\frac{x^3e^{-2b^2x^2}}{5\pi b^2}-\frac{4e^{-b^2x^2}\text{erfc}(bx)}{5\sqrt{\pi}\,b^5}+\frac{11xe^{-2b^2x^2}}{20\pi b^4}-\frac{4x^2e^{-b^2x^2}\text{erfc}(bx)}{5\sqrt{\pi}\,b^3}+\frac{1}{5}x^5\text{erfc}(bx)^2$$

```
[Out] 11/20*x/b^4/exp(2*b^2*x^2)/Pi+1/5*x^3/b^2/exp(2*b^2*x^2)/Pi+1/5*x^5*erfc(b*
x)^2-4/5*erfc(b*x)/b^5/exp(b^2*x^2)/Pi^(1/2)-4/5*x^2*erfc(b*x)/b^3/exp(b^2*
x^2)/Pi^(1/2)-2/5*x^4*erfc(b*x)/b/exp(b^2*x^2)/Pi^(1/2)-43/80*erf(b*x*2^(1/
2))/b^5*2^(1/2)/Pi^(1/2)
```

Rubi [A] time = 0.23, antiderivative size = 165, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6365, 6386, 6383, 2205, 2212}

$$-\frac{43\text{Erf}\left(\sqrt{2}\,bx\right)}{40\sqrt{2\pi}\,b^5}-\frac{2x^4e^{-b^2x^2}\text{Erfc}(bx)}{5\sqrt{\pi}\,b}-\frac{4x^2e^{-b^2x^2}\text{Erfc}(bx)}{5\sqrt{\pi}\,b^3}-\frac{4e^{-b^2x^2}\text{Erfc}(bx)}{5\sqrt{\pi}\,b^5}+\frac{x^3e^{-2b^2x^2}}{5\pi b^2}+\frac{11xe^{-2b^2x^2}}{20\pi b^4}+\frac{1}{5}x^5\text{Erfc}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^4*Erfc[b*x]^2,x]
```

```
[Out] (11*x)/(20*b^4*E^(2*b^2*x^2)*Pi) + x^3/(5*b^2*E^(2*b^2*x^2)*Pi) - (43*Erf[S
qrt[2]*b*x])/(40*b^5*Sqrt[2*Pi]) - (4*Erfc[b*x])/(5*b^5*E^(b^2*x^2)*Sqrt[Pi
]) - (4*x^2*Erfc[b*x])/(5*b^3*E^(b^2*x^2)*Sqrt[Pi]) - (2*x^4*Erfc[b*x])/(5*
b*E^(b^2*x^2)*Sqrt[Pi]) + (x^5*Erfc[b*x]^2)/5
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int x^4\operatorname{erfc}(bx)^2\,dx = \frac{1}{5}x^5\operatorname{erfc}(bx)^2 + \frac{(4b)\int e^{-b^2x^2}x^5\operatorname{erfc}(bx)\,dx}{5\sqrt{\pi}}$$

$$= -\frac{2e^{-b^2x^2}x^4\operatorname{erfc}(bx)}{5b\sqrt{\pi}} + \frac{1}{5}x^5\operatorname{erfc}(bx)^2 - \frac{4\int e^{-2b^2x^2}x^4\,dx}{5\pi} + \frac{8\int e^{-b^2x^2}x^3\operatorname{erfc}(bx)\,dx}{5b\sqrt{\pi}}$$

$$= \frac{e^{-2b^2x^2}x^3}{5b^2\pi} - \frac{4e^{-b^2x^2}x^2\operatorname{erfc}(bx)}{5b^3\sqrt{\pi}} - \frac{2e^{-b^2x^2}x^4\operatorname{erfc}(bx)}{5b\sqrt{\pi}} + \frac{1}{5}x^5\operatorname{erfc}(bx)^2 - \frac{3\int e^{-2b^2x^2}x^2\,dx}{5b^2\pi} - \frac{8\int}{}$$

$$= \frac{11e^{-2b^2x^2}x}{20b^4\pi} + \frac{e^{-2b^2x^2}x^3}{5b^2\pi} - \frac{4e^{-b^2x^2}\operatorname{erfc}(bx)}{5b^5\sqrt{\pi}} - \frac{4e^{-b^2x^2}x^2\operatorname{erfc}(bx)}{5b^3\sqrt{\pi}} - \frac{2e^{-b^2x^2}x^4\operatorname{erfc}(bx)}{5b\sqrt{\pi}} + \frac{1}{5}x^5\operatorname{erf}$$

$$= \frac{11e^{-2b^2x^2}x}{20b^4\pi} + \frac{e^{-2b^2x^2}x^3}{5b^2\pi} - \frac{2\sqrt{\frac{2}{\pi}}\operatorname{erf}\left(\sqrt{2}\,bx\right)}{5b^5} - \frac{11\operatorname{erf}\left(\sqrt{2}\,bx\right)}{40b^5\sqrt{2\pi}} - \frac{4e^{-b^2x^2}\operatorname{erfc}(bx)}{5b^5\sqrt{\pi}} - \frac{4e^{-b^2x^2}x^2\operatorname{er}}{5b^3\sqrt{}}$$

Mathematica [A] time = 0.16, size = 108, normalized size = 0.65

$$\frac{4\left(4\pi b^5x^5\operatorname{erfc}(bx)^2 + bxe^{-2b^2x^2}\left(4b^2x^2+11\right) - 8\sqrt{\pi}\,e^{-b^2x^2}\left(b^4x^4+2b^2x^2+2\right)\operatorname{erfc}(bx)\right) - 43\sqrt{2\pi}\operatorname{erf}\left(\sqrt{2}\,bx\right)}{80\pi b^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*Erfc[b*x]^2,x]
```

```
[Out] (-43*Sqrt[2*Pi]*Erf[Sqrt[2]*b*x] + 4*((b*x*(11 + 4*b^2*x^2))/E^(2*b^2*x^2)
- (8*Sqrt[Pi]*(2 + 2*b^2*x^2 + b^4*x^4)*Erfc[b*x])/E^(b^2*x^2) + 4*b^5*Pi*x
^5*Erfc[b*x]^2))/(80*b^5*Pi)
```

fricas [A] time = 0.40, size = 154, normalized size = 0.93

$$\frac{16\,\pi b^6x^5\operatorname{erf}(bx)^2-32\,\pi b^6x^5\operatorname{erf}(bx)+16\,\pi b^6x^5-43\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,\operatorname{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)-32\,\sqrt{\pi}\,\left(b^5x^4+2\,b^3x^2-\left(b^5x\right.\right.}{80\,\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfc(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/80*(16*pi*b^6*x^5*erf(b*x)^2 - 32*pi*b^6*x^5*erf(b*x) + 16*pi*b^6*x^5 - 4
3*sqrt(2)*sqrt(pi)*sqrt(b^2)*erf(sqrt(2)*sqrt(b^2)*x) - 32*sqrt(pi)*(b^5*x^
4 + 2*b^3*x^2 - (b^5*x^4 + 2*b^3*x^2 + 2*b)*erf(b*x) + 2*b)*e^(-b^2*x^2) +
4*(4*b^4*x^3 + 11*b^2*x)*e^(-2*b^2*x^2))/(pi*b^6)
```

giac [A] time = 0.86, size = 218, normalized size = 1.32

$$\frac{1}{5}\,x^5\operatorname{erf}(bx)^2-\frac{2}{5}\,x^5\operatorname{erf}(bx)+\frac{1}{5}\,x^5+\frac{b\left(\frac{32\left(b^4x^4+2\,b^2x^2+2\right)\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{b^6}+\frac{b^4\left(\frac{4\left(4\,b^2x^3+3\,x\right)e^{\left(-2\,b^2x^2\right)}}{b^4}+\frac{3\,\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b^5}\right)+8\,b^2\left(\frac{4\,xe^{\left(-2\,b\right.}}{b^2}\right.}{\sqrt{\pi}\,b^5}\right.}{80\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfc(b*x)^2,x, algorithm="giac")
```

```
[Out] 1/5*x^5*erf(b*x)^2 - 2/5*x^5*erf(b*x) + 1/5*x^5 + 1/80*b*(32*(b^4*x^4 + 2*b
^2*x^2 + 2)*erf(b*x)*e^(-b^2*x^2)/b^6 + (b^4*(4*(4*b^2*x^3 + 3*x)*e^(-2*b^2
*x^2)/b^4 + 3*sqrt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b^5) + 8*b^2*(4*x*e^(-2*b^
2*x^2)/b^2 + sqrt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b^3) + 32*sqrt(2)*sqrt(pi)*
erf(-sqrt(2)*b*x)/b)/(sqrt(pi)*b^5))/sqrt(pi) - 2/5*(b^4*x^4 + 2*b^2*x^2 +
2)*e^(-b^2*x^2)/(sqrt(pi)*b^5)
```

maple [A] time = 0.01, size = 205, normalized size = 1.24

$$\frac{\frac{b^5x^5}{5}-\frac{2b^5x^5\operatorname{erf}(bx)}{5}+\frac{-\frac{2\,\mathrm{e}^{-b^2x^2}b^4x^4}{5}-\frac{4\,\mathrm{e}^{-b^2x^2}b^2x^2}{5}-\frac{4\,\mathrm{e}^{-b^2x^2}}{5}}{\sqrt{\pi}}+\frac{b^5x^5\operatorname{erf}(bx)^2}{5}-\frac{4\operatorname{erf}(bx)\left(-\frac{\mathrm{e}^{-b^2x^2}b^4x^4}{2}-\mathrm{e}^{-b^2x^2}b^2x^2-\mathrm{e}^{-b^2x^2}\right)}{5\sqrt{\pi}}+\frac{-\frac{43\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(bx\right.}{80}}{}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfc(b*x)^2,x)
```

```
[Out] 1/b^5*(1/5*b^5*x^5-2/5*b^5*x^5*erf(b*x)+4/5/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^4
*x^4-1/exp(b^2*x^2)*b^2*x^2-1/exp(b^2*x^2))+1/5*b^5*x^5*erf(b*x)^2-4/5*erf(
b*x)/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^4*x^4-1/exp(b^2*x^2)*b^2*x^2-1/exp(b^2*x
^2))+4/5/Pi*(-43/64*2^(1/2)*Pi^(1/2)*erf(b*x*2^(1/2))+11/16/exp(b^2*x^2)^2*
b*x+1/4/exp(b^2*x^2)^2*b^3*x^3))
```

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

$$\int x^4 \operatorname{erfc}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfc(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x^4*erfc(b*x)^2, x)
```

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

$$\int x^4 \operatorname{erfc}(b\,x)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfc(b*x)^2,x)
```

```
[Out] int(x^4*erfc(b*x)^2, x)
```

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

$$\int x^4 \operatorname{erfc}^2(bx) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*erfc(b*x)**2,x)
```

```
[Out] Integral(x**4*erfc(b*x)**2, x)
```

3.133 $\int x^2 \mathbf{erfc}(bx)^2\,dx$

Optimal. Leaf size=113

$$-\frac{5\text{erf}\left(\sqrt{2}\,bx\right)}{6\sqrt{2\pi}\,b^3}-\frac{2x^2e^{-b^2x^2}\text{erfc}(bx)}{3\sqrt{\pi}\,b}+\frac{xe^{-2b^2x^2}}{3\pi b^2}-\frac{2e^{-b^2x^2}\text{erfc}(bx)}{3\sqrt{\pi}\,b^3}+\frac{1}{3}x^3\text{erfc}(bx)^2$$

```
[Out] 1/3*x/b^2/exp(2*b^2*x^2)/Pi+1/3*x^3*erfc(b*x)^2-2/3*erfc(b*x)/b^3/exp(b^2*x
^2)/Pi^(1/2)-2/3*x^2*erfc(b*x)/b/exp(b^2*x^2)/Pi^(1/2)-5/12*erf(b*x*2^(1/2)
)/b^3*2^(1/2)/Pi^(1/2)
```

Rubi [A] time = 0.13, antiderivative size = 113, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6365, 6386, 6383, 2205, 2212}

$$-\frac{5\text{Erf}\left(\sqrt{2}\,bx\right)}{6\sqrt{2\pi}\,b^3}-\frac{2x^2e^{-b^2x^2}\text{Erfc}(bx)}{3\sqrt{\pi}\,b}-\frac{2e^{-b^2x^2}\text{Erfc}(bx)}{3\sqrt{\pi}\,b^3}+\frac{xe^{-2b^2x^2}}{3\pi b^2}+\frac{1}{3}x^3\text{Erfc}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Erfc[b*x]^2,x]
```

```
[Out] x/(3*b^2*E^(2*b^2*x^2)*Pi) - (5*Erf[Sqrt[2]*b*x])/(6*b^3*Sqrt[2*Pi]) - (2*E
rfc[b*x])/(3*b^3*E^(b^2*x^2)*Sqrt[Pi]) - (2*x^2*Erfc[b*x])/(3*b*E^(b^2*x^2)
*Sqrt[Pi]) + (x^3*Erfc[b*x]^2)/3
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
```

```
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}
\int x^2\text{erfc}(bx)^2\,dx &= \frac{1}{3}x^3\text{erfc}(bx)^2 + \frac{(4b)\int e^{-b^2x^2}x^3\text{erfc}(bx)\,dx}{3\sqrt{\pi}}\\
&= -\frac{2e^{-b^2x^2}x^2\text{erfc}(bx)}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erfc}(bx)^2 - \frac{4\int e^{-2b^2x^2}x^2\,dx}{3\pi} + \frac{4\int e^{-b^2x^2}x\text{erfc}(bx)\,dx}{3b\sqrt{\pi}}\\
&= \frac{e^{-2b^2x^2}x}{3b^2\pi} - \frac{2e^{-b^2x^2}\text{erfc}(bx)}{3b^3\sqrt{\pi}} - \frac{2e^{-b^2x^2}x^2\text{erfc}(bx)}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erfc}(bx)^2 - \frac{\int e^{-2b^2x^2}\,dx}{3b^2\pi} - \frac{4\int e^{-2b^2x^2}}{3b^2\pi}\\
&= \frac{e^{-2b^2x^2}x}{3b^2\pi} - \frac{\sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,bx\right)}{3b^3} - \frac{\text{erf}\left(\sqrt{2}\,bx\right)}{6b^3\sqrt{2\pi}} - \frac{2e^{-b^2x^2}\text{erfc}(bx)}{3b^3\sqrt{\pi}} - \frac{2e^{-b^2x^2}x^2\text{erfc}(bx)}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erfc}
\end{aligned}$$

Mathematica [A] time = 0.10, size = 88, normalized size = 0.78

$$\frac{4\pi b^3x^3\text{erfc}(bx)^2 - 8\sqrt{\pi}\,e^{-b^2x^2}\left(b^2x^2+1\right)\text{erfc}(bx) + 4bxe^{-2b^2x^2} - 5\sqrt{2\pi}\,\text{erf}\left(\sqrt{2}\,bx\right)}{12\pi b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*Erfc[b*x]^2,x]
```

```
[Out] ((4*b*x)/E^(2*b^2*x^2) - 5*Sqrt[2*Pi]*Erf[Sqrt[2]*b*x] - (8*Sqrt[Pi]*(1 + b
^2*x^2)*Erfc[b*x])/E^(b^2*x^2) + 4*b^3*Pi*x^3*Erfc[b*x]^2)/(12*b^3*Pi)
```

fricas [A] time = 0.39, size = 123, normalized size = 1.09

$$\frac{4\,\pi b^4x^3\operatorname{erf}(bx)^2 - 8\,\pi b^4x^3\operatorname{erf}(bx) + 4\,\pi b^4x^3 + 4\,b^2xe^{\left(-2\,b^2x^2\right)} - 5\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,\operatorname{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right) - 8\,\sqrt{\pi}\left(b^3x^2 - \left(b^3\right.\right.}{12\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfc(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/12*(4*pi*b^4*x^3*erf(b*x)^2 - 8*pi*b^4*x^3*erf(b*x) + 4*pi*b^4*x^3 + 4*b^
2*x*e^(-2*b^2*x^2) - 5*sqrt(2)*sqrt(pi)*sqrt(b^2)*erf(sqrt(2)*sqrt(b^2)*x)
- 8*sqrt(pi)*(b^3*x^2 - (b^3*x^2 + b)*erf(b*x) + b)*e^(-b^2*x^2))/(pi*b^4)
```

giac [A] time = 0.69, size = 151, normalized size = 1.34

$$\frac{1}{3}\,x^3\operatorname{erf}(bx)^2 - \frac{2}{3}\,x^3\operatorname{erf}(bx) + \frac{1}{3}\,x^3 + \frac{b\left(\frac{8\left(b^2x^2+1\right)\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{b^4} + \frac{b^2\left(\frac{4\,xe^{\left(-2\,b^2x^2\right)}}{b^2} + \frac{\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b^3}\right) + \frac{4\,\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b}}{\sqrt{\pi}\,b^3}\right)}{12\,\sqrt{\pi}} - \frac{2\left(b^2x^2\right.}{3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfc(b*x)^2,x, algorithm="giac")
```

```
[Out] 1/3*x^3*erf(b*x)^2 - 2/3*x^3*erf(b*x) + 1/3*x^3 + 1/12*b*(8*(b^2*x^2 + 1)*e
rf(b*x)*e^(-b^2*x^2)/b^4 + (b^2*(4*x*e^(-2*b^2*x^2)/b^2 + sqrt(2)*sqrt(pi)*
erf(-sqrt(2)*b*x)/b^3) + 4*sqrt(2)*sqrt(pi)*erf(-sqrt(2)*b*x)/b)/(sqrt(pi)*
b^3))/sqrt(pi) - 2/3*(b^2*x^2 + 1)*e^(-b^2*x^2)/(sqrt(pi)*b^3)
```

maple [A] time = 0.01, size = 151, normalized size = 1.34

$$\frac{\frac{b^3x^3}{3} - \frac{2b^3x^3\operatorname{erf}(bx)}{3} + \frac{-\frac{2\,\mathrm{e}^{-b^2x^2}b^2x^2}{3} - \frac{2\,\mathrm{e}^{-b^2x^2}}{3}}{\sqrt{\pi}} + \frac{b^3x^3\operatorname{erf}(bx)^2}{3} - \frac{4\operatorname{erf}(bx)\left(-\frac{\mathrm{e}^{-b^2x^2}b^2x^2}{2} - \frac{\mathrm{e}^{-b^2x^2}}{2}\right)}{3\sqrt{\pi}} + \frac{-\frac{5\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(bx\sqrt{2}\right)}{12} + \frac{\mathrm{e}^{-2b^2x^2}bx}{3}}{\pi}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfc(b*x)^2,x)
```

```
[Out] 1/b^3*(1/3*b^3*x^3-2/3*b^3*x^3*erf(b*x)+4/3/Pi^(1/2)*(-1/2/exp(b^2*x^2)*b^2
*x^2-1/2/exp(b^2*x^2))+1/3*b^3*x^3*erf(b*x)^2-4/3*erf(b*x)/Pi^(1/2)*(-1/2/e
xp(b^2*x^2)*b^2*x^2-1/2/exp(b^2*x^2))+4/3/Pi*(-5/16*2^(1/2)*Pi^(1/2)*erf(b*
x*2^(1/2))+1/4/exp(b^2*x^2)^2*b*x))
```

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

$$\int x^2 \operatorname{erfc}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfc(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x^2*erfc(b*x)^2, x)
```

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

$$\int x^2 \operatorname{erfc}(b\,x)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfc(b*x)^2,x)
```

```
[Out] int(x^2*erfc(b*x)^2, x)
```

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

$$\int x^2 \operatorname{erfc}^2(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erfc(b*x)**2,x)
```

```
[Out] Integral(x**2*erfc(b*x)**2, x)
```

3.134 $\int \text{erfc}(bx)^2\,dx$

Optimal. Leaf size=56

$$-\frac{2e^{-b^2x^2}\text{erfc}(bx)}{\sqrt{\pi}\,b}-\frac{\sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,bx\right)}{b}+x\text{erfc}(bx)^2$$

```
[Out] x*erfc(b*x)^2-erf(b*x*2^(1/2))*2^(1/2)/Pi^(1/2)/b-2*erfc(b*x)/b/exp(b^2*x^2
)/Pi^(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 = 4, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {6353, 12, 6383, 2205}

$$-\frac{2e^{-b^2x^2}\text{Erfc}(bx)}{\sqrt{\pi}\,b}-\frac{\sqrt{\frac{2}{\pi}}\,\text{Erf}\left(\sqrt{2}\,bx\right)}{b}+x\text{Erfc}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]^2,x]
```

```
[Out] -((Sqrt[2/Pi]*Erf[Sqrt[2]*b*x])/b) - (2*Erfc[b*x])/(b*E^(b^2*x^2)*Sqrt[Pi])
 + x*Erfc[b*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 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 6353

```
Int[Erfc[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erfc[a + b*x]^
2)/b, x] + Dist[4/Sqrt[Pi], Int[((a + b*x)*Erfc[a + b*x])/E^(a + b*x)^2, x]
, x] /; FreeQ[{a, b}, x]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
```

```
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erfc}(bx)^2\,dx &= x\operatorname{erfc}(bx)^2+\frac{4\int be^{-b^2x^2}x\operatorname{erfc}(bx)\,dx}{\sqrt{\pi}}\\ &= x\operatorname{erfc}(bx)^2+\frac{(4b)\int e^{-b^2x^2}x\operatorname{erfc}(bx)\,dx}{\sqrt{\pi}}\\ &= -\frac{2e^{-b^2x^2}\operatorname{erfc}(bx)}{b\sqrt{\pi}}+x\operatorname{erfc}(bx)^2-\frac{4\int e^{-2b^2x^2}\,dx}{\pi}\\ &= -\frac{\sqrt{\frac{2}{\pi}}\operatorname{erf}\left(\sqrt{2}\,bx\right)}{b}-\frac{2e^{-b^2x^2}\operatorname{erfc}(bx)}{b\sqrt{\pi}}+x\operatorname{erfc}(bx)^2\end{aligned}$$

Mathematica [A] time = 0.05, size = 56, normalized size = 1.00

$$-\frac{2e^{-b^2x^2}\operatorname{erfc}(bx)}{\sqrt{\pi}\,b}-\frac{\sqrt{\frac{2}{\pi}}\operatorname{erf}\left(\sqrt{2}\,bx\right)}{b}+x\operatorname{erfc}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]^2,x]
```

```
[Out] -((Sqrt[2/Pi]*Erf[Sqrt[2]*b*x])/b) - (2*Erfc[b*x])/(b*E^(b^2*x^2)*Sqrt[Pi])
 + x*Erfc[b*x]^2
```

fricas [A] time = 0.48, size = 85, normalized size = 1.52

$$\frac{\pi b^2x\operatorname{erf}(bx)^2-2\,\pi b^2x\operatorname{erf}(bx)+\pi b^2x-\sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,\operatorname{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)+2\,\sqrt{\pi}\,(b\operatorname{erf}(bx)-b)e^{\left(-b^2x^2\right)}}{\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2,x, algorithm="fricas")
```

```
[Out] (pi*b^2*x*erf(b*x)^2 - 2*pi*b^2*x*erf(b*x) + pi*b^2*x - sqrt(2)*sqrt(pi)*sq
rt(b^2)*erf(sqrt(2)*sqrt(b^2)*x) + 2*sqrt(pi)*(b*erf(b*x) - b)*e^(-b^2*x^2)
)/(pi*b^2)
```

giac [A] time = 0.68, size = 73, normalized size = 1.30

$$x\operatorname{erf}(bx)^2 - 2\,x\operatorname{erf}(bx) + \frac{b\left(\frac{2\operatorname{erf}(bx)e^{\left(-b^2x^2\right)}}{b^2} + \frac{\sqrt{2}\operatorname{erf}\left(-\sqrt{2}\,bx\right)}{b^2}\right)}{\sqrt{\pi}} + x - \frac{2\,e^{\left(-b^2x^2\right)}}{\sqrt{\pi}\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2,x, algorithm="giac")
```

```
[Out] x*erf(b*x)^2 - 2*x*erf(b*x) + b*(2*erf(b*x)*e^(-b^2*x^2)/b^2 + sqrt(2)*erf(
-sqrt(2)*b*x)/b^2)/sqrt(pi) + x - 2*e^(-b^2*x^2)/(sqrt(pi)*b)
```

maple [A] time = 0.01, size = 48, normalized size = 0.86

$$\frac{bx\operatorname{erf}(bx)^2 + \frac{2\operatorname{erf}(bx)e^{-b^2x^2}}{\sqrt{\pi}} - \frac{\sqrt{2}\operatorname{erf}\left(bx\sqrt{2}\right)}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2,x)
```

```
[Out] 1/b*(b*x*erf(b*x)^2+2*erf(b*x)/Pi^(1/2)*exp(-b^2*x^2)-1/Pi^(1/2)*2^(1/2)*er
f(b*x*2^(1/2)))
```

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

$$\int \operatorname{erfc}(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)^2, x)
```

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

$$\int \operatorname{erfc}(b\,x)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2,x)
```

```
[Out] int(erfc(b*x)^2, x)
```

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

$$\int \operatorname{erfc}^2(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)**2,x)
```

```
[Out] Integral(erfc(b*x)**2, x)
```

3.135 $\int \frac{\operatorname{erfc}(bx)^2}{x^2}\,dx$

Optimal. Leaf size=13

$$\operatorname{Int}\left(\frac{\operatorname{erfc}(bx)^2}{x^2},x\right)$$

```
[Out] Unintegrable(erfc(b*x)^2/x^2,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\operatorname{Erfc}(bx)^2}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfc[b*x]^2/x^2,x]
```

```
[Out] Defer[Int][Erfc[b*x]^2/x^2, x]
```

Rubi steps

$$\int \frac{\operatorname{erfc}(bx)^2}{x^2}\,dx = \int \frac{\operatorname{erfc}(bx)^2}{x^2}\,dx$$

Mathematica [A] time = 0.18, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfc[b*x]^2/x^2,x]
```

```
[Out] Integrate[Erfc[b*x]^2/x^2, x]
```

fricas [A] time = 0.39, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erf}(bx)^2-2\,\operatorname{erf}(bx)+1}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^2,x, algorithm="fricas")
```

```
[Out] integral((erf(b*x)^2 - 2*erf(b*x) + 1)/x^2, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^2,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)^2/x^2, x)
```

maple [A] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^2,x)
```

```
[Out] int(erfc(b*x)^2/x^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erfc(b*x)^2/x^2, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erfc}(b\,x)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^2,x)
```

```
[Out] int(erfc(b*x)^2/x^2, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}^2(bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)**2/x**2,x)
```

```
[Out] Integral(erfc(b*x)**2/x**2, x)
```

3.136 $\int \frac{\text{erfc}(bx)^2}{x^4}\,dx$

Optimal. Leaf size=13

$$\text{Int}\left(\frac{\text{erfc}(bx)^2}{x^4},x\right)$$

```
[Out] Unintegrable(erfc(b*x)^2/x^4,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfc}(bx)^2}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfc[b*x]^2/x^4,x]
```

```
[Out] Defer[Int][Erfc[b*x]^2/x^4, x]
```

Rubi steps

$$\int \frac{\text{erfc}(bx)^2}{x^4}\,dx = \int \frac{\text{erfc}(bx)^2}{x^4}\,dx$$

Mathematica [A] time = 0.13, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)^2}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfc[b*x]^2/x^4,x]
```

```
[Out] Integrate[Erfc[b*x]^2/x^4, x]
```

fricas [A] time = 0.41, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx)^2 - 2\,\text{erf}\,(bx) + 1}{x^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^4,x, algorithm="fricas")
```

```
[Out] integral((erf(b*x)^2 - 2*erf(b*x) + 1)/x^4, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^4,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)^2/x^4, x)
```

maple [A] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^4,x)
```

```
[Out] int(erfc(b*x)^2/x^4,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^4,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)^2/x^4, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erfc}(b\,x)^2}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^4,x)
```

```
[Out] int(erfc(b*x)^2/x^4, x)
```

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

$$\int \frac{\operatorname{erfc}^2(bx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)**2/x**4,x)
```

```
[Out] Integral(erfc(b*x)**2/x**4, x)
```

3.137 $\int \frac{\text{erfc}(bx)^2}{x^6}\,dx$

Optimal. Leaf size=13

$$\text{Int}\left(\frac{\text{erfc}(bx)^2}{x^6},x\right)$$

```
[Out] Unintegrable(erfc(b*x)^2/x^6,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfc}(bx)^2}{x^6}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfc[b*x]^2/x^6,x]
[Out] Defer[Int][Erfc[b*x]^2/x^6, x]
```

Rubi steps

$$\int \frac{\text{erfc}(bx)^2}{x^6}\,dx = \int \frac{\text{erfc}(bx)^2}{x^6}\,dx$$

Mathematica [A] time = 0.18, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)^2}{x^6}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfc[b*x]^2/x^6,x]
[Out] Integrate[Erfc[b*x]^2/x^6, x]
```

fricas [A] time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx)^2 - 2\,\text{erf}\,(bx) + 1}{x^6},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^6,x, algorithm="fricas")
[Out] integral((erf(b*x)^2 - 2*erf(b*x) + 1)/x^6, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^6,x, algorithm="giac")
[Out] integrate(erfc(b*x)^2/x^6, x)
```

maple [A] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^6,x)
[Out] int(erfc(b*x)^2/x^6,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)^2/x^6,x, algorithm="maxima")
[Out] integrate(erfc(b*x)^2/x^6, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erfc}(b\,x)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)^2/x^6,x)
[Out] int(erfc(b*x)^2/x^6, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}^2(bx)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)**2/x**6,x)
```

```
[Out] Integral(erfc(b*x)**2/x**6, x)
```

3.138 $\int (c+dx)^2 \mathbf{erfc}(a+bx)^2\,dx$

Optimal. Leaf size=375

$$-\frac{\sqrt{\frac{2}{\pi}}(bc-ad)^2\operatorname{erf}\left(\sqrt{2}(a+bx)\right)}{b^3}+\frac{d(a+bx)^2(bc-ad)\operatorname{erfc}(a+bx)^2}{b^3}+\frac{(a+bx)(bc-ad)^2\operatorname{erfc}(a+bx)^2}{b^3}-\frac{2de^{-(a+bx}}{}$$

```
[Out] d*(-a*d+b*c)/b^3/exp(2*(b*x+a)^2)/Pi+1/3*d^2*(b*x+a)/b^3/exp(2*(b*x+a)^2)/P
i-1/2*d*(-a*d+b*c)*erfc(b*x+a)^2/b^3+(-a*d+b*c)^2*(b*x+a)*erfc(b*x+a)^2/b^3
+d*(-a*d+b*c)*(b*x+a)^2*erfc(b*x+a)^2/b^3+1/3*d^2*(b*x+a)^3*erfc(b*x+a)^2/b
^3-(-a*d+b*c)^2*erf((b*x+a)*2^(1/2))*2^(1/2)/Pi^(1/2)/b^3-2/3*d^2*erfc(b*x+
a)/b^3/exp((b*x+a)^2)/Pi^(1/2)-2*(-a*d+b*c)^2*erfc(b*x+a)/b^3/exp((b*x+a)^2
)/Pi^(1/2)-2*d*(-a*d+b*c)*(b*x+a)*erfc(b*x+a)/b^3/exp((b*x+a)^2)/Pi^(1/2)-2
/3*d^2*(b*x+a)^2*erfc(b*x+a)/b^3/exp((b*x+a)^2)/Pi^(1/2)-5/12*d^2*erf((b*x+
a)*2^(1/2))/b^3*2^(1/2)/Pi^(1/2)
```

Rubi [A] time = 0.37, antiderivative size = 375, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 10, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}} = 0.625$, Rules used = {6368, 6353, 6383, 2205, 6365, 6386, 6374, 30, 2209, 2212}

$$-\frac{\sqrt{\frac{2}{\pi}}(bc-ad)^2\operatorname{Erf}\left(\sqrt{2}(a+bx)\right)}{b^3}+\frac{d(a+bx)^2(bc-ad)\operatorname{Erfc}(a+bx)^2}{b^3}+\frac{(a+bx)(bc-ad)^2\operatorname{Erfc}(a+bx)^2}{b^3}-\frac{2de^{-(a+b}}{}$$

Antiderivative was successfully verified.

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

```
[Out] (d*(b*c - a*d))/(b^3*E^(2*(a + b*x)^2)*Pi) + (d^2*(a + b*x))/(3*b^3*E^(2*(a
 + b*x)^2)*Pi) - ((b*c - a*d)^2*Sqrt[2/Pi]*Erf[Sqrt[2]*(a + b*x)])/b^3 - (5
*d^2*Erf[Sqrt[2]*(a + b*x)])/(6*b^3*Sqrt[2*Pi]) - (2*d^2*Erfc[a + b*x])/(3*
b^3*E^(a + b*x)^2*Sqrt[Pi]) - (2*(b*c - a*d)^2*Erfc[a + b*x])/(b^3*E^(a + b
*x)^2*Sqrt[Pi]) - (2*d*(b*c - a*d)*(a + b*x)*Erfc[a + b*x])/(b^3*E^(a + b*x
)^2*Sqrt[Pi]) - (2*d^2*(a + b*x)^2*Erfc[a + b*x])/(3*b^3*E^(a + b*x)^2*Sqrt
[Pi]) - (d*(b*c - a*d)*Erfc[a + b*x]^2)/(2*b^3) + ((b*c - a*d)^2*(a + b*x)*
Erfc[a + b*x]^2)/b^3 + (d*(b*c - a*d)*(a + b*x)^2*Erfc[a + b*x]^2)/b^3 + (d
^2*(a + b*x)^3*Erfc[a + b*x]^2)/(3*b^3)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6353

```
Int[Erfc[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erfc[a + b*x]^
2)/b, x] + Dist[4/Sqrt[Pi], Int[((a + b*x)*Erfc[a + b*x])/E^(a + b*x)^2, x]
, x] /; FreeQ[{a, b}, x]
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6368

```
Int[Erfc[(a_) + (b_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Dist
[1/b^(m + 1), Subst[Int[ExpandIntegrand[Erfc[x]^2, (b*c - a*d + d*x)^m, x],
 x], x, a + b*x], x] /; FreeQ[{a, b, c, d}, x] && IGtQ[m, 0]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int (c+dx)^2\text{erfc}(a+bx)^2\,dx = \frac{\text{Subst}\left(\int \left(b^2c^2\left(1+\frac{ad(-2bc+ad)}{b^2c^2}\right)\text{erfc}(x)^2+2bcd\left(1-\frac{ad}{bc}\right)x\text{erfc}(x)^2+d^2x^2\text{erfc}(x)^2\right.}{b^3}$$

$$= \frac{d^2\,\text{Subst}\left(\int x^2\text{erfc}(x)^2\,dx,x,a+bx\right)}{b^3}+\frac{(2d(bc-ad))\,\text{Subst}\left(\int x\text{erfc}(x)^2\,dx,x,a-\right.}{b^3}$$

$$= \frac{(bc-ad)^2(a+bx)\text{erfc}(a+bx)^2}{b^3}+\frac{d(bc-ad)(a+bx)^2\text{erfc}(a+bx)^2}{b^3}+\frac{d^2(a+bx)}{}$$

$$= -\frac{2(bc-ad)^2e^{-(a+bx)^2}\text{erfc}(a+bx)}{b^3\sqrt{\pi}}-\frac{2d(bc-ad)e^{-(a+bx)^2}(a+bx)\text{erfc}(a+bx)}{b^3\sqrt{\pi}}-\frac{2a}{}$$

$$= \frac{d(bc-ad)e^{-2(a+bx)^2}}{b^3\pi}+\frac{d^2e^{-2(a+bx)^2}(a+bx)}{3b^3\pi}-\frac{(bc-ad)^2\sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,(a+bx)\right)}{b^3}-\frac{2}{}$$

$$= \frac{d(bc-ad)e^{-2(a+bx)^2}}{b^3\pi}+\frac{d^2e^{-2(a+bx)^2}(a+bx)}{3b^3\pi}-\frac{d^2\sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,(a+bx)\right)}{3b^3}-\frac{(bc-ad)}{}$$

Mathematica [A] time = 4.48, size = 610, normalized size = 1.63

$$\frac{d^2\left(-12\sqrt{2\pi}\,a^2\text{erf}\left(\sqrt{2}\,(a+bx)\right)+12\pi a^2bx+12\pi ab^2x^2+12\pi bx\text{erf}(a+bx)-12\sqrt{2\pi}\,bx(2a+bx)\text{erf}\left(\sqrt{2}\,(a+\right.\right.}{}$$

Warning: Unable to verify antiderivative.

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

```
[Out] (-12*b^2*Sqrt[Pi]*(c + d*x)^2*(Sqrt[2]*Erf[Sqrt[2]*(a + b*x)] + Erfc[a + b*
x]*(2/E^(a + b*x)^2 - Sqrt[Pi]*(a + b*x)*Erfc[a + b*x])) + 6*b*d*(c + d*x)*
(2/E^(2*(a + b*x)^2) + (4*Sqrt[Pi]*(a + b*x))/E^(a + b*x)^2 - 2*Pi*(a + b*x
)^2 - 2*Pi*Erf[a + b*x] - (4*Sqrt[Pi]*(a + b*x)*Erf[a + b*x])/E^(a + b*x)^2
 + 4*Pi*(a + b*x)^2*Erf[a + b*x] + Pi*Erf[a + b*x]^2 - 2*Pi*(a + b*x)^2*Erf
[a + b*x]^2 + 4*a*Sqrt[2*Pi]*Erf[Sqrt[2]*(a + b*x)] + 4*b*Sqrt[2*Pi]*x*Erf[
Sqrt[2]*(a + b*x)] + 2*Pi*(2 + Erfc[-a - b*x]*Erfc[a + b*x]) - 4*Sqrt[Pi]*(
a + b*x)*ExpIntegralE[1/2, (a + b*x)^2]) + d^2*((24*Sqrt[Pi])/E^(a + b*x)^2
 - 36*b*Pi*x + 12*a^2*b*Pi*x + 12*a*b^2*Pi*x^2 + 4*b^3*Pi*x^3 - (8*(a + b*x
))/E^(2*(a + b*x)^2) - (8*Sqrt[Pi]*(1 + (a + b*x)^2))/E^(a + b*x)^2 + 12*a*
Pi*Erf[a + b*x] + 12*b*Pi*x*Erf[a + b*x] - 8*Pi*(a + b*x)^3*Erf[a + b*x] +
(8*Sqrt[Pi]*(1 + (a + b*x)^2)*Erf[a + b*x])/E^(a + b*x)^2 + 6*Pi*(a + b*x)*
Erf[a + b*x]^2 + 4*Pi*(a + b*x)^3*Erf[a + b*x]^2 - 5*Sqrt[2*Pi]*Erf[Sqrt[2]
*(a + b*x)] - 12*a^2*Sqrt[2*Pi]*Erf[Sqrt[2]*(a + b*x)] - 12*b*Sqrt[2*Pi]*x*
(2*a + b*x)*Erf[Sqrt[2]*(a + b*x)] - 12*Sqrt[Pi]*ExpIntegralE[3/2, (a + b*x
)^2]))/(12*b^3*Pi)
```

fricas [A] time = 0.53, size = 472, normalized size = 1.26

$$\frac{4\,\pi b^4 d^2 x^3 + 12\,\pi b^4 c d x^2 + 12\,\pi b^4 c^2 x - \sqrt{2}\,\sqrt{\pi}\left(12\,b^2c^2 - 24\,abcd + \left(12\,a^2+5\right)d^2\right)\sqrt{b^2}\,\operatorname{erf}\left(\frac{\sqrt{2}\,\sqrt{b^2}\,(bx+a)}{b}\right) - 4\,\pi\left(6\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/12*(4*pi*b^4*d^2*x^3 + 12*pi*b^4*c*d*x^2 + 12*pi*b^4*c^2*x - sqrt(2)*sqrt
(pi)*(12*b^2*c^2 - 24*a*b*c*d + (12*a^2 + 5)*d^2)*sqrt(b^2)*erf(sqrt(2)*sqr
t(b^2)*(b*x + a)/b) - 4*pi*(6*a*b^2*c^2 - 3*(2*a^2 + 1)*b*c*d + (2*a^3 + 3*
a)*d^2)*sqrt(b^2)*erf(sqrt(b^2)*(b*x + a)/b) + 2*(2*pi*b^4*d^2*x^3 + 6*pi*b
^4*c*d*x^2 + 6*pi*b^4*c^2*x + pi*(6*a*b^3*c^2 - 3*(2*a^2 + 1)*b^2*c*d + (2*
a^3 + 3*a)*b*d^2))*erf(b*x + a)^2 - 8*sqrt(pi)*(b^3*d^2*x^2 + 3*b^3*c^2 - 3
*a*b^2*c*d + (a^2 + 1)*b*d^2 + (3*b^3*c*d - a*b^2*d^2)*x - (b^3*d^2*x^2 + 3
*b^3*c^2 - 3*a*b^2*c*d + (a^2 + 1)*b*d^2 + (3*b^3*c*d - a*b^2*d^2)*x)*erf(b
*x + a))*e^(-b^2*x^2 - 2*a*b*x - a^2) - 8*(pi*b^4*d^2*x^3 + 3*pi*b^4*c*d*x^
2 + 3*pi*b^4*c^2*x)*erf(b*x + a) + 4*(b^2*d^2*x + 3*b^2*c*d - 2*a*b*d^2)*e^
(-2*b^2*x^2 - 4*a*b*x - 2*a^2))/(pi*b^4)
```

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

$$\int (dx+c)^2 \operatorname{erfc}(bx+a)^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [F] time = 0.09, size = 0, normalized size = 0.00

$$\int (dx+c)^2 \operatorname{erfc}(bx+a)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

$$\int (dx+c)^2 \operatorname{erfc}(bx+a)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

$$\int \operatorname{erfc}(a+b\,x)^2\,(c+d\,x)^2 \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

$$\int (c+dx)^2 \operatorname{erfc}^2(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)**2*erfc(b*x+a)**2,x)
[Out] Integral((c + d*x)**2*erfc(a + b*x)**2, x)
```

3.139 $\int (c+dx)\textbf{erfc}(a+bx)^2\,dx$

Optimal. Leaf size=189

$$-\frac{\sqrt{\frac{2}{\pi}}(bc-ad)\text{erf}\left(\sqrt{2}(a+bx)\right)}{b^2}+\frac{(a+bx)(bc-ad)\text{erfc}(a+bx)^2}{b^2}-\frac{2e^{-(a+bx)^2}(bc-ad)\text{erfc}(a+bx)}{\sqrt{\pi}b^2}+\frac{d(a+bx)^2\text{erfc}}{2b^2}$$

```
[Out] 1/2*d/b^2/exp(2*(b*x+a)^2)/Pi-1/4*d*erfc(b*x+a)^2/b^2+(-a*d+b*c)*(b*x+a)*er
fc(b*x+a)^2/b^2+1/2*d*(b*x+a)^2*erfc(b*x+a)^2/b^2-(-a*d+b*c)*erf((b*x+a)*2^
(1/2))*2^(1/2)/Pi^(1/2)/b^2-2*(-a*d+b*c)*erfc(b*x+a)/b^2/exp((b*x+a)^2)/Pi^
(1/2)-d*(b*x+a)*erfc(b*x+a)/b^2/exp((b*x+a)^2)/Pi^(1/2)
```

Rubi [A] time = 0.19, antiderivative size = 189, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 9, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.643, Rules used = {6368, 6353, 6383, 2205, 6365, 6386, 6374, 30, 2209}

$$-\frac{\sqrt{\frac{2}{\pi}}(bc-ad)\text{Erf}\left(\sqrt{2}(a+bx)\right)}{b^2}+\frac{(a+bx)(bc-ad)\text{Erfc}(a+bx)^2}{b^2}-\frac{2e^{-(a+bx)^2}(bc-ad)\text{Erfc}(a+bx)}{\sqrt{\pi}b^2}+\frac{d(a+bx)^2\text{Erf}}{2b^2}$$

Antiderivative was successfully verified.

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

```
[Out] d/(2*b^2*E^(2*(a + b*x)^2)*Pi) - ((b*c - a*d)*Sqrt[2/Pi]*Erf[Sqrt[2]*(a + b
*x)])/b^2 - (2*(b*c - a*d)*Erfc[a + b*x])/(b^2*E^(a + b*x)^2*Sqrt[Pi]) - (d
*(a + b*x)*Erfc[a + b*x])/(b^2*E^(a + b*x)^2*Sqrt[Pi]) - (d*Erfc[a + b*x]^2
)/(4*b^2) + ((b*c - a*d)*(a + b*x)*Erfc[a + b*x]^2)/b^2 + (d*(a + b*x)^2*Er
fc[a + b*x]^2)/(2*b^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
```

```
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 6353

```
Int[Erfc[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erfc[a + b*x]^
2)/b, x] + Dist[4/Sqrt[Pi], Int[((a + b*x)*Erfc[a + b*x])/E^(a + b*x)^2, x]
, x] /; FreeQ[{a, b}, x]
```

Rule 6365

```
Int[Erfc[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfc[b*x]^2
)/(m + 1), x] + Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[(x^(m + 1)*Erfc[b*x])/E^
(b^2*x^2), x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6368

```
Int[Erfc[(a_) + (b_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Dist
[1/b^(m + 1), Subst[Int[ExpandIntegrand[Erfc[x]^2, (b*c - a*d + d*x)^m, x],
 x], x, a + b*x], x] /; FreeQ[{a, b, c, d}, x] && IGtQ[m, 0]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int (c+dx)\text{erfc}(a+bx)^2\,dx = \frac{\text{Subst}\left(\int \left(bc\left(1-\frac{ad}{bc}\right)\text{erfc}(x)^2 + dx\text{erfc}(x)^2\right)dx, x, a+bx\right)}{b^2}$$
$$= \frac{d\,\text{Subst}\left(\int x\text{erfc}(x)^2\,dx, x, a+bx\right)}{b^2} + \frac{(bc-ad)\,\text{Subst}\left(\int \text{erfc}(x)^2\,dx, x, a+bx\right)}{b^2}$$
$$= \frac{(bc-ad)(a+bx)\text{erfc}(a+bx)^2}{b^2} + \frac{d(a+bx)^2\text{erfc}(a+bx)^2}{2b^2} + \frac{(2d)\,\text{Subst}\left(\int e^{-x^2}x^2\text{erf}\right.}{b^2\sqrt{\pi}}$$
$$= -\frac{2(bc-ad)e^{-(a+bx)^2}\text{erfc}(a+bx)}{b^2\sqrt{\pi}} - \frac{de^{-(a+bx)^2}(a+bx)\text{erfc}(a+bx)}{b^2\sqrt{\pi}} + \frac{(bc-ad)(a+b}{b}$$
$$= \frac{de^{-2(a+bx)^2}}{2b^2\pi} - \frac{(bc-ad)\sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,(a+bx)\right)}{b^2} - \frac{2(bc-ad)e^{-(a+bx)^2}\text{erfc}(a+bx)}{b^2\sqrt{\pi}} - \frac{de^{-}}{}$$
$$= \frac{de^{-2(a+bx)^2}}{2b^2\pi} - \frac{(bc-ad)\sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,(a+bx)\right)}{b^2} - \frac{2(bc-ad)e^{-(a+bx)^2}\text{erfc}(a+bx)}{b^2\sqrt{\pi}} - \frac{de^{-}}{}$$

Mathematica [A] time = 1.36, size = 301, normalized size = 1.59

$$\frac{4b(c+dx)\left(\text{erfc}(a+bx)\left((a+bx)\text{erfc}(a+bx) - \frac{2e^{-(a+bx)^2}}{\sqrt{\pi}}\right) - \sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,(a+bx)\right)\right) + \frac{d\left(-2\pi(a+bx)^2\text{erf}(a+bx)^2 + 4\pi(a+bx)\right.}{}}{}$$

Warning: Unable to verify antiderivative.

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

```
[Out] (4*b*(c + d*x)*(-(Sqrt[2/Pi]*Erf[Sqrt[2]*(a + b*x)]) + Erfc[a + b*x]*(-2/(E
^(a + b*x)^2*Sqrt[Pi]) + (a + b*x)*Erfc[a + b*x])) + (d*(2/E^(2*(a + b*x)^2
) + (4*Sqrt[Pi]*(a + b*x))/E^(a + b*x)^2 - 2*Pi*(a + b*x)^2 - 2*Pi*Erf[a +
b*x] - (4*Sqrt[Pi]*(a + b*x)*Erf[a + b*x])/E^(a + b*x)^2 + 4*Pi*(a + b*x)^2
*Erf[a + b*x] + Pi*Erf[a + b*x]^2 - 2*Pi*(a + b*x)^2*Erf[a + b*x]^2 + 4*a*S
qrt[2*Pi]*Erf[Sqrt[2]*(a + b*x)] + 4*b*Sqrt[2*Pi]*x*Erf[Sqrt[2]*(a + b*x)]
+ 2*Pi*(2 + Erfc[-a - b*x]*Erfc[a + b*x]) - 4*Sqrt[Pi]*(a + b*x)*ExpIntegra
lE[1/2, (a + b*x)^2]))/Pi)/(4*b^2)
```

fricas [A] time = 0.42, size = 273, normalized size = 1.44

$$\frac{2\,\pi b^3dx^2 + 4\,\pi b^3cx - 4\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,(bc-ad)\,\text{erf}\left(\frac{\sqrt{2}\,\sqrt{b^2}\,(bx+a)}{b}\right) - 2\,\pi\left(4\,abc - \left(2\,a^2+1\right)d\right)\sqrt{b^2}\,\text{erf}\left(\frac{\sqrt{b^2}\,(bx+a)}{b}\right) + \left(\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*(2*pi*b^3*d*x^2 + 4*pi*b^3*c*x - 4*sqrt(2)*sqrt(pi)*sqrt(b^2)*(b*c - a*
d)*erf(sqrt(2)*sqrt(b^2)*(b*x + a)/b) - 2*pi*(4*a*b*c - (2*a^2 + 1)*d)*sqrt
(b^2)*erf(sqrt(b^2)*(b*x + a)/b) + (2*pi*b^3*d*x^2 + 4*pi*b^3*c*x + pi*(4*a
*b^2*c - (2*a^2 + 1)*b*d))*erf(b*x + a)^2 + 2*b*d*e^(-2*b^2*x^2 - 4*a*b*x -
 2*a^2) - 4*sqrt(pi)*(b^2*d*x + 2*b^2*c - a*b*d - (b^2*d*x + 2*b^2*c - a*b*
d)*erf(b*x + a))*e^(-b^2*x^2 - 2*a*b*x - a^2) - 4*(pi*b^3*d*x^2 + 2*pi*b^3*
c*x)*erf(b*x + a))/(pi*b^3)
```

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

$$\int (dx + c)\,\text{erfc}\,(bx + a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int (dx + c)\,\text{erfc}\,(bx + a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int (dx + c)\,\text{erfc}\,(bx + a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \text{erfc}\,(a + b\,x)^2\,(c + d\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int (c+dx)\operatorname{erfc}^2(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.140 $\int \text{erfc}(a+bx)^2\,dx$

Optimal. Leaf size=71

$$-\frac{\sqrt{\frac{2}{\pi}}\operatorname{erf}\left(\sqrt{2}\,(a+bx)\right)}{b}+\frac{(a+bx)\operatorname{erfc}(a+bx)^2}{b}-\frac{2e^{-(a+bx)^2}\operatorname{erfc}(a+bx)}{\sqrt{\pi}\,b}$$

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

Rubi [A] time = 0.16, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6353, 6383, 2205}

$$-\frac{\sqrt{\frac{2}{\pi}}\operatorname{Erf}\left(\sqrt{2}\,(a+bx)\right)}{b}+\frac{(a+bx)\operatorname{Erfc}(a+bx)^2}{b}-\frac{2e^{-(a+bx)^2}\operatorname{Erfc}(a+bx)}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[a + b*x]^2,x]
```

```
[Out] -((Sqrt[2/Pi]*Erf[Sqrt[2]*(a + b*x)])/b) - (2*Erfc[a + b*x])/(b*E^(a + b*x)
^2*Sqrt[Pi]) + ((a + b*x)*Erfc[a + b*x]^2)/b
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 6353

```
Int[Erfc[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erfc[a + b*x]^
2)/b, x] + Dist[4/Sqrt[Pi], Int[((a + b*x)*Erfc[a + b*x])/E^(a + b*x)^2, x]
, x] /; FreeQ[{a, b}, x]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int \text{erfc}(a+bx)^2\,dx = \frac{(a+bx)\text{erfc}(a+bx)^2}{b} + \frac{4\int e^{-(a+bx)^2}(a+bx)\text{erfc}(a+bx)\,dx}{\sqrt{\pi}}$$
$$= \frac{(a+bx)\text{erfc}(a+bx)^2}{b} + \frac{4\,\text{Subst}\left(\int e^{-x^2}x\text{erfc}(x)\,dx, x, a+bx\right)}{b\sqrt{\pi}}$$
$$= -\frac{2e^{-(a+bx)^2}\text{erfc}(a+bx)}{b\sqrt{\pi}} + \frac{(a+bx)\text{erfc}(a+bx)^2}{b} - \frac{4\,\text{Subst}\left(\int e^{-2x^2}\,dx, x, a+bx\right)}{b\pi}$$
$$= -\frac{\sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,(a+bx)\right)}{b} - \frac{2e^{-(a+bx)^2}\text{erfc}(a+bx)}{b\sqrt{\pi}} + \frac{(a+bx)\text{erfc}(a+bx)^2}{b}$$

Mathematica [**A**] time = 0.01, size = 66, normalized size = 0.93

$$\frac{\text{erfc}(a+bx)\left((a+bx)\text{erfc}(a+bx) - \frac{2e^{-(a+bx)^2}}{\sqrt{\pi}}\right) - \sqrt{\frac{2}{\pi}}\,\text{erf}\left(\sqrt{2}\,(a+bx)\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[a + b*x]^2,x]
```

```
[Out] (-(Sqrt[2/Pi]*Erf[Sqrt[2]*(a + b*x)]) + Erfc[a + b*x]*(-2/(E^(a + b*x)^2*Sq
rt[Pi]) + (a + b*x)*Erfc[a + b*x]))/b
```

fricas [**B**] time = 0.45, size = 141, normalized size = 1.99

$$-\frac{2\,\pi b^2 x\,\text{erf}\,(bx+a) - \pi b^2 x + 2\,\pi a\sqrt{b^2}\,\,\text{erf}\left(\frac{\sqrt{b^2}\,(bx+a)}{b}\right) - \left(\pi b^2 x + \pi ab\right)\text{erf}\,(bx+a)^2 + \sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,\,\text{erf}\left(\frac{\sqrt{2}\,\sqrt{b^2}\,(bx\cdots}{b}\right.}{\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(2*pi*b^2*x*erf(b*x + a) - pi*b^2*x + 2*pi*a*sqrt(b^2)*erf(sqrt(b^2)*(b*x
+ a)/b) - (pi*b^2*x + pi*a*b)*erf(b*x + a)^2 + sqrt(2)*sqrt(pi)*sqrt(b^2)*e
rf(sqrt(2)*sqrt(b^2)*(b*x + a)/b) - 2*sqrt(pi)*(b*erf(b*x + a) - b)*e^(-b^2
*x^2 - 2*a*b*x - a^2))/(pi*b^2)
```

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

$$\int \text{erfc}\,(bx+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.00, size = 59, normalized size = 0.83

$$\frac{(bx+a)\,\mathrm{erf}\,(bx+a)^2+\frac{2\,\mathrm{erf}(bx+a)\mathrm{e}^{-(bx+a)^2}}{\sqrt{\pi}}-\frac{\sqrt{2}\,\,\mathrm{erf}\left((bx+a)\sqrt{2}\right)}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \mathrm{erfc}\,(bx+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(erfc(a + b*x)^2, x)
```

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

$$\int \mathrm{erfc}^2\,(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.141 $\int \frac{\text{erfc}(a+bx)^2}{c+dx}\,dx$

Optimal. Leaf size=19

$$\text{Int}\left(\frac{\text{erfc}(a+bx)^2}{c+dx},x\right)$$

```
[Out] Unintegrable(erfc(b*x+a)^2/(d*x+c),x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfc}(a+bx)^2}{c+dx}\,dx$$

Verification is Not applicable to the result.

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

```
[Out] Defer[Int][Erfc[a + b*x]^2/(c + d*x), x]
```

Rubi steps

$$\int \frac{\text{erfc}(a+bx)^2}{c+dx}\,dx=\int \frac{\text{erfc}(a+bx)^2}{c+dx}\,dx$$

Mathematica [A] time = 0.51, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(a+bx)^2}{c+dx}\,dx$$

Verification is Not applicable to the result.

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

```
[Out] Integrate[Erfc[a + b*x]^2/(c + d*x), x]
```

fricas [A] time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\left(bx+a\right)^2-2\,\text{erf}\left(bx+a\right)+1}{dx+c},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x+a)^2/(d*x+c),x, algorithm="fricas")
[Out] integral((erf(b*x + a)^2 - 2*erf(b*x + a) + 1)/(d*x + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)^2}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.08, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)^2}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)^2}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{erfc}(a+b\,x)^2}{c+d\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}^2(a+bx)}{c+dx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(erfc(a + b*x)**2/(c + d*x), x)
```

3.142 $\int \frac{\text{erfc}(a+bx)^2}{(c+dx)^2} dx$

Optimal. Leaf size=19

$$\text{Int}\left(\frac{\text{erfc}(a+bx)^2}{(c+dx)^2}, x\right)$$

```
[Out] Unintegrable(erfc(b*x+a)^2/(d*x+c)^2,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfc}(a+bx)^2}{(c+dx)^2} dx$$

Verification is Not applicable to the result.

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

```
[Out] Defer[Int][Erfc[a + b*x]^2/(c + d*x)^2, x]
```

Rubi steps

$$\int \frac{\text{erfc}(a+bx)^2}{(c+dx)^2} dx = \int \frac{\text{erfc}(a+bx)^2}{(c+dx)^2} dx$$

Mathematica [A] time = 0.50, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(a+bx)^2}{(c+dx)^2} dx$$

Verification is Not applicable to the result.

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

```
[Out] Integrate[Erfc[a + b*x]^2/(c + d*x)^2, x]
```

fricas [A] time = 0.40, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erf}\,(bx+a)^2 - 2\,\text{erf}\,(bx+a) + 1}{d^2x^2 + 2\,cdx + c^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral((erf(b*x + a)^2 - 2*erf(b*x + a) + 1)/(d^2*x^2 + 2*c*d*x + c^2), x
)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)^2}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)^2}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)^2}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{erfc}(a+b\,x)^2}{(c+d\,x)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}^2(a+bx)}{(c+dx)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(erfc(a + b*x)**2/(c + d*x)**2, x)
```

3.143 $\int x^2 \mathbf{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=102

$$\frac{1}{3}x^3\left(cx^n\right)^{-3/n}e^{\frac{9-12abd^2n}{4b^2d^2n^2}}\text{erf}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)-\frac{3}{n}}{2bd}\right)+\frac{1}{3}x^3\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)$$

```
[Out] 1/3*exp(1/4*(-12*a*b*d^2*n+9)/b^2/d^2/n^2)*x^3*erf(1/2*(2*a*b*d^2-3/n+2*b^2
*d^2*ln(c*x^n))/b/d)/((c*x^n)^(3/n))+1/3*x^3*erfc(d*(a+b*ln(c*x^n)))
```

Rubi [A] time = 0.22, antiderivative size = 102, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.412, Rules used = {6402, 2278, 2274, 15, 2276, 2234, 2205}

$$\frac{1}{3}x^3\left(cx^n\right)^{-3/n}e^{\frac{9-12abd^2n}{4b^2d^2n^2}}\text{Erf}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)-\frac{3}{n}}{2bd}\right)+\frac{1}{3}x^3\text{Erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Erfc[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (E^((9 - 12*a*b*d^2*n)/(4*b^2*d^2*n^2))*x^3*Erf[(2*a*b*d^2 - 3/n + 2*b^2*d^
2*Log[c*x^n])/(2*b*d)])/(3*(c*x^n)^(3/n)) + (x^3*Erfc[d*(a + b*Log[c*x^n])]
)/3
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6402

```
Int[Erfc[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfc[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 + Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x^2\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx=\frac{1}{3}x^3\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{(2bdn)\int e^{-d^2\left(a+b\log(cx^n)\right)^2}x^2\,dx}{3\sqrt{\pi}}$$

$$=\frac{1}{3}x^3\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{(2bdn)\int\exp\left(-a^2d^2-2abd^2\log\left(cx^n\right)-b^2d^2\right.}{3\sqrt{\pi}}$$

$$=\frac{1}{3}x^3\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{(2bdn)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x^2\left(cx^n\right)^{-2abd^2}\,dx}{3\sqrt{\pi}}$$

$$=\frac{1}{3}x^3\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{\left(2bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}}{3\sqrt{\pi}}$$

$$=\frac{1}{3}x^3\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{\left(2bdx^3\left(cx^n\right)^{-2abd^2-\frac{3-2abd^2n}{n}}\right)\text{Subst}\left(\int\exp\left(-a\right.\right.}{3\sqrt{}}$$

$$=\frac{1}{3}x^3\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{\left(2bde^{\frac{9-12abd^2n}{4b^2d^2n^2}}x^3\left(cx^n\right)^{-2abd^2-\frac{3-2abd^2n}{n}}\right)\text{Subst}\left(\int\right.}{3\sqrt{\pi}}$$

$$=\frac{1}{3}e^{\frac{9-12abd^2n}{4b^2d^2n^2}}x^3\left(cx^n\right)^{-3/n}\text{erf}\left(\frac{2abd^2-\frac{3}{n}+2b^2d^2\log\left(cx^n\right)}{2bd}\right)+\frac{1}{3}x^3\text{erfc}\left(d\left(a+b\right.\right.$$

Mathematica [A] time = 0.34, size = 87, normalized size = 0.85

$$\frac{1}{3}\left(x^3\text{erf}\left(ad+bd\log\left(cx^n\right)-\frac{3}{2bdn}\right)\exp\left(\frac{3\left(\frac{\frac{3}{d^2}-4abn}{b^2}-4n\log\left(cx^n\right)\right)}{4n^2}\right)+x^3\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*Erfc[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (E^((3*((3/d^2 - 4*a*b*n)/b^2 - 4*n*Log[c*x^n]))/(4*n^2))*x^3*Erf[a*d - 3/(
2*b*d*n) + b*d*Log[c*x^n]] + x^3*Erfc[d*(a + b*Log[c*x^n])])/3
```

fricas [A] time = 0.54, size = 130, normalized size = 1.27

$$-\frac{1}{3}x^3\,\text{erf}\left(bd\log\left(cx^n\right)+ad\right)+\frac{1}{3}x^3+\frac{1}{3}\sqrt{b^2d^2n^2}\,\text{erf}\left(\frac{\left(2\,b^2d^2n^2\log(x)+2\,b^2d^2n\log(c)+2\,abd^2n-3\right)\sqrt{b^2d^2n^2}}{2\,b^2d^2n^2}\right)e$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 1.49, size = 90, normalized size = 0.88

$$-\frac{1}{3}\,x^3\,\mathrm{erf}\left(bdn\log(x)+bd\log(c)+ad\right)+\frac{1}{3}\,x^3-\frac{\mathrm{erf}\left(-bdn\log(x)-bd\log(c)-ad+\frac{3}{2\,bdn}\right)e^{\left(-\frac{3\,a}{bn}+\frac{9}{4\,b^2d^2n^2}\right)}}{3\,c^{\frac{3}{n}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/3*x^3*erf(b*d*n*log(x) + b*d*log(c) + a*d) + 1/3*x^3 - 1/3*erf(-b*d*n*lo
g(x) - b*d*log(c) - a*d + 3/2/(b*d*n))*e^(-3*a/(b*n) + 9/4/(b^2*d^2*n^2))/c
^(3/n)
```

maple [F] time = 0.16, size = 0, normalized size = 0.00

$$\int x^2\mathrm{erfc}\left(d\left(a+b\ln\left(c\,x^n\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfc(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int(x^2*erfc(d*(a+b*ln(c*x^n))),x)
```

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

$$\int x^2\,\mathrm{erfc}\left(\left(b\log\left(cx^n\right)+a\right)d\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(x^2*erfc((b*log(c*x^n) + a)*d), x)
```

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

$$\int x^2\,\mathrm{erfc}\left(d\,\left(a+b\,\ln\left(c\,x^n\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfc(d*(a + b*log(c*x^n))),x)
```

```
[Out] int(x^2*erfc(d*(a + b*log(c*x^n))), x)
```

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

$$\int x^2 \operatorname{erfc}\left(ad + bd\log\left(cx^n\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erfc(d*(a+b*ln(c*x**n))),x)
```

```
[Out] Integral(x**2*erfc(a*d + b*d*log(c*x**n)), x)
```

3.144 $\int x\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=94

$$\frac{1}{2}x^2\left(cx^n\right)^{-2/n}e^{\frac{1-2abd^2n}{b^2d^2n^2}}\text{erf}\left(\frac{abd^2+b^2d^2\log\left(cx^n\right)-\frac{1}{n}}{bd}\right)+\frac{1}{2}x^2\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)$$

```
[Out] 1/2*exp((-2*a*b*d^2*n+1)/b^2/d^2/n^2)*x^2*erf((a*b*d^2-1/n+b^2*d^2*ln(c*x^n
))/b/d)/((c*x^n)^(2/n))+1/2*x^2*erfc(d*(a+b*ln(c*x^n)))
```

Rubi [A] time = 0.17, antiderivative size = 94, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.467, Rules used = {6402, 2278, 2274, 15, 2276, 2234, 2205}

$$\frac{1}{2}x^2\left(cx^n\right)^{-2/n}e^{\frac{1-2abd^2n}{b^2d^2n^2}}\text{Erf}\left(\frac{abd^2+b^2d^2\log\left(cx^n\right)-\frac{1}{n}}{bd}\right)+\frac{1}{2}x^2\text{Erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)$$

Antiderivative was successfully verified.

```
[In] Int[x*Erfc[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (E^((1 - 2*a*b*d^2*n)/(b^2*d^2*n^2))*x^2*Erf[(a*b*d^2 - n^(-1) + b^2*d^2*Lo
g[c*x^n])/(b*d)])/(2*(c*x^n)^(2/n)) + (x^2*Erfc[d*(a + b*Log[c*x^n])])/2
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6402

```
Int[Erfc[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfc[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 + Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx=\frac{1}{2}x^2\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{(bdn)\int e^{-d^2\left(a+b\log(cx^n)\right)^2}x\,dx}{\sqrt{\pi}}$$

$$=\frac{1}{2}x^2\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{(bdn)\int \exp\left(-a^2d^2-2abd^2\log\left(cx^n\right)-b^2d^2$$

$$=\frac{1}{2}x^2\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{(bdn)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x\left(cx^n\right)^{-2abd^2}\,dx}{\sqrt{\pi}}$$

$$=\frac{1}{2}x^2\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{\left(bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x$$

$$=\frac{1}{2}x^2\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{\left(bdx^2\left(cx^n\right)^{-2abd^2-\frac{2-2abd^2n}{n}}\right)\text{Subst}\left(\int\exp\left(-a^2$$

$$=\frac{1}{2}x^2\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{\left(bde^{\frac{1-2abd^2n}{b^2d^2n^2}}x^2\left(cx^n\right)^{-2abd^2-\frac{2-2abd^2n}{n}}\right)\text{Subst}\left(\int e$$

$$=\frac{1}{2}e^{\frac{1-2abd^2n}{b^2d^2n^2}}x^2\left(cx^n\right)^{-2/n}\text{erf}\left(\frac{abd^2-\frac{1}{n}+b^2d^2\log\left(cx^n\right)}{bd}\right)+\frac{1}{2}x^2\text{erfc}\left(d\left(a+b\log$$

Mathematica [A] time = 0.30, size = 80, normalized size = 0.85

$$\frac{1}{2}\left(x^2e^{\frac{\frac{\frac{1}{d^2}-2abn}{b^2}-2n\log\left(cx^n\right)}{n^2}}\text{erf}\left(ad+bd\log\left(cx^n\right)-\frac{1}{bdn}\right)+x^2\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Erfc[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (E^(((d^(-2) - 2*a*b*n)/b^2 - 2*n*Log[c*x^n])/n^2)*x^2*Erf[a*d - 1/(b*d*n)
+ b*d*Log[c*x^n]] + x^2*Erfc[d*(a + b*Log[c*x^n])])/2
```

fricas [A] time = 0.43, size = 126, normalized size = 1.34

$$-\frac{1}{2}x^2\,\text{erf}\left(bd\log\left(cx^n\right)+ad\right)+\frac{1}{2}\sqrt{b^2d^2n^2}\,\text{erf}\left(\frac{\left(b^2d^2n^2\log(x)+b^2d^2n\log(c)+abd^2n-1\right)\sqrt{b^2d^2n^2}}{b^2d^2n^2}\right)e^{\left(-\frac{2b^2d^2n\log}{b^2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

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

giac [A] time = 1.16, size = 88, normalized size = 0.94

$$-\frac{1}{2}x^2\operatorname{erf}\left(bdn\log(x)+bd\log(c)+ad\right)+\frac{1}{2}x^2-\frac{\operatorname{erf}\left(-bdn\log(x)-bd\log(c)-ad+\frac{1}{bdn}\right)e^{\left(-\frac{2a}{bn}+\frac{1}{b^2d^2n^2}\right)}}{2c^{\frac{2}{n}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] -1/2*x^2*erf(b*d*n*log(x) + b*d*log(c) + a*d) + 1/2*x^2 - 1/2*erf(-b*d*n*lo
g(x) - b*d*log(c) - a*d + 1/(b*d*n))*e^(-2*a/(b*n) + 1/(b^2*d^2*n^2))/c^(2/
n)
```

maple [F] time = 0.14, size = 0, normalized size = 0.00

$$\int x\operatorname{erfc}\left(d\left(a+b\ln\left(cx^n\right)\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfc(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int(x*erfc(d*(a+b*ln(c*x^n))),x)
```

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

$$\int x\operatorname{erfc}\left(\left(b\log\left(cx^n\right)+a\right)d\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] integrate(x*erfc((b*log(c*x^n) + a)*d), x)
```

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

$$\int x\operatorname{erfc}\left(d\left(a+b\ln\left(cx^n\right)\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfc(d*(a + b*log(c*x^n))),x)
[Out] int(x*erfc(d*(a + b*log(c*x^n))), x)
```

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

$$\int x \operatorname{erfc}\left(ad + bd \log\left(cx^{n}\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(d*(a+b*ln(c*x**n))),x)
[Out] Integral(x*erfc(a*d + b*d*log(c*x**n)), x)
```

3.145 $\int \text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=92

$$x\left(cx^n\right)^{-1/n} e^{\frac{1-4abd^2n}{4b^2d^2n^2}} \text{erf}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)-\frac{1}{n}}{2bd}\right)+x\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)$$

```
[Out] exp(1/4*(-4*a*b*d^2*n+1)/b^2/d^2/n^2)*x*erf(1/2*(2*a*b*d^2-1/n+2*b^2*d^2*ln
(c*x^n))/b/d)/((c*x^n)^(1/n))+x*erfc(d*(a+b*ln(c*x^n)))
```

Rubi [A] time = 0.10, antiderivative size = 92, 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 = {6398, 2277, 2274, 15, 2276, 2234, 2205}

$$x\left(cx^n\right)^{-1/n} e^{\frac{1-4abd^2n}{4b^2d^2n^2}} \text{Erf}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)-\frac{1}{n}}{2bd}\right)+x\text{Erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (E^((1 - 4*a*b*d^2*n)/(4*b^2*d^2*n^2))*x*Erf[(2*a*b*d^2 - n^(-1) + 2*b^2*d^
2*Log[c*x^n])/(2*b*d)])/(c*x^n)^n^(-1) + x*Erfc[d*(a + b*Log[c*x^n])]
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2277

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.)), x_Symbol] :> Int[
F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]^2), x] /; FreeQ[{F, a, b,
c, d, n}, x]
```

Rule 6398

```
Int[Erfc[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)], x_Symbol] :> Simp[x*
Erfc[d*(a + b*Log[c*x^n])], x] + Dist[(2*b*d*n)/Sqrt[Pi], Int[1/E^(d*(a + b
*Log[c*x^n]))^2, x], x] /; FreeQ[{a, b, c, d, n}, x]
```

Rubi steps

$$\int \operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)dx = x\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{(2bdn)\int e^{-d^2\left(a+b\log(cx^n)\right)^2}dx}{\sqrt{\pi}}$$

$$= x\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{(2bdn)\int \exp\left(-a^2d^2-2abd^2\log\left(cx^n\right)-b^2d^2\log^2\right.}{\sqrt{\pi}}$$

$$= x\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{(2bdn)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}\left(cx^n\right)^{-2abd^2}dx}{\sqrt{\pi}}$$

$$= x\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{\left(2bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x^{-2ab}}{\sqrt{\pi}}$$

$$= x\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{\left(2bdx\left(cx^n\right)^{-2abd^2-\frac{1-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int\exp\left(-a^2d^2+\right.\right.}{\sqrt{\pi}}$$

$$= x\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)+\frac{\left(2bde^{\frac{1-4abd^2n}{4b^2d^2n^2}}x\left(cx^n\right)^{-2abd^2-\frac{1-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int\exp\left(-\right.\right.}{\sqrt{\pi}}$$

$$= e^{\frac{1-4abd^2n}{4b^2d^2n^2}}x\left(cx^n\right)^{-1/n}\operatorname{erf}\left(\frac{2abd^2-\frac{1}{n}+2b^2d^2\log\left(cx^n\right)}{2bd}\right)+x\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right.\right.$$

Mathematica [A] time = 0.28, size = 77, normalized size = 0.84

$$xe^{\frac{\frac{\frac{1}{d^2}-4abn}{b^2}-4n\log\left(cx^n\right)}{4n^2}}\operatorname{erf}\left(ad+bd\log\left(cx^n\right)-\frac{1}{2bdn}\right)+x\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[d*(a + b*Log[c*x^n])],x]
```

```
[Out] E^(((d^(-2) - 4*a*b*n)/b^2 - 4*n*Log[c*x^n])/(4*n^2))*x*Erf[a*d - 1/(2*b*d*
n) + b*d*Log[c*x^n]] + x*Erfc[d*(a + b*Log[c*x^n])]
```

fricas [A] time = 0.55, size = 123, normalized size = 1.34

$$\sqrt{b^2d^2n^2}\operatorname{erf}\left(\frac{\left(2\,b^2d^2n^2\log(x)+2\,b^2d^2n\log(c)+2\,abd^2n-1\right)\sqrt{b^2d^2n^2}}{2\,b^2d^2n^2}\right)e^{\left(-\frac{4\,b^2d^2n\log(c)+4\,abd^2n-1}{4\,b^2d^2n^2}\right)}-x\operatorname{erf}\left(bd\log\left(cx^n\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

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

giac [A] time = 0.79, size = 82, normalized size = 0.89

$$-x\,\mathrm{erf}\left(bdn\log(x)+bd\log(c)+ad\right)+x-\frac{\mathrm{erf}\left(-bdn\log(x)-bd\log(c)-ad+\frac{1}{2\,bdn}\right)e^{\left(-\frac{a}{bn}+\frac{1}{4\,b^2d^2n^2}\right)}}{c^{\left(\frac{1}{n}\right)}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] -x*erf(b*d*n*log(x) + b*d*log(c) + a*d) + x - erf(-b*d*n*log(x) - b*d*log(c
) - a*d + 1/2/(b*d*n))*e^(-a/(b*n) + 1/4/(b^2*d^2*n^2))/c^(1/n)
```

maple [F] time = 0.15, size = 0, normalized size = 0.00

$$\int \mathrm{erfc}\left(d\left(a+b\ln\left(c\,x^{n}\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int(erfc(d*(a+b*ln(c*x^n))),x)
```

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

$$\int \mathrm{erfc}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] integrate(erfc((b*log(c*x^n) + a)*d), x)
```

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

$$\int \mathrm{erfc}\left(d\,\left(a+b\,\ln\left(c\,x^{n}\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(d*(a + b*log(c*x^n))),x)
```

```
[Out] int(erfc(d*(a + b*log(c*x^n))), x)
```

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

$$\int \operatorname{erfc}\left(d\left(a + b\log\left(cx^{n}\right)\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*ln(c*x**n))),x)
```

```
[Out] Integral(erfc(d*(a + b*log(c*x**n))), x)
```

3.146 $\int \frac{\mathrm{erfc}\left(d\left(a+b\log(cx^n)\right)\right)}{x}\,dx$

Optimal. Leaf size=66

$$\frac{\left(a+b\log\left(cx^n\right)\right)\mathrm{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{bn}-\frac{e^{-d^2\left(a+b\log(cx^n)\right)^2}}{\sqrt{\pi}\,bdn}$$

```
[Out] erfc(d*(a+b*ln(c*x^n)))*(a+b*ln(c*x^n))/b/n-1/b/d/exp(d^2*(a+b*ln(c*x^n))^2
)/n/Pi^(1/2)
```

Rubi [A] time = 0.04, antiderivative size = 66, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 1, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.059, Rules used = {6350}

$$\frac{\left(a+b\log\left(cx^n\right)\right)\mathrm{Erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{bn}-\frac{e^{-d^2\left(a+b\log(cx^n)\right)^2}}{\sqrt{\pi}\,bdn}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[d*(a + b*Log[c*x^n])]/x,x]
```

```
[Out] -(1/(b*d*E^(d^2*(a + b*Log[c*x^n])^2)*n*Sqrt[Pi])) + (Erfc[d*(a + b*Log[c*x
^n])]*(a + b*Log[c*x^n]))/(b*n)
```

Rule 6350

```
Int[Erfc[(a_.) + (b_.)*(x_)], x_Symbol] :> Simp[((a + b*x)*Erfc[a + b*x])/b
, x] - Simp[1/(b*Sqrt[Pi]*E^(a + b*x)^2), x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\begin{aligned}\int \frac{\mathrm{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}\,dx &= \frac{\mathrm{Subst}\left(\int \mathrm{erfc}(d(a+bx))\,dx,x,\log\left(cx^n\right)\right)}{n}\\ &= \frac{\mathrm{Subst}\left(\int \mathrm{erfc}(x)\,dx,x,ad+bd\log\left(cx^n\right)\right)}{bdn}\\ &= -\frac{e^{-\left(ad+bd\log(cx^n)\right)^2}}{bdn\sqrt{\pi}}+\frac{\mathrm{erfc}\left(ad+bd\log\left(cx^n\right)\right)\left(a+b\log\left(cx^n\right)\right)}{bn}\end{aligned}$$

Mathematica [A] time = 0.13, size = 93, normalized size = 1.41

$$\frac{-\frac{(cx^n)^{-2abd^2}e^{-d^2\left(a^2+b^2\log^2(cx^n)\right)}}{\sqrt{\pi}\,bd}-\frac{a\operatorname{erf}\left(d\left(a+b\log(cx^n)\right)\right)}{b}+\log\left(cx^n\right)\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{n}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[d*(a + b*Log[c*x^n])]/x,x]
```

```
[Out] (-(1/(b*d*E^(d^2*(a^2 + b^2*Log[c*x^n]^2))*Sqrt[Pi]*(c*x^n)^(2*a*b*d^2))) -
 (a*Erf[d*(a + b*Log[c*x^n])])/b + Erfc[d*(a + b*Log[c*x^n])]*Log[c*x^n])/n
```

fricas [B] time = 0.49, size = 128, normalized size = 1.94

$$\frac{\pi bdn\log(x)-\left(\pi bdn\log(x)+\pi bd\log(c)+\pi ad\right)\operatorname{erf}\left(bd\log\left(cx^n\right)+ad\right)-\sqrt{\pi}\,e^{\left(-b^2d^2n^2\log(x)^2-b^2d^2\log(c)^2-2\,abd^2\log(c\right.}}{\pi bdn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*log(c*x^n)))/x,x, algorithm="fricas")
```

```
[Out] (pi*b*d*n*log(x) - (pi*b*d*n*log(x) + pi*b*d*log(c) + pi*a*d)*erf(b*d*log(c
*x^n) + a*d) - sqrt(pi)*e^(-b^2*d^2*n^2*log(x)^2 - b^2*d^2*log(c)^2 - 2*a*b
*d^2*log(c) - a^2*d^2 - 2*(b^2*d^2*n*log(c) + a*b*d^2*n)*log(x)))/(pi*b*d*n
)
```

giac [A] time = 0.22, size = 83, normalized size = 1.26

$$\frac{bdn\log(x)+bd\log(c)+ad-\left(bdn\log(x)+bd\log(c)+ad\right)\operatorname{erf}\left(bdn\log(x)+bd\log(c)+ad\right)-\frac{e^{\left(-\left(bdn\log(x)+bd\log(c)+\right.\right.}}{\sqrt{\pi}}}{bdn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*log(c*x^n)))/x,x, algorithm="giac")
```

```
[Out] (b*d*n*log(x) + b*d*log(c) + a*d - (b*d*n*log(x) + b*d*log(c) + a*d)*erf(b*
d*n*log(x) + b*d*log(c) + a*d) - e^(-(b*d*n*log(x) + b*d*log(c) + a*d)^2)/s
qrt(pi))/(b*d*n)
```

maple [A] time = 0.06, size = 80, normalized size = 1.21

$$\frac{\ln\left(c\,x^n\right)\operatorname{erfc}\left(ad+bd\ln\left(c\,x^n\right)\right)}{n}+\frac{\operatorname{erfc}\left(ad+bd\ln\left(c\,x^n\right)\right)a}{nb}-\frac{\mathrm{e}^{-\left(ad+bd\ln\left(c\,x^n\right)\right)^2}}{nbd\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(d*(a+b*ln(c*x^n)))/x,x)
```

```
[Out] 1/n*ln(c*x^n)*erfc(a*d+b*d*ln(c*x^n))+1/n/b*erfc(a*d+b*d*ln(c*x^n))*a-1/n/b
/d/Pi^(1/2)*exp(-(a*d+b*d*ln(c*x^n))^2)
```

maxima [A] time = 0.32, size = 59, normalized size = 0.89

$$\frac{\left(b\log\left(cx^{n}\right)+a\right)d\operatorname{erfc}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)-\frac{e^{\left(-\left(b\log\left(cx^{n}\right)+a\right)^{2}d^{2}\right)}}{\sqrt{\pi}}}{bdn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*log(c*x^n)))/x,x, algorithm="maxima")
```

```
[Out] ((b*log(c*x^n) + a)*d*erfc((b*log(c*x^n) + a)*d) - e^(-(b*log(c*x^n) + a)^2
*d^2)/sqrt(pi))/(b*d*n)
```

mupad [B] time = 0.45, size = 100, normalized size = 1.52

$$\frac{\operatorname{erfc}\left(d\ \left(a+b\ \ln\left(c\,x^n\right)\right)\right)\,\ln\left(c\,x^n\right)}{n}+\frac{a\operatorname{erfc}\left(d\ \left(a+b\ \ln\left(c\,x^n\right)\right)\right)}{b\,n}-\frac{\mathrm{e}^{-b^2\,d^2\,{\ln\left(c\,x^n\right)}^2}\,\mathrm{e}^{-a^2\,d^2}}{b\,d\,n\,\sqrt{\pi}\,\left(c\,x^n\right)^{2\,a\,b\,d^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(d*(a + b*log(c*x^n)))/x,x)
```

```
[Out] (erfc(d*(a + b*log(c*x^n)))*log(c*x^n))/n + (a*erfc(d*(a + b*log(c*x^n))))/
(b*n) - (exp(-b^2*d^2*log(c*x^n)^2)*exp(-a^2*d^2))/(b*d*n*pi^(1/2)*(c*x^n)^
(2*a*b*d^2))
```

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

$$\int\frac{\operatorname{erfc}\left(ad+bd\log\left(cx^{n}\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*ln(c*x**n)))/x,x)
```

```
[Out] Integral(erfc(a*d + b*d*log(c*x**n))/x, x)
```

3.147 $\int \frac{\mathbf{erfc}\left(d\left(a+b\log(cx^n)\right)\right)}{x^2}\,dx$

Optimal. Leaf size=93

$$-\frac{(cx^n)^{\frac{1}{n}}\, e^{\frac{a}{bn}+\frac{1}{4b^2d^2n^2}}\operatorname{erf}\left(\frac{2abd^2+2b^2d^2\log(cx^n)+\frac{1}{n}}{2bd}\right)}{x}-\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

```
[Out] -exp(1/4/b^2/d^2/n^2+a/b/n)*(c*x^n)^(1/n)*erf(1/2*(2*a*b*d^2+1/n+2*b^2*d^2*
ln(c*x^n))/b/d)/x-erfc(d*(a+b*ln(c*x^n)))/x
```

Rubi [A] time = 0.18, antiderivative size = 93, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.412, Rules used = {6402, 2278, 2274, 15, 2276, 2234, 2205}

$$-\frac{(cx^n)^{\frac{1}{n}}\, e^{\frac{a}{bn}+\frac{1}{4b^2d^2n^2}}\operatorname{Erf}\left(\frac{2abd^2+2b^2d^2\log(cx^n)+\frac{1}{n}}{2bd}\right)}{x}-\frac{\operatorname{Erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[d*(a + b*Log[c*x^n])]/x^2,x]
```

```
[Out] -((E^(1/(4*b^2*d^2*n^2) + a/(b*n))*(c*x^n)^n^(-1)*Erf[(2*a*b*d^2 + n^(-1) +
 2*b^2*d^2*Log[c*x^n])/(2*b*d)])/x) - Erfc[d*(a + b*Log[c*x^n])]/x
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6402

```
Int[Erfc[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfc[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 + Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x^2}\,dx = -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} - \frac{(2bdn)\int \frac{e^{-d^2\left(a+b\log\left(cx^n\right)\right)^2}}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} - \frac{(2bdn)\int \frac{\exp\left(-a^2d^2-2abd^2\log(cx^n)-b^2d^2\log^2(cx^n)\right)}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} - \frac{(2bdn)\int \frac{e^{-a^2d^2-b^2d^2\log^2(cx^n)}(cx^n)^{-2abd^2}}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} - \frac{\left(2bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x^{-2-}}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} - \frac{\left(2bd\left(cx^n\right)^{-2abd^2-\frac{-1-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\left(-a^2d^2+\right.\right.}{\sqrt{\pi}\,x}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x} - \frac{\left(2bde^{\frac{1}{4b^2d^2n^2}+\frac{a}{bn}}\left(cx^n\right)^{-2abd^2-\frac{-1-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\right.}{\sqrt{\pi}\,x}$$

$$= -\frac{e^{\frac{1}{4b^2d^2n^2}+\frac{a}{bn}}\left(cx^n\right)^{\frac{1}{n}}\operatorname{erf}\left(\frac{2abd^2+\frac{1}{n}+2b^2d^2\log(cx^n)}{2bd}\right)}{x} - \frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

Mathematica [A] time = 0.27, size = 81, normalized size = 0.87

$$-\frac{\left(cx^n\right)^{\frac{1}{n}}e^{\frac{4abd^2n+1}{4b^2d^2n^2}}\operatorname{erf}\left(ad+bd\log\left(cx^n\right)+\frac{1}{2bdn}\right)+\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[d*(a + b*Log[c*x^n])]/x^2,x]
```

```
[Out] -((E^((1 + 4*a*b*d^2*n)/(4*b^2*d^2*n^2))*(c*x^n)^n^(-1)*Erf[a*d + 1/(2*b*d*
n) + b*d*Log[c*x^n]] + Erfc[d*(a + b*Log[c*x^n])])/x)
```

fricas [A] time = 0.51, size = 128, normalized size = 1.38

$$-\frac{\sqrt{b^2d^2n^2}\,x\operatorname{erf}\left(\frac{\left(2\,b^2d^2n^2\log(x)+2\,b^2d^2n\log(c)+2\,abd^2n+1\right)\sqrt{b^2d^2n^2}}{2\,b^2d^2n^2}\right)e^{\left(\frac{4\,b^2d^2n\log(c)+4\,abd^2n+1}{4\,b^2d^2n^2}\right)}-\operatorname{erf}\left(bd\log\left(cx^n\right)+ad\right)+1}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\operatorname{erfc}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erfc((b*log(c*x^n) + a)*d)/x^2, x)
```

maple [F] time = 0.21, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}\left(d\left(a+b\ln\left(c\,x^{n}\right)\right)\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(d*(a+b*ln(c*x^n)))/x^2,x)
```

```
[Out] int(erfc(d*(a+b*ln(c*x^n)))/x^2,x)
```

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

$$\int \frac{\operatorname{erfc}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erfc((b*log(c*x^n) + a)*d)/x^2, x)
```

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

$$\int \frac{\operatorname{erfc}\left(d\,\left(a+b\,\ln\left(c\,x^{n}\right)\right)\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(d*(a + b*log(c*x^n)))/x^2,x)
```

```
[Out] int(erfc(d*(a + b*log(c*x^n)))/x^2, x)
```

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

$$\int \frac{\operatorname{erfc}\left(ad + bd\log\left(cx^{n}\right)\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*ln(c*x**n)))/x**2,x)
```

```
[Out] Integral(erfc(a*d + b*d*log(c*x**n))/x**2, x)
```

3.148 $\int \frac{\mathbf{erfc}\left(d\left(a+b\log(cx^n)\right)\right)}{x^3}\,dx$

Optimal. Leaf size=95

$$-\frac{(cx^n)^{2/n}\,e^{\frac{2abd^2n+1}{b^2d^2n^2}}\,\mathrm{erf}\left(\frac{abd^2n+b^2d^2n\log(cx^n)+1}{bdn}\right)}{2x^2}-\frac{\mathrm{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

```
[Out] -1/2*exp((2*a*b*d^2*n+1)/b^2/d^2/n^2)*(c*x^n)^(2/n)*erf((1+a*b*d^2*n+b^2*d^
2*n*ln(c*x^n))/b/d/n)/x^2-1/2*erfc(d*(a+b*ln(c*x^n)))/x^2
```

Rubi [A] time = 0.19, antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.412, Rules used = {6402, 2278, 2274, 15, 2276, 2234, 2205}

$$-\frac{(cx^n)^{2/n}\,e^{\frac{2abd^2n+1}{b^2d^2n^2}}\,\mathrm{Erf}\left(\frac{abd^2n+b^2d^2n\log(cx^n)+1}{bdn}\right)}{2x^2}-\frac{\mathrm{Erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[d*(a + b*Log[c*x^n])]/x^3,x]
```

```
[Out] -(E^((1 + 2*a*b*d^2*n)/(b^2*d^2*n^2))*(c*x^n)^(2/n)*Erf[(1 + a*b*d^2*n + b^
2*d^2*n*Log[c*x^n])/(b*d*n)])/(2*x^2) - Erfc[d*(a + b*Log[c*x^n])]/(2*x^2)
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6402

```
Int[Erfc[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfc[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 + Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x^3}\,dx = -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} - \frac{(bdn)\int \frac{e^{-d^2\left(a+b\log\left(cx^n\right)\right)^2}}{x^3}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} - \frac{(bdn)\int \frac{\exp\left(-a^2d^2-2abd^2\log(cx^n)-b^2d^2\log^2(cx^n)\right)}{x^3}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} - \frac{(bdn)\int \frac{e^{-a^2d^2-b^2d^2\log^2\left(cx^n\right)}\left(cx^n\right)^{-2abd^2}}{x^3}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} - \frac{\left(bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}x^{-3-}}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} - \frac{\left(bd\left(cx^n\right)^{-2abd^2-\frac{-2-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\left(-a^2d^2+\right.\right.}{\sqrt{\pi}\,x^2}$$

$$= -\frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} - \frac{\left(bde^{\frac{1+2abd^2n}{b^2d^2n^2}}\left(cx^n\right)^{-2abd^2-\frac{-2-2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\left(\right.\right.}{\sqrt{\pi}\,x^2}$$

$$= -\frac{e^{\frac{1+2abd^2n}{b^2d^2n^2}}\left(cx^n\right)^{2/n}\operatorname{erf}\left(\frac{1+abd^2n+b^2d^2n\log(cx^n)}{bdn}\right)}{2x^2} - \frac{\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

Mathematica [A] time = 0.26, size = 79, normalized size = 0.83

$$-\frac{\left(cx^n\right)^{2/n}e^{\frac{2abd^2n+1}{b^2d^2n^2}}\operatorname{erf}\left(ad+bd\log\left(cx^n\right)+\frac{1}{bdn}\right)+\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[d*(a + b*Log[c*x^n])]/x^3,x]
```

```
[Out] -1/2*(E^((1 + 2*a*b*d^2*n)/(b^2*d^2*n^2))*(c*x^n)^(2/n)*Erf[a*d + 1/(b*d*n)
 + b*d*Log[c*x^n]] + Erfc[d*(a + b*Log[c*x^n])])/x^2
```

fricas [A] time = 0.43, size = 125, normalized size = 1.32

$$-\frac{\sqrt{b^2d^2n^2}\,x^2\operatorname{erf}\left(\frac{\left(b^2d^2n^2\log(x)+b^2d^2n\log(c)+abd^2n+1\right)\sqrt{b^2d^2n^2}}{b^2d^2n^2}\right)e^{\left(\frac{2\,b^2d^2n\log(c)+2\,abd^2n+1}{b^2d^2n^2}\right)} - \operatorname{erf}\left(bd\log\left(cx^n\right)+ad\right)+1}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\operatorname{erfc}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erfc((b*log(c*x^n) + a)*d)/x^3, x)
```

maple [F] time = 0.22, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}\left(d\left(a+b\ln\left(c\,x^{n}\right)\right)\right)}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(d*(a+b*ln(c*x^n)))/x^3,x)
```

```
[Out] int(erfc(d*(a+b*ln(c*x^n)))/x^3,x)
```

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

$$\int \frac{\operatorname{erfc}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(erfc((b*log(c*x^n) + a)*d)/x^3, x)
```

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

$$\int \frac{\operatorname{erfc}\left(d\,\left(a+b\,\ln\left(c\,x^{n}\right)\right)\right)}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(d*(a + b*log(c*x^n)))/x^3,x)
```

```
[Out] int(erfc(d*(a + b*log(c*x^n)))/x^3, x)
```

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

$$\int \frac{\operatorname{erfc}\left(ad + bd \log\left(cx^{n}\right)\right)}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(d*(a+b*ln(c*x**n)))/x**3,x)
```

```
[Out] Integral(erfc(a*d + b*d*log(c*x**n))/x**3, x)
```

3.149 $\int (ex)^m \mathbf{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=126

$$\frac{(ex)^{m+1}\operatorname{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(m+1)}-\frac{x(ex)^m\left(cx^n\right)^{-\frac{m+1}{n}}\exp\left(\frac{(m+1)\left(-4abd^2n+m+1\right)}{4b^2d^2n^2}\right)\operatorname{erf}\left(\frac{-2abd^2n-2b^2d^2n\log\left(cx^n\right)+m+1}{2bdn}\right)}{m+1}$$

```
[Out] -exp(1/4*(1+m)*(-4*a*b*d^2*n+m+1)/b^2/d^2/n^2)*x*(e*x)^m*erf(1/2*(1+m-2*a*b
*d^2*n-2*b^2*d^2*n*ln(c*x^n))/b/d/n)/(1+m)/((c*x^n)^((1+m)/n))+(e*x)^(1+m)*
erfc(d*(a+b*ln(c*x^n)))/e/(1+m)
```

Rubi [A] time = 0.25, antiderivative size = 126, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.421, Rules used = {6402, 2278, 2274, 15, 20, 2276, 2234, 2205}

$$\frac{(ex)^{m+1}\operatorname{Erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(m+1)}-\frac{x(ex)^m\left(cx^n\right)^{-\frac{m+1}{n}}\exp\left(\frac{(m+1)\left(-4abd^2n+m+1\right)}{4b^2d^2n^2}\right)\operatorname{Erf}\left(\frac{-2abd^2n-2b^2d^2n\log\left(cx^n\right)+m+1}{2bdn}\right)}{m+1}$$

Antiderivative was successfully verified.

```
[In] Int[(e*x)^m*Erfc[d*(a + b*Log[c*x^n])],x]
```

```
[Out] -((E^(((1 + m)*(1 + m - 4*a*b*d^2*n))/(4*b^2*d^2*n^2))*x*(e*x)^m*Erf[(1 + m
 - 2*a*b*d^2*n - 2*b^2*d^2*n*Log[c*x^n])/(2*b*d*n)])/((1 + m)*(c*x^n)^((1 +
 m)/n))) + ((e*x)^(1 + m)*Erfc[d*(a + b*Log[c*x^n])])/(e*(1 + m))
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 20

```
Int[(u_.)*((a_.)*(v_))^(m_)*((b_.)*(v_))^(n_), x_Symbol] :> Dist[(b^IntPart
[n]*(b*v)^FracPart[n])/(a^IntPart[n]*(a*v)^FracPart[n]), Int[u*(a*v)^(m + n
), x], x] /; FreeQ[{a, b, m, n}, x] && !IntegerQ[m] && !IntegerQ[n] && !
IntegerQ[m + n]
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
```

```
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6402

```
Int[Erfc[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfc[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 + Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m/E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (ex)^m \text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx = \frac{(ex)^{1+m}\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} + \frac{(2bdn)\int e^{-d^2\left(a+b\log(cx^n)\right)^2}(ex)^m\,dx}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} + \frac{(2bdn)\int \exp\left(-a^2d^2-2abd^2\log\left(cx^n\right)\right.}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} + \frac{(2bdn)\int e^{-a^2d^2-b^2d^2\log^2(cx^n)}(ex)^m\left(cx^n\right)^{-}}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} + \frac{\left(2bdnx^{2abd^2n}\left(cx^n\right)^{-2abd^2}\right)\int e^{-a^2d^2-b^2d^2\,\mathrm{l}}}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} + \frac{\left(2bdnx^{-m+2abd^2n}(ex)^m\left(cx^n\right)^{-2abd^2}\right)\int e^{-}}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} + \frac{\left(2bdx(ex)^m\left(cx^n\right)^{-2abd^2-\frac{1+m-2abd^2n}{n}}\right)\text{Sub}}{}$$

$$= \frac{(ex)^{1+m}\text{erfc}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} + \frac{\left(2bd\exp\left(\frac{(1+m)\left(1+m-4abd^2n\right)}{4b^2d^2n^2}\right)x(ex)^m\left(c\right.\right.}{}$$

$$= -\frac{\exp\left(\frac{(1+m)\left(1+m-4abd^2n\right)}{4b^2d^2n^2}\right)x(ex)^m\left(cx^n\right)^{-\frac{1+m}{n}}\text{erf}\left(\frac{1+m-2abd^2n-2b^2d^2n\log(cx^n)}{2bdn}\right)}{1+m} +$$

Mathematica [A] time = 0.53, size = 126, normalized size = 1.00

$$\frac{(ex)^m\left(x^{-m}\text{erf}\left(ad-\frac{-2b^2d^2n\log(cx^n)+m+1}{2bdn}\right)\exp\left(\frac{(m+1)\left(-4abd^2n-4b^2d^2n\log(cx^n)+4b^2d^2n^2\log(x)+m+1\right)}{4b^2d^2n^2}\right)+x\text{erfc}\left(d\left(a+b\log\left(\right.\right.\right.\right.}{m+1}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e*x)^m*Erfc[d*(a + b*Log[c*x^n])],x]
```

```
[Out] ((e*x)^m*((E^(((1 + m)*(1 + m - 4*a*b*d^2*n + 4*b^2*d^2*n^2*Log[x] - 4*b^2*
d^2*n*Log[c*x^n]))/(4*b^2*d^2*n^2))*Erf[a*d - (1 + m - 2*b^2*d^2*n*Log[c*x^
n])/(2*b*d*n)])/x^m + x*Erfc[d*(a + b*Log[c*x^n])]))/(1 + m)
```

fricas [A] time = 0.42, size = 194, normalized size = 1.54

$$-\frac{x\operatorname{erf}\left(bd\log\left(cx^{n}\right)+ad\right)e^{\left(m\log(e)+m\log(x)\right)}-\sqrt{b^{2}d^{2}n^{2}}\operatorname{erf}\left(\frac{\left(2\,b^{2}d^{2}n^{2}\log(x)+2\,b^{2}d^{2}n\log(c)+2\,abd^{2}n-m-1\right)\sqrt{b^{2}d^{2}n^{2}}}{2\,b^{2}d^{2}n^{2}}\right)e^{\left(\frac{4\,b^{2}d^{2}m}{\cdots}\right.}}{m+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)^m*erfc(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

```
[Out] -(x*erf(b*d*log(c*x^n) + a*d)*e^(m*log(e) + m*log(x)) - sqrt(b^2*d^2*n^2)*e
rf(1/2*(2*b^2*d^2*n^2*log(x) + 2*b^2*d^2*n*log(c) + 2*a*b*d^2*n - m - 1)*sq
rt(b^2*d^2*n^2)/(b^2*d^2*n^2))*e^(1/4*(4*b^2*d^2*m*n^2*log(e) - 4*(b^2*d^2*
m + b^2*d^2)*n*log(c) + m^2 - 4*(a*b*d^2*m + a*b*d^2)*n + 2*m + 1)/(b^2*d^2
*n^2)) - x*e^(m*log(e) + m*log(x)))/(m + 1)
```

giac [A] time = 0.80, size = 169, normalized size = 1.34

$$-\frac{xx^{m}\operatorname{erf}\left(bdn\log(x)+bd\log(c)+ad\right)e^{m}}{m+1}+\frac{xx^{m}e^{m}}{m+1}-\frac{\pi\operatorname{erf}\left(-bdn\log(x)-bd\log(c)-ad+\frac{m}{2\,bdn}+\frac{1}{2\,bdn}\right)e^{\left(m-\frac{am}{bn}-\cdots\right.}}{(\pi+\pi m)c^{\frac{m}{n}}c^{\left(\frac{1}{n}\right)}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)^m*erfc(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] -x*x^m*erf(b*d*n*log(x) + b*d*log(c) + a*d)*e^m/(m + 1) + x*x^m*e^m/(m + 1)
 - pi*erf(-b*d*n*log(x) - b*d*log(c) - a*d + 1/2*m/(b*d*n) + 1/2/(b*d*n))*e
^(m - a*m/(b*n) - a/(b*n) + 1/4*m^2/(b^2*d^2*n^2) + 1/2*m/(b^2*d^2*n^2) + 1
/4/(b^2*d^2*n^2))/((pi + pi*m)*c^(m/n)*c^(1/n))
```

maple [F] time = 0.10, size = 0, normalized size = 0.00

$$\int (ex)^{m}\operatorname{erfc}\left(d\left(a+b\ln\left(c\,x^{n}\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x)^m*erfc(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int((e*x)^m*erfc(d*(a+b*ln(c*x^n))),x)
```

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

$$\int (ex)^{m}\operatorname{erfc}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)^m*erfc(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] integrate((e*x)^m*erfc((b*log(c*x^n) + a)*d), x)
```

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

$$\int \operatorname{erfc}\left(d\ \left(a+b\ \ln\left(c\,x^n\right)\right)\right)\ \left(e\,x\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(d*(a + b*log(c*x^n)))*(e*x)^m,x)
```

```
[Out] int(erfc(d*(a + b*log(c*x^n)))*(e*x)^m, x)
```

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

$$\int (ex)^m \operatorname{erfc}\left(ad + bd\log\left(cx^n\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)**m*erfc(d*(a+b*ln(c*x**n))),x)
```

```
[Out] Integral((e*x)**m*erfc(a*d + b*d*log(c*x**n)), x)
```

3.150 $\int e^{c-b^2x^2}\text{erfc}(bx)^2\,dx$

Optimal. Leaf size=21

$$-\frac{\sqrt{\pi}\,e^c\text{erfc}(bx)^3}{6b}$$

```
[Out] -1/6*exp(c)*erfc(b*x)^3*Pi^(1/2)/b
```

Rubi [A] time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6374, 30}

$$-\frac{\sqrt{\pi}\,e^c\text{Erfc}(bx)^3}{6b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)*Erfc[b*x]^2,x]
```

```
[Out] -(E^c*Sqrt[Pi]*Erfc[b*x]^3)/(6*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c-b^2x^2}\text{erfc}(bx)^2\,dx &= -\frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int x^2\,dx,x,\text{erfc}(bx)\right)}{2b}\\ &= -\frac{e^c\sqrt{\pi}\,\text{erfc}(bx)^3}{6b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$-\frac{\sqrt{\pi}\,e^c\text{erfc}(bx)^3}{6b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)*Erfc[b*x]^2,x]
```

```
[Out] -1/6*(E^c*Sqrt[Pi]*Erfc[b*x]^3)/b
```

fricas [A] time = 0.51, size = 31, normalized size = 1.48

$$\frac{\sqrt{\pi}\left(\operatorname{erf}(bx)^3 - 3\operatorname{erf}(bx)^2 + 3\operatorname{erf}(bx)\right)e^c}{6b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erfc(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/6*sqrt(pi)*(erf(b*x)^3 - 3*erf(b*x)^2 + 3*erf(b*x))*e^c/b
```

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

$$\int \operatorname{erfc}(bx)^2 e^{\left(-b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erfc(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)^2*e^(-b^2*x^2 + c), x)
```

maple [B] time = 0.19, size = 43, normalized size = 2.05

$$\frac{\frac{e^c\sqrt{\pi}\ \operatorname{erf}(bx)}{2} - \frac{e^c\sqrt{\pi}\ \operatorname{erf}(bx)^2}{2} + \frac{e^c\sqrt{\pi}\ \operatorname{erf}(bx)^3}{6}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)*erfc(b*x)^2,x)
```

```
[Out] (1/2*exp(c)*Pi^(1/2)*erf(b*x)-1/2*exp(c)*Pi^(1/2)*erf(b*x)^2+1/6*exp(c)*Pi^
(1/2)*erf(b*x)^3)/b
```

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

$$\int \operatorname{erfc}(bx)^2 e^{\left(-b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erfc(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)^2*e^(-b^2*x^2 + c), x)
```

mupad [B] time = 0.15, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\ \mathrm{e}^c\,\mathrm{erfc}\left(b\,x\right)^3}{6\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)*erfc(b*x)^2,x)
```

```
[Out] -(pi^(1/2)*exp(c)*erfc(b*x)^3)/(6*b)
```

sympy [A] time = 1.66, size = 24, normalized size = 1.14

$$\begin{cases} -\frac{\sqrt{\pi} e^{c} \operatorname{erfc}^{3}{\left(bx \right)}}{6b} & \text{for}\: b \neq 0 \\ xe^{c} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)*erfc(b*x)**2,x)
```

```
[Out] Piecewise((-sqrt(pi)*exp(c)*erfc(b*x)**3/(6*b), Ne(b, 0)), (x*exp(c), True)
)
```

3.151 $\int e^{c-b^2x^2}\,\mathrm{erfc}(bx)\,dx$

Optimal. Leaf size=21

$$-\frac{\sqrt{\pi}\,e^c\mathrm{erfc}(bx)^2}{4b}$$

```
[Out] -1/4*exp(c)*erfc(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.02, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {6374, 30}

$$-\frac{\sqrt{\pi}\,e^c\mathrm{Erfc}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)*Erfc[b*x],x]
```

```
[Out] -(E^c*Sqrt[Pi]*Erfc[b*x]^2)/(4*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c-b^2x^2}\mathrm{erfc}(bx)\,dx &= -\frac{\left(e^c\sqrt{\pi}\right)\mathrm{Subst}(\int x\,dx, x, \mathrm{erfc}(bx))}{2b}\\ &= -\frac{e^c\sqrt{\pi}\,\mathrm{erfc}(bx)^2}{4b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$-\frac{\sqrt{\pi}\,e^c\mathrm{erfc}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)*Erfc[b*x],x]
[Out] -1/4*(E^c*Sqrt[Pi]*Erfc[b*x]^2)/b
```

fricas [A] time = 0.52, size = 23, normalized size = 1.10

$$-\frac{\sqrt{\pi}\left(\operatorname{erf}(bx)^2 - 2\operatorname{erf}(bx)\right)e^c}{4b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erfc(b*x),x, algorithm="fricas")
[Out] -1/4*sqrt(pi)*(erf(b*x)^2 - 2*erf(b*x))*e^c/b
```

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

$$\int \operatorname{erfc}(bx)\, e^{\left(-b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erfc(b*x),x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(-b^2*x^2 + c), x)
```

maple [A] time = 0.06, size = 30, normalized size = 1.43

$$\frac{\frac{e^c\sqrt{\pi}\ \operatorname{erf}(bx)}{2} - \frac{e^c\sqrt{\pi}\ \operatorname{erf}(bx)^2}{4}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)*erfc(b*x),x)
[Out] (1/2*exp(c)*Pi^(1/2)*erf(b*x)-1/4*exp(c)*Pi^(1/2)*erf(b*x)^2)/b
```

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

$$\int \operatorname{erfc}(bx)\, e^{\left(-b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erfc(b*x),x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(-b^2*x^2 + c), x)
```

mupad [B] time = 0.15, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\ \mathrm{e}^{c}\,\mathrm{erfc}\left(b\,x\right)^2}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)*erfc(b*x),x)
```

```
[Out] -(pi^(1/2)*exp(c)*erfc(b*x)^2)/(4*b)
```

sympy [A] time = 0.62, size = 24, normalized size = 1.14

$$\begin{cases} -\frac{\sqrt{\pi}e^{c}\operatorname{erfc}^{2}\left(bx\right)}{4b} & \text{for}\ b \neq 0 \\ xe^{c} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)*erfc(b*x),x)
```

```
[Out] Piecewise((-sqrt(pi)*exp(c)*erfc(b*x)**2/(4*b), Ne(b, 0)), (x*exp(c), True)
)
```

3.152 $\int \frac{e^{c-b^2x^2}}{\text{erfc}(bx)} \, dx$

Optimal. Leaf size=20

$$-\frac{\sqrt{\pi}\, e^c \log(\text{erfc}(bx))}{2b}$$

```
[Out] -1/2*exp(c)*ln(erfc(b*x))*Pi^(1/2)/b
```

Rubi [A] time = 0.03, antiderivative size = 20, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6374, 29}

$$-\frac{\sqrt{\pi}\, e^c \log(\text{Erfc}(bx))}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)/Erfc[b*x],x]
```

```
[Out] -(E^c*Sqrt[Pi]*Log[Erfc[b*x]])/(2*b)
```

Rule 29

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

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c-b^2x^2}}{\text{erfc}(bx)} \, dx &= -\frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int \frac{1}{x} \, dx, x, \text{erfc}(bx)\right)}{2b}\\ &= -\frac{e^c\sqrt{\pi}\, \log(\text{erfc}(bx))}{2b}\end{aligned}$$

Mathematica [A] time = 0.02, size = 20, normalized size = 1.00

$$-\frac{\sqrt{\pi}\, e^c \log(\text{erfc}(bx))}{2b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)/Erfc[b*x],x]
```

```
[Out] -1/2*(E^c*Sqrt[Pi]*Log[Erfc[b*x]])/b
```

fricas [A] time = 0.42, size = 17, normalized size = 0.85

$$-\frac{\sqrt{\pi}\, e^{c} \log\left(\text{erf}\left(bx\right) - 1\right)}{2\, b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/2*sqrt(pi)*e^c*log(erf(b*x) - 1)/b
```

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

$$\int \frac{e^{\left(-b^{2} x^{2} + c\right)}}{\text{erfc}\left(bx\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(e^(-b^2*x^2 + c)/erfc(b*x), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{-b^{2} x^{2}+c}}{\text{erfc}\left(bx\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)/erfc(b*x),x)
```

```
[Out] int(exp(-b^2*x^2+c)/erfc(b*x),x)
```

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

$$\int \frac{e^{\left(-b^{2} x^{2} + c\right)}}{\text{erfc}\left(bx\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

[Out] integrate(e^(-b^2*x^2 + c)/erfc(b*x), x)

mupad [B] time = 0.18, size = 15, normalized size = 0.75

$$-\frac{\sqrt{\pi}\ \ln\left(\mathrm{erfc}\left(b\,x\right)\right)\,\mathrm{e}^c}{2\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(exp(c - b^2*x^2)/erfc(b*x),x)

[Out] -(pi^(1/2)*log(erfc(b*x))*exp(c))/(2*b)

sympy [A] time = 0.44, size = 24, normalized size = 1.20

$$\begin{cases} -\frac{\sqrt{\pi}e^{c}\log\left(\mathrm{erfc}\left(bx\right)\right)}{2b} & \text{for } b \neq 0 \\ xe^{c} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(exp(-b**2*x**2+c)/erfc(b*x),x)

[Out] Piecewise((-sqrt(pi)*exp(c)*log(erfc(b*x))/(2*b), Ne(b, 0)), (x*exp(c), True))

3.153 $\int \frac{e^{c-b^2x^2}}{\mathbf{erfc}(bx)^2}\,dx$

Optimal. Leaf size=21

$$\frac{\sqrt{\pi}\,e^c}{2b\text{erfc}(bx)}$$

```
[Out] 1/2*exp(c)*Pi^(1/2)/b/erfc(b*x)
```

Rubi [A] time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6374, 30}

$$\frac{\sqrt{\pi}\,e^c}{2b\text{Erfc}(bx)}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)/Erfc[b*x]^2,x]
```

```
[Out] (E^c*Sqrt[Pi])/(2*b*Erfc[b*x])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c-b^2x^2}}{\text{erfc}(bx)^2}\,dx &= -\frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int \frac{1}{x^2}\,dx, x, \text{erfc}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}}{2b\text{erfc}(bx)}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c}{2b\text{erfc}(bx)}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)/Erfc[b*x]^2,x]
```

```
[Out] (E^c*Sqrt[Pi])/(2*b*Erfc[b*x])
```

fricas [A] time = 0.39, size = 19, normalized size = 0.90

$$-\frac{\sqrt{\pi}\,e^{c}}{2\,(b\operatorname{erf}(bx)-b)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/2*sqrt(pi)*e^c/(b*erf(b*x) - b)
```

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

$$\int \frac{e^{\left(-b^{2}x^{2}+c\right)}}{\operatorname{erfc}(bx)^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(e^(-b^2*x^2 + c)/erfc(b*x)^2, x)
```

maple [F] time = 0.12, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{-b^{2}x^{2}+c}}{\operatorname{erfc}(bx)^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)/erfc(b*x)^2,x)
```

```
[Out] int(exp(-b^2*x^2+c)/erfc(b*x)^2,x)
```

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

$$\int \frac{e^{\left(-b^{2}x^{2}+c\right)}}{\operatorname{erfc}(bx)^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(e^(-b^2*x^2 + c)/erfc(b*x)^2, x)
```

mupad [B] time = 0.16, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\ \mathrm{e}^c}{2\,b\,\mathrm{erfc}\left(b\,x\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)/erfc(b*x)^2,x)
```

```
[Out] (pi^(1/2)*exp(c))/(2*b*erfc(b*x))
```

sympy [A] time = 0.98, size = 20, normalized size = 0.95

$$\begin{cases} \frac{\sqrt{\pi}e^{c}}{2b\,\mathrm{erfc}\left(bx\right)} & \text{for}\: b \neq 0 \\ xe^{c} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)/erfc(b*x)**2,x)
```

```
[Out] Piecewise((sqrt(pi)*exp(c)/(2*b*erfc(b*x)), Ne(b, 0)), (x*exp(c), True))
```

3.154 $\int \frac{e^{c-b^2x^2}}{\mathbf{erfc}(bx)^3}\,dx$

Optimal. Leaf size=21

$$\frac{\sqrt{\pi}\,e^c}{4b\mathrm{erfc}(bx)^2}$$

```
[Out] 1/4*exp(c)*Pi^(1/2)/b/erfc(b*x)^2
```

Rubi [A] time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6374, 30}

$$\frac{\sqrt{\pi}\,e^c}{4b\mathrm{Erfc}(bx)^2}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)/Erfc[b*x]^3,x]
```

```
[Out] (E^c*Sqrt[Pi])/(4*b*Erfc[b*x]^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c-b^2x^2}}{\mathrm{erfc}(bx)^3}\,dx &= -\frac{\left(e^c\sqrt{\pi}\right)\mathrm{Subst}\left(\int \frac{1}{x^3}\,dx, x, \mathrm{erfc}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}}{4b\mathrm{erfc}(bx)^2}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c}{4b\mathrm{erfc}(bx)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)/Erfc[b*x]^3,x]
[Out] (E^c*Sqrt[Pi])/(4*b*Erfc[b*x]^2)
```

fricas [A] time = 1.41, size = 26, normalized size = 1.24

$$\frac{\sqrt{\pi}\, e^{c}}{4\left(b\,\text{erf}\,(bx)^{2} - 2\,b\,\text{erf}\,(bx) + b\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)/erfc(b*x)^3,x, algorithm="fricas")
[Out] 1/4*sqrt(pi)*e^c/(b*erf(b*x)^2 - 2*b*erf(b*x) + b)
```

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

$$\int \frac{e^{\left(-b^{2} x^{2} + c\right)}}{\text{erfc}\,(bx)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)/erfc(b*x)^3,x, algorithm="giac")
[Out] integrate(e^(-b^2*x^2 + c)/erfc(b*x)^3, x)
```

maple [F] time = 0.36, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{-b^{2} x^{2}+c}}{\text{erfc}\,(bx)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)/erfc(b*x)^3,x)
[Out] int(exp(-b^2*x^2+c)/erfc(b*x)^3,x)
```

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

$$\int \frac{e^{\left(-b^{2} x^{2} + c\right)}}{\text{erfc}\,(bx)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)/erfc(b*x)^3,x, algorithm="maxima")
```

```
[Out] integrate(e^(-b^2*x^2 + c)/erfc(b*x)^3, x)
```

mupad [B] time = 0.09, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\ \mathrm{e}^{c}}{4\,b\,\mathrm{erfc}\left(b\,x\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)/erfc(b*x)^3,x)
[Out] (pi^(1/2)*exp(c))/(4*b*erfc(b*x)^2)
```

sympy [A] time = 2.06, size = 22, normalized size = 1.05

$$\begin{cases} \frac{\sqrt{\pi} e^{c}}{4b \operatorname{erfc}^{2}{\left(bx \right)}} & \text{for}\: b \neq 0 \\ xe^{c} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)/erfc(b*x)**3,x)
[Out] Piecewise((sqrt(pi)*exp(c)/(4*b*erfc(b*x)**2), Ne(b, 0)), (x*exp(c), True))
```

3.155 $\int e^{c-b^2x^2}\textbf{erfc}(bx)^n\,dx$

Optimal. Leaf size=28

$$-\frac{\sqrt{\pi}\,e^c\text{erfc}(bx)^{n+1}}{2b(n+1)}$$

```
[Out] -1/2*exp(c)*erfc(b*x)^(1+n)*Pi^(1/2)/b/(1+n)
```

Rubi [A] time = 0.03, antiderivative size = 28, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105, Rules used = {6374, 30}

$$-\frac{\sqrt{\pi}\,e^c\text{Erfc}(bx)^{n+1}}{2b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c - b^2*x^2)*Erfc[b*x]^n,x]
```

```
[Out] -(E^c*Sqrt[Pi]*Erfc[b*x]^(1 + n))/(2*b*(1 + n))
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c-b^2x^2}\text{erfc}(bx)^n\,dx &= -\frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int x^n\,dx,x,\text{erfc}(bx)\right)}{2b}\\ &= -\frac{e^c\sqrt{\pi}\,\text{erfc}(bx)^{1+n}}{2b(1+n)}\end{aligned}$$

Mathematica [A] time = 0.01, size = 28, normalized size = 1.00

$$-\frac{\sqrt{\pi}\,e^c\text{erfc}(bx)^{n+1}}{2b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c - b^2*x^2)*Erfc[b*x]^n,x]
[Out] -1/2*(E^c*Sqrt[Pi]*Erfc[b*x]^(1 + n))/(b*(1 + n))
```

fricas [A] time = 0.51, size = 30, normalized size = 1.07

$$\frac{\sqrt{\pi}\,(-\operatorname{erf}(bx)+1)^{n}(\operatorname{erf}(bx)-1)e^{c}}{2\,(bn+b)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erfc(b*x)^n,x, algorithm="fricas")
[Out] 1/2*sqrt(pi)*(-erf(b*x) + 1)^n*(erf(b*x) - 1)*e^c/(b*n + b)
```

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

$$\int \operatorname{erfc}(bx)^{n}\,e^{\left(-b^{2}x^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erfc(b*x)^n,x, algorithm="giac")
[Out] integrate(erfc(b*x)^n*e^(-b^2*x^2 + c), x)
```

maple [F] time = 0.10, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{-b^{2}x^{2}+c}\operatorname{erfc}(bx)^{n}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2+c)*erfc(b*x)^n,x)
[Out] int(exp(-b^2*x^2+c)*erfc(b*x)^n,x)
```

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

$$\int \operatorname{erfc}(bx)^{n}\,e^{\left(-b^{2}x^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b^2*x^2+c)*erfc(b*x)^n,x, algorithm="maxima")
[Out] integrate(erfc(b*x)^n*e^(-b^2*x^2 + c), x)
```

mupad [B] time = 0.20, size = 23, normalized size = 0.82

$$-\frac{\sqrt{\pi}\ \mathrm{e}^c\,\mathrm{erfc}\left(b\,x\right)^{n+1}}{2\,b\ \left(n+1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c - b^2*x^2)*erfc(b*x)^n,x)
```

```
[Out] -(pi^(1/2)*exp(c)*erfc(b*x)^(n + 1))/(2*b*(n + 1))
```

sympy [A] time = 5.13, size = 60, normalized size = 2.14

$$\begin{cases} xe^c & \text{for } b = 0 \wedge (b = 0 \vee n = -1) \\ -\frac{\sqrt{\pi}e^c \log(\mathrm{erfc}(bx))}{2b} & \text{for } n = -1 \\ -\frac{\sqrt{\pi}e^c \,\mathrm{erfc}(bx)\,\mathrm{erfc}^n(bx)}{2bn+2b} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b**2*x**2+c)*erfc(b*x)**n,x)
```

```
[Out] Piecewise((x*exp(c), Eq(b, 0) & (Eq(b, 0) | Eq(n, -1))), (-sqrt(pi)*exp(c)*
log(erfc(b*x))/(2*b), Eq(n, -1)), (-sqrt(pi)*exp(c)*erfc(b*x)*erfc(b*x)**n/
(2*b*n + 2*b), True))
```

3.156 $\int e^{c+dx^2}x^5\textbf{erfc}(bx)\,dx$

Optimal. Leaf size=283

$$\frac{be^c\text{erf}\left(x\sqrt{b^2-d}\right)}{d^3\sqrt{b^2-d}}-\frac{be^c\text{erf}\left(x\sqrt{b^2-d}\right)}{2d^2\left(b^2-d\right)^{3/2}}+\frac{bxe^{c-x^2\left(b^2-d\right)}}{\sqrt{\pi}\,d^2\left(b^2-d\right)}+\frac{3be^c\text{erf}\left(x\sqrt{b^2-d}\right)}{8d\left(b^2-d\right)^{5/2}}-\frac{3bxe^{c-x^2\left(b^2-d\right)}}{4\sqrt{\pi}\,d\left(b^2-d\right)^2}-\frac{bx^3e^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}$$

```
[Out] -1/2*b*exp(c)*erf(x*(b^2-d)^(1/2))/(b^2-d)^(3/2)/d^2+3/8*b*exp(c)*erf(x*(b^
2-d)^(1/2))/(b^2-d)^(5/2)/d+exp(d*x^2+c)*erfc(b*x)/d^3-exp(d*x^2+c)*x^2*erf
c(b*x)/d^2+1/2*exp(d*x^2+c)*x^4*erfc(b*x)/d+b*exp(c)*erf(x*(b^2-d)^(1/2))/d
^3/(b^2-d)^(1/2)+b*exp(c-(b^2-d)*x^2)*x/(b^2-d)/d^2/Pi^(1/2)-3/4*b*exp(c-(b
^2-d)*x^2)*x/(b^2-d)^2/d/Pi^(1/2)-1/2*b*exp(c-(b^2-d)*x^2)*x^3/(b^2-d)/d/Pi
^(1/2)
```

Rubi [A] time = 0.37, antiderivative size = 283, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.235, Rules used = {6386, 6383, 2205, 2212}

$$-\frac{be^c\text{Erf}\left(x\sqrt{b^2-d}\right)}{2d^2\left(b^2-d\right)^{3/2}}+\frac{be^c\text{Erf}\left(x\sqrt{b^2-d}\right)}{d^3\sqrt{b^2-d}}+\frac{bxe^{c-x^2\left(b^2-d\right)}}{\sqrt{\pi}\,d^2\left(b^2-d\right)}+\frac{3be^c\text{Erf}\left(x\sqrt{b^2-d}\right)}{8d\left(b^2-d\right)^{5/2}}-\frac{bx^3e^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}-\frac{3bxe^{c-x^2\left(b^2-d\right)}}{4\sqrt{\pi}\,d\left(b^2-d\right)^2}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x^5*Erfc[b*x],x]
```

```
[Out] (b*E^(c - (b^2 - d)*x^2)*x)/((b^2 - d)*d^2*Sqrt[Pi]) - (3*b*E^(c - (b^2 - d
)*x^2)*x)/(4*(b^2 - d)^2*d*Sqrt[Pi]) - (b*E^(c - (b^2 - d)*x^2)*x^3)/(2*(b^
2 - d)*d*Sqrt[Pi]) + (b*E^c*Erf[Sqrt[b^2 - d]*x])/(Sqrt[b^2 - d]*d^3) - (b*
E^c*Erf[Sqrt[b^2 - d]*x])/(2*(b^2 - d)^(3/2)*d^2) + (3*b*E^c*Erf[Sqrt[b^2 -
 d]*x])/(8*(b^2 - d)^(5/2)*d) + (E^(c + d*x^2)*Erfc[b*x])/d^3 - (E^(c + d*x
^2)*x^2*Erfc[b*x])/d^2 + (E^(c + d*x^2)*x^4*Erfc[b*x])/(2*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
```

```
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{c+dx^2}x^5\text{erfc}(bx)\,dx = \frac{e^{c+dx^2}x^4\text{erfc}(bx)}{2d} - \frac{2\int e^{c+dx^2}x^3\text{erfc}(bx)\,dx}{d} + \frac{b\int e^{c-\left(b^2-d\right)x^2}x^4\,dx}{d\sqrt{\pi}}$$

$$= -\frac{be^{c-\left(b^2-d\right)x^2}x^3}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}x^2\text{erfc}(bx)}{d^2} + \frac{e^{c+dx^2}x^4\text{erfc}(bx)}{2d} + \frac{2\int e^{c+dx^2}x\text{erfc}(bx)\,dx}{d^2} - \frac{(2b)}{}$$

$$= \frac{be^{c-\left(b^2-d\right)x^2}x}{\left(b^2-d\right)d^2\sqrt{\pi}} - \frac{3be^{c-\left(b^2-d\right)x^2}x}{4\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{be^{c-\left(b^2-d\right)x^2}x^3}{2\left(b^2-d\right)d\sqrt{\pi}} + \frac{e^{c+dx^2}\text{erfc}(bx)}{d^3} - \frac{e^{c+dx^2}x^2\text{erfc}(bx}{d^2}$$

$$= \frac{be^{c-\left(b^2-d\right)x^2}x}{\left(b^2-d\right)d^2\sqrt{\pi}} - \frac{3be^{c-\left(b^2-d\right)x^2}x}{4\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{be^{c-\left(b^2-d\right)x^2}x^3}{2\left(b^2-d\right)d\sqrt{\pi}} + \frac{be^c\text{erf}\left(\sqrt{b^2-d}\,x\right)}{\sqrt{b^2-d}\,d^3} - \frac{be^c\text{erf}\left(\sqrt{b}\right.}{2\left(b^2-d\right.}$$

Mathematica [A] time = 0.45, size = 138, normalized size = 0.49

$$\frac{e^c\left(\frac{2bdxe^{x^2\left(d-b^2\right)}\left(b^2\left(4-2dx^2\right)+d\left(2dx^2-7\right)\right)}{\sqrt{\pi}\left(b^2-d\right)^2} + \frac{b\left(8b^4-20b^2d+15d^2\right)\text{erfi}\left(x\sqrt{d-b^2}\right)}{\left(d-b^2\right)^{5/2}} + 4e^{dx^2}\left(d^2x^4-2dx^2+2\right)\text{erfc}(bx)\right)}{8d^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x^5*Erfc[b*x],x]
```

```
[Out] (E^c*((2*b*d*E^((-b^2 + d)*x^2)*x*(b^2*(4 - 2*d*x^2) + d*(-7 + 2*d*x^2)))/(
(b^2 - d)^2*Sqrt[Pi]) + 4*E^(d*x^2)*(2 - 2*d*x^2 + d^2*x^4)*Erfc[b*x] + (b*
(8*b^4 - 20*b^2*d + 15*d^2)*Erfi[Sqrt[-b^2 + d]*x])/(-b^2 + d)^(5/2)))/(8*d
^3)
```

fricas [A] time = 0.44, size = 356, normalized size = 1.26

$$\frac{\pi\left(8\,b^{5}-20\,b^{3}d+15\,bd^{2}\right)\sqrt{b^{2}-d}\;\mathrm{erf}\left(\sqrt{b^{2}-d}\,x\right)e^{c}-2\,\sqrt{\pi}\left(2\left(b^{5}d^{2}-2\,b^{3}d^{3}+bd^{4}\right)x^{3}-\left(4\,b^{5}d-11\,b^{3}d^{2}+7\,bd\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^5*erfc(b*x),x, algorithm="fricas")
```

```
[Out] 1/8*(pi*(8*b^5 - 20*b^3*d + 15*b*d^2)*sqrt(b^2 - d)*erf(sqrt(b^2 - d)*x)*e^
c - 2*sqrt(pi)*(2*(b^5*d^2 - 2*b^3*d^3 + b*d^4)*x^3 - (4*b^5*d - 11*b^3*d^2
 + 7*b*d^3)*x)*e^(-b^2*x^2 + d*x^2 + c) + 4*(pi*(b^6*d^2 - 3*b^4*d^3 + 3*b^
2*d^4 - d^5)*x^4 - 2*pi*(b^6*d - 3*b^4*d^2 + 3*b^2*d^3 - d^4)*x^2 + 2*pi*(b
^6 - 3*b^4*d + 3*b^2*d^2 - d^3) - (pi*(b^6*d^2 - 3*b^4*d^3 + 3*b^2*d^4 - d^
5)*x^4 - 2*pi*(b^6*d - 3*b^4*d^2 + 3*b^2*d^3 - d^4)*x^2 + 2*pi*(b^6 - 3*b^4
*d + 3*b^2*d^2 - d^3))*erf(b*x))*e^(d*x^2 + c))/(pi*(b^6*d^3 - 3*b^4*d^4 +
3*b^2*d^5 - d^6))
```

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

$$\int x^{5}\,\mathrm{erfc}\left(bx\right)e^{\left(dx^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^5*erfc(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^5*erfc(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.08, size = 376, normalized size = 1.33

$$\frac{\frac{e^{c}\left(\frac{e^{d\,x^{2}} b^{6} x^{4}}{2d}-\frac{2b^{2}\left(\frac{b^{4} x^{2} e^{d\,x^{2}}}{2d}-\frac{b^{4} e^{d\,x^{2}}}{2d^{2}}\right)}{d}\right)}{b^{5}}-\frac{\operatorname{erf}(bx) e^{c}\left(\frac{e^{d\,x^{2}} b^{6} x^{4}}{2d}-\frac{2b^{2}\left(\frac{b^{4} x^{2} e^{d\,x^{2}}}{2d}-\frac{b^{4} e^{d\,x^{2}}}{2d^{2}}\right)}{d}\right)}{b^{5}}+\frac{e^{c}\left(\frac{b^{2}\left(\frac{b^{3} x^{3} e^{\left(-1+\frac{d}{b^{2}}\right) b^{2} x^{2}}}{-2+\frac{2d}{b^{2}}}-\frac{3\left(\frac{b x\, e^{\left(-1+\frac{d}{b^{2}}\right) b^{2} x^{2}}}{-2+\frac{2d}{b^{2}}}-\frac{\sqrt{\pi}\,\operatorname{erf}\left(\sqrt{1-\frac{d}{b^{2}}}\cdots\right.}{4\left(-1+\frac{d}{b^{2}}\right)\sqrt{1-\cdots}}\right.}{2\left(-1+\frac{d}{b^{2}}\right)}\right.}{d}\cdots\right.}{\cdots}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^5*erfc(b*x),x)
```

```
[Out] (1/b^5*exp(c)*(1/2*exp(d*x^2)*b^6*x^4/d-2/d*b^2*(1/2/d*b^4*x^2*exp(d*x^2)-1
/2/d^2*b^4*exp(d*x^2)))-erf(b*x)/b^5*exp(c)*(1/2*exp(d*x^2)*b^6*x^4/d-2/d*b
^2*(1/2/d*b^4*x^2*exp(d*x^2)-1/2/d^2*b^4*exp(d*x^2)))+1/Pi^(1/2)/b^5*exp(c)
*(1/d*b^2*(1/2/(-1+d/b^2)*b^3*x^3*exp((-1+d/b^2)*b^2*x^2)-3/2/(-1+d/b^2)*(1
/2/(-1+d/b^2)*b*x*exp((-1+d/b^2)*b^2*x^2)-1/4/(-1+d/b^2)*Pi^(1/2)/(1-d/b^2)
^(1/2)*erf((1-d/b^2)^(1/2)*b*x)))+1/d^3*b^6*Pi^(1/2)/(1-d/b^2)^(1/2)*erf((1
-d/b^2)^(1/2)*b*x)-2/d^2*b^4*(1/2/(-1+d/b^2)*b*x*exp((-1+d/b^2)*b^2*x^2)-1/
4/(-1+d/b^2)*Pi^(1/2)/(1-d/b^2)^(1/2)*erf((1-d/b^2)^(1/2)*b*x))))/b
```

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

$$\int x^{5} \operatorname{erfc}\left(bx\right) e^{\left(dx^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^5*erfc(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x^5*erfc(b*x)*e^(d*x^2 + c), x)
```

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

$$\int x^{5}\,e^{d\,x^{2}+c}\,\operatorname{erfc}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*exp(c + d*x^2)*erfc(b*x),x)
```

```
[Out] int(x^5*exp(c + d*x^2)*erfc(b*x), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**5*erfc(b*x),x)
```

```
[Out] Timed out
```

3.157 $\int e^{c+dx^2} x^3 \mathbf{erfc}(bx)\, dx$

Optimal. Leaf size=155

$$-\frac{be^c\text{erf}\left(x\sqrt{b^2-d}\right)}{2d^2\sqrt{b^2-d}}+\frac{be^c\text{erf}\left(x\sqrt{b^2-d}\right)}{4d\left(b^2-d\right)^{3/2}}-\frac{bxe^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}-\frac{\text{erfc}(bx)e^{c+dx^2}}{2d^2}+\frac{x^2\text{erfc}(bx)e^{c+dx^2}}{2d}$$

```
[Out] 1/4*b*exp(c)*erf(x*(b^2-d)^(1/2))/(b^2-d)^(3/2)/d-1/2*exp(d*x^2+c)*erfc(b*x
)/d^2+1/2*exp(d*x^2+c)*x^2*erfc(b*x)/d-1/2*b*exp(c)*erf(x*(b^2-d)^(1/2))/d^
2/(b^2-d)^(1/2)-1/2*b*exp(c-(b^2-d)*x^2)*x/(b^2-d)/d/Pi^(1/2)
```

Rubi [A] time = 0.16, antiderivative size = 155, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.235, Rules used = {6386, 6383, 2205, 2212}

$$-\frac{be^c\text{Erf}\left(x\sqrt{b^2-d}\right)}{2d^2\sqrt{b^2-d}}+\frac{be^c\text{Erf}\left(x\sqrt{b^2-d}\right)}{4d\left(b^2-d\right)^{3/2}}-\frac{bxe^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}-\frac{\text{Erfc}(bx)e^{c+dx^2}}{2d^2}+\frac{x^2\text{Erfc}(bx)e^{c+dx^2}}{2d}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x^3*Erfc[b*x],x]
```

```
[Out] -(b*E^(c - (b^2 - d)*x^2)*x)/(2*(b^2 - d)*d*Sqrt[Pi]) - (b*E^c*Erf[Sqrt[b^2
 - d]*x])/(2*Sqrt[b^2 - d]*d^2) + (b*E^c*Erf[Sqrt[b^2 - d]*x])/(4*(b^2 - d)
^(3/2)*d) - (E^(c + d*x^2)*Erfc[b*x])/(2*d^2) + (E^(c + d*x^2)*x^2*Erfc[b*x
])/(2*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{c+dx^2}x^3\text{erfc}(bx)\,dx = \frac{e^{c+dx^2}x^2\text{erfc}(bx)}{2d} - \frac{\int e^{c+dx^2}x\text{erfc}(bx)\,dx}{d} + \frac{b\int e^{c-(b^2-d)x^2}x^2\,dx}{d\sqrt{\pi}}$$
$$= -\frac{be^{c-(b^2-d)x^2}x}{2(b^2-d)d\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erfc}(bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erfc}(bx)}{2d} - \frac{b\int e^{c-(b^2-d)x^2}\,dx}{d^2\sqrt{\pi}} + \frac{b\int e^{c+(-b^2}}{2(b^2-d}$$
$$= -\frac{be^{c-(b^2-d)x^2}x}{2(b^2-d)d\sqrt{\pi}} - \frac{be^c\text{erf}\left(\sqrt{b^2-d}\,x\right)}{2\sqrt{b^2-d}\,d^2} + \frac{be^c\text{erf}\left(\sqrt{b^2-d}\,x\right)}{4(b^2-d)^{3/2}d} - \frac{e^{c+dx^2}\text{erfc}(bx)}{2d^2} + \frac{e^{c+dx^2}x}{}$$

Mathematica [A] time = 0.34, size = 99, normalized size = 0.64

$$\frac{e^c\left(\frac{2bdxe^{x^2(d-b^2)}}{\sqrt{\pi}(d-b^2)} + \frac{(2b^3-3bd)\text{erfi}\left(x\sqrt{d-b^2}\right)}{(d-b^2)^{3/2}} + 2e^{dx^2}(dx^2-1)\text{erfc}(bx)\right)}{4d^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x^3*Erfc[b*x],x]
```

```
[Out] (E^c*((2*b*d*E^((-b^2 + d)*x^2)*x)/((-b^2 + d)*Sqrt[Pi]) + 2*E^(d*x^2)*(-1
+ d*x^2)*Erfc[b*x] + ((2*b^3 - 3*b*d)*Erfi[Sqrt[-b^2 + d]*x])/(-b^2 + d)^(3
/2)))/(4*d^2)
```

fricas [A] time = 0.51, size = 190, normalized size = 1.23

$$-\frac{\pi\left(2b^3-3bd\right)\sqrt{b^2-d}\ \text{erf}\left(\sqrt{b^2-d}\,x\right)e^c + 2\sqrt{\pi}\left(b^3d-bd^2\right)xe^{\left(-b^2x^2+dx^2+c\right)} - 2\left(\pi\left(b^4d-2b^2d^2+d^3\right)x^2 - \pi\left(b^4\right.\right.}{4\pi\left(b^4d^2-2b^2d^3+d^4\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/4*(pi*(2*b^3 - 3*b*d)*sqrt(b^2 - d)*erf(sqrt(b^2 - d)*x)*e^c + 2*sqrt(pi
)*(b^3*d - b*d^2)*x*e^(-b^2*x^2 + d*x^2 + c) - 2*(pi*(b^4*d - 2*b^2*d^2 + d
^3)*x^2 - pi*(b^4 - 2*b^2*d + d^2) - (pi*(b^4*d - 2*b^2*d^2 + d^3)*x^2 - pi
*(b^4 - 2*b^2*d + d^2))*erf(b*x))*e^(d*x^2 + c))/(pi*(b^4*d^2 - 2*b^2*d^3 +
 d^4))
```

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

$$\int x^3 \operatorname{erfc}(bx) e^{(dx^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(x^3*erfc(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.22, size = 206, normalized size = 1.33

$$\frac{\frac{e^{c}\left(\frac{b^{4}x^{2}e^{d\,x^{2}}}{2d}-\frac{b^{4}e^{d\,x^{2}}}{2d^{2}}\right)}{b^{3}}-\frac{\operatorname{erf}(bx)e^{c}\left(\frac{b^{4}x^{2}e^{d\,x^{2}}}{2d}-\frac{b^{4}e^{d\,x^{2}}}{2d^{2}}\right)}{b^{3}}+\frac{e^{c}\left(\frac{b^{2}\left(\frac{bx\,e^{\left(-1+\frac{d}{b^{2}}\right)b^{2}x^{2}}}{-2+\frac{2d}{b^{2}}}-\frac{\sqrt{\pi}\,\operatorname{erf}\left(\sqrt{1-\frac{d}{b^{2}}}\,bx\right)}{4\left(-1+\frac{d}{b^{2}}\right)\sqrt{1-\frac{d}{b^{2}}}}\right)}{d}-\frac{b^{4}\sqrt{\pi}\,\operatorname{erf}\left(\sqrt{1-\frac{d}{b^{2}}}\,bx\right)}{2d^{2}\sqrt{1-\frac{d}{b^{2}}}}\right)}{\sqrt{\pi}\,b^{3}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^3*erfc(b*x),x)
```

```
[Out] (1/b^3*exp(c)*(1/2/d*b^4*x^2*exp(d*x^2)-1/2/d^2*b^4*exp(d*x^2))-erf(b*x)/b^
3*exp(c)*(1/2/d*b^4*x^2*exp(d*x^2)-1/2/d^2*b^4*exp(d*x^2))+1/Pi^(1/2)/b^3*e
xp(c)*(1/d*b^2*(1/2/(-1+d/b^2)*b*x*exp((-1+d/b^2)*b^2*x^2)-1/4/(-1+d/b^2)*P
i^(1/2)/(1-d/b^2)^(1/2)*erf((1-d/b^2)^(1/2)*b*x))-1/2/d^2*b^4*Pi^(1/2)/(1-d
/b^2)^(1/2)*erf((1-d/b^2)^(1/2)*b*x)))/b
```

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

$$\int x^3 \operatorname{erfc}(bx) e^{(dx^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfc(b*x),x, algorithm="maxima")
[Out] integrate(x^3*erfc(b*x)*e^(d*x^2 + c), x)
```

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

$$\int x^3\,\mathrm{e}^{d\,x^2+c}\,\mathrm{erfc}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*exp(c + d*x^2)*erfc(b*x),x)
[Out] int(x^3*exp(c + d*x^2)*erfc(b*x), x)
```

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

$$e^{c}\int x^{3}e^{dx^{2}}\,\mathrm{erfc}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**3*erfc(b*x),x)
[Out] exp(c)*Integral(x**3*exp(d*x**2)*erfc(b*x), x)
```

3.158 $\int e^{c+dx^2} x\,\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=57

$$\frac{be^c \operatorname{erf}\left(x\sqrt{b^2-d}\right)}{2d\sqrt{b^2-d}}+\frac{\operatorname{erfc}(bx)e^{c+dx^2}}{2d}$$

```
[Out] 1/2*exp(d*x^2+c)*erfc(b*x)/d+1/2*b*exp(c)*erf(x*(b^2-d)^(1/2))/d/(b^2-d)^(1
/2)
```

Rubi [A] time = 0.04, antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {6383, 2205}

$$\frac{be^c \operatorname{Erf}\left(x\sqrt{b^2-d}\right)}{2d\sqrt{b^2-d}}+\frac{\operatorname{Erfc}(bx)e^{c+dx^2}}{2d}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x*Erfc[b*x],x]
```

```
[Out] (b*E^c*Erf[Sqrt[b^2 - d]*x])/(2*Sqrt[b^2 - d]*d) + (E^(c + d*x^2)*Erfc[b*x]
)/(2*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int e^{c+dx^2} x\text{erfc}(bx)\,dx = \frac{e^{c+dx^2}\text{erfc}(bx)}{2d} + \frac{b\int e^{c-\left(b^2-d\right)x^2}\,dx}{d\sqrt{\pi}}$$
$$= \frac{be^c\text{erf}\left(\sqrt{b^2-d}\,x\right)}{2\sqrt{b^2-d}\,d} + \frac{e^{c+dx^2}\text{erfc}(bx)}{2d}$$

Mathematica [A] time = 0.06, size = 50, normalized size = 0.88

$$\frac{e^c\left(\frac{b\text{erfi}\left(x\sqrt{d-b^2}\right)}{\sqrt{d-b^2}} + e^{dx^2}\text{erfc}(bx)\right)}{2d}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x*Erfc[b*x],x]
```

```
[Out] (E^c*(E^(d*x^2)*Erfc[b*x] + (b*Erfi[Sqrt[-b^2 + d]*x])/Sqrt[-b^2 + d]))/(2*
d)
```

fricas [A] time = 0.46, size = 70, normalized size = 1.23

$$\frac{\sqrt{b^2-d}\,b\,\text{erf}\left(\sqrt{b^2-d}\,x\right)e^c + \left(b^2 - \left(b^2-d\right)\text{erf}\left(bx\right) - d\right)e^{\left(dx^2+c\right)}}{2\left(b^2d - d^2\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfc(b*x),x, algorithm="fricas")
```

```
[Out] 1/2*(sqrt(b^2 - d)*b*erf(sqrt(b^2 - d)*x)*e^c + (b^2 - (b^2 - d)*erf(b*x) -
 d)*e^(d*x^2 + c))/(b^2*d - d^2)
```

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

$$\int x\,\text{erfc}\left(bx\right)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfc(b*x),x, algorithm="giac")
```

```
[Out] integrate(x*erfc(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.21, size = 92, normalized size = 1.61

$$\frac{\frac{b\,\mathrm{e}^{\frac{b^2 d\,x^2+c\,b^2}{b^2}}}{2d}-\frac{\mathrm{erf}(bx)b\,\mathrm{e}^{\frac{b^2 d\,x^2+c\,b^2}{b^2}}}{2d}+\frac{b\,\mathrm{e}^{c}\,\mathrm{erf}\left(\sqrt{1-\frac{d}{b^2}}\,bx\right)}{2d\sqrt{1-\frac{d}{b^2}}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x*erfc(b*x),x)
```

```
[Out] (1/2*b*exp((b^2*d*x^2+b^2*c)/b^2)/d-1/2*erf(b*x)*b*exp((b^2*d*x^2+b^2*c)/b^
2)/d+1/2*b/d*exp(c)/(1-d/b^2)^(1/2)*erf((1-d/b^2)^(1/2)*b*x))/b
```

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

$$\int x\,\mathrm{erfc}\,(bx)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfc(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x*erfc(b*x)*e^(d*x^2 + c), x)
```

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

$$\int x\,\mathrm{e}^{d\,x^2+c}\,\mathrm{erfc}\,(b\,x)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(c + d*x^2)*erfc(b*x),x)
```

```
[Out] int(x*exp(c + d*x^2)*erfc(b*x), x)
```

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

$$e^{c}\int xe^{dx^2}\,\mathrm{erfc}\,(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x*erfc(b*x),x)
```

```
[Out] exp(c)*Integral(x*exp(d*x**2)*erfc(b*x), x)
```

3.159 $\int \frac{e^{c+dx^2}\mathbf{erfc}(bx)}{x}\,dx$

Optimal. Leaf size=20

$$\text{Int}\left(\frac{\text{erfc}(bx)e^{c+dx^2}}{x},x\right)$$

[Out] Unintegrable(exp(d*x^2+c)*erfc(b*x)/x,x)

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfc}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

[In] Int[(E^(c + d*x^2)*Erfc[b*x])/x,x]

[Out] Defer[Int][(E^(c + d*x^2)*Erfc[b*x])/x, x]

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x}\,dx = \int \frac{e^{c+dx^2}\text{erfc}(bx)}{x}\,dx$$

Mathematica [A] time = 0.62, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x,x]

[Out] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x, x]

fricas [A] time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}(bx)-1)e^{(dx^2+c)}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x,x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(d*x^2 + c)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)e^{\left(dx^2+c\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x,x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x, x)
```

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\operatorname{erfc}(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x)/x,x)
[Out] int(exp(d*x^2+c)*erfc(b*x)/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)e^{\left(dx^2+c\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{e^{d\,x^2+c}\,\operatorname{erfc}(b\,x)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfc(b*x))/x,x)
[Out] int((exp(c + d*x^2)*erfc(b*x))/x, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int\frac{e^{dx^{2}}\operatorname{erfc}(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x)/x,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfc(b*x)/x, x)
```

3.160 $\int \frac{e^{c+dx^2}\mathbf{erfc}(bx)}{x^3}\,dx$

Optimal. Leaf size=99

$$d\text{Int}\left(\frac{\text{erfc}(bx)e^{c+dx^2}}{x},x\right)+be^c\sqrt{b^2-d}\,\text{erf}\left(x\sqrt{b^2-d}\right)+\frac{be^{c-x^2(b^2-d)}}{\sqrt{\pi}\,x}-\frac{\text{erfc}(bx)e^{c+dx^2}}{2x^2}$$

```
[Out] -1/2*exp(d*x^2+c)*erfc(b*x)/x^2+b*exp(c)*erf(x*(b^2-d)^(1/2))*(b^2-d)^(1/2)
+b*exp(c-(b^2-d)*x^2)/x/Pi^(1/2)+d*Unintegrable(exp(d*x^2+c)*erfc(b*x)/x,x)
```

Rubi [A] time = 0.15, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfc}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfc[b*x])/x^3,x]
```

```
[Out] (b*E^(c - (b^2 - d)*x^2))/(Sqrt[Pi]*x) + b*Sqrt[b^2 - d]*E^c*Erf[Sqrt[b^2 -
 d]*x] - (E^(c + d*x^2)*Erfc[b*x])/(2*x^2) + d*Defer[Int][(E^(c + d*x^2)*Er
fc[b*x])/x, x]
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^3}\,dx &= -\frac{e^{c+dx^2}\text{erfc}(bx)}{2x^2}+d\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x}\,dx-\frac{b\int \frac{e^{c-(b^2-d)x^2}}{x^2}\,dx}{\sqrt{\pi}}\\
&= \frac{be^{c-(b^2-d)x^2}}{\sqrt{\pi}\,x}-\frac{e^{c+dx^2}\text{erfc}(bx)}{2x^2}+d\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x}\,dx+\frac{\left(2b\left(b^2-d\right)\right)\int e^{c+(-b^2+d)x^2}\,dx}{\sqrt{\pi}}\\
&= \frac{be^{c-(b^2-d)x^2}}{\sqrt{\pi}\,x}+b\sqrt{b^2-d}\,e^c\text{erf}\left(\sqrt{b^2-d}\,x\right)-\frac{e^{c+dx^2}\text{erfc}(bx)}{2x^2}+d\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x}\,dx
\end{aligned}$$

Mathematica [A] time = 0.78, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x^3,x]
[Out] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x^3, x]
```

fricas [A] time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}(bx)-1)e^{(dx^2+c)}}{x^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^3,x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(d*x^2 + c)/x^3, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\, e^{(dx^2+c)}}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^3,x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x^3, x)
```

maple [A] time = 0.27, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\text{erfc}(bx)}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x)/x^3,x)
[Out] int(exp(d*x^2+c)*erfc(b*x)/x^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\, e^{(dx^2+c)}}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^3,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x^3, x)
```

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

$$\int \frac{e^{d\,x^2+c}\,\mathrm{erfc}\,(b\,x)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfc(b*x))/x^3,x)
```

```
[Out] int((exp(c + d*x^2)*erfc(b*x))/x^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^c \int \frac{e^{dx^2}\,\mathrm{erfc}\,(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x)/x**3,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfc(b*x)/x**3, x)
```

3.161 $\int \frac{e^{c+dx^2}\textbf{erfc}(bx)}{x^5}\,dx$

Optimal. Leaf size=231

$$\frac{1}{2}d^2\text{Int}\left(\frac{\text{erfc}(bx)e^{c+dx^2}}{x},x\right)+\frac{1}{2}be^c d\sqrt{b^2-d}\,\text{erf}\left(x\sqrt{b^2-d}\right)-\frac{1}{3}be^c\left(b^2-d\right)^{3/2}\text{erf}\left(x\sqrt{b^2-d}\right)+\frac{bde^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,x}-\frac{b\left(b^2\right.}{}$$

```
[Out] -1/3*b*(b^2-d)^(3/2)*exp(c)*erf(x*(b^2-d)^(1/2))-1/4*exp(d*x^2+c)*erfc(b*x)
/x^4-1/4*d*exp(d*x^2+c)*erfc(b*x)/x^2+1/2*b*d*exp(c)*erf(x*(b^2-d)^(1/2))*(
b^2-d)^(1/2)+1/6*b*exp(c-(b^2-d)*x^2)/x^3/Pi^(1/2)-1/3*b*(b^2-d)*exp(c-(b^2
-d)*x^2)/x/Pi^(1/2)+1/2*b*d*exp(c-(b^2-d)*x^2)/x/Pi^(1/2)+1/2*d^2*Unintegra
ble(exp(d*x^2+c)*erfc(b*x)/x,x)
```

Rubi [A] time = 0.33, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfc}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfc[b*x])/x^5,x]
```

```
[Out] (b*E^(c - (b^2 - d)*x^2))/(6*Sqrt[Pi]*x^3) - (b*(b^2 - d)*E^(c - (b^2 - d)*
x^2))/(3*Sqrt[Pi]*x) + (b*d*E^(c - (b^2 - d)*x^2))/(2*Sqrt[Pi]*x) - (b*(b^2
 - d)^(3/2)*E^c*Erf[Sqrt[b^2 - d]*x])/3 + (b*Sqrt[b^2 - d]*d*E^c*Erf[Sqrt[b
^2 - d]*x])/2 - (E^(c + d*x^2)*Erfc[b*x])/(4*x^4) - (d*E^(c + d*x^2)*Erfc[b
*x])/(4*x^2) + (d^2*Defer[Int][(E^(c + d*x^2)*Erfc[b*x])/x, x])/2
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^5}\,dx = -\frac{e^{c+dx^2}\text{erfc}(bx)}{4x^4} + \frac{1}{2}d\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^3}\,dx - \frac{b\int \frac{e^{c-(b^2-d)x^2}}{x^4}\,dx}{2\sqrt{\pi}}$$

$$= \frac{be^{c-(b^2-d)x^2}}{6\sqrt{\pi}\,x^3} - \frac{e^{c+dx^2}\text{erfc}(bx)}{4x^4} - \frac{de^{c+dx^2}\text{erfc}(bx)}{4x^2} + \frac{1}{2}d^2\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x}\,dx + \frac{\left(b\left(b^2-d\right)\right)}{3}$$

$$= \frac{be^{c-(b^2-d)x^2}}{6\sqrt{\pi}\,x^3} - \frac{b\left(b^2-d\right)e^{c-(b^2-d)x^2}}{3\sqrt{\pi}\,x} + \frac{bde^{c-(b^2-d)x^2}}{2\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfc}(bx)}{4x^4} - \frac{de^{c+dx^2}\text{erfc}(bx)}{4x^2} + \frac{1}{2}$$

$$= \frac{be^{c-(b^2-d)x^2}}{6\sqrt{\pi}\,x^3} - \frac{b\left(b^2-d\right)e^{c-(b^2-d)x^2}}{3\sqrt{\pi}\,x} + \frac{bde^{c-(b^2-d)x^2}}{2\sqrt{\pi}\,x} - \frac{1}{3}b\left(b^2-d\right)^{3/2}e^c\text{erf}\left(\sqrt{b^2-d}\,x\right) + \frac{1}{2}b$$

Mathematica [A] time = 0.81, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x^5,x]
[Out] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x^5, x]
```

fricas [A] time = 0.41, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}(bx)-1)e^{(dx^2+c)}}{x^5}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^5,x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(d*x^2 + c)/x^5, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\,e^{(dx^2+c)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^5,x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x^5, x)
```

maple [A] time = 0.29, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^{2}+c}\operatorname{erfc}\left(bx\right)}{x^{5}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x)/x^5,x)
[Out] int(exp(d*x^2+c)*erfc(b*x)/x^5,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}\left(bx\right)e^{\left(dx^{2}+c\right)}}{x^{5}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^5,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x^5, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{e^{d\,x^{2}+c}\operatorname{erfc}\left(b\,x\right)}{x^{5}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfc(b*x))/x^5,x)
[Out] int((exp(c + d*x^2)*erfc(b*x))/x^5, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\operatorname{erfc}\left(bx\right)}{x^{5}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x)/x**5,x)
[Out] exp(c)*Integral(exp(d*x**2)*erfc(b*x)/x**5, x)
```

3.162 $\int e^{c+dx^2} x^4 \textbf{erfc}(bx)\, dx$

Optimal. Leaf size=186

$$\frac{3\mathrm{Int}\left(\mathrm{erfc}(bx)e^{c+dx^2},x\right)}{4d^2}+\frac{3be^{c-x^2\left(b^2-d\right)}}{4\sqrt{\pi}\,d^2\left(b^2-d\right)}-\frac{bx^2e^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}-\frac{be^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)^2}-\frac{3x\mathrm{erfc}(bx)e^{c+dx^2}}{4d^2}+\frac{x^3\mathrm{erfc}(bx)e^{c+dx^2}}{2d}$$

```
[Out] -3/4*exp(d*x^2+c)*x*erfc(b*x)/d^2+1/2*exp(d*x^2+c)*x^3*erfc(b*x)/d+3/4*b*ex
p(c-(b^2-d)*x^2)/(b^2-d)/d^2/Pi^(1/2)-1/2*b*exp(c-(b^2-d)*x^2)/(b^2-d)^2/d/
Pi^(1/2)-1/2*b*exp(c-(b^2-d)*x^2)*x^2/(b^2-d)/d/Pi^(1/2)+3/4*Unintegrable(e
xp(d*x^2+c)*erfc(b*x),x)/d^2
```

Rubi [A] time = 0.23, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2} x^4 \mathrm{Erfc}(bx)\, dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^4*Erfc[b*x],x]
```

```
[Out] (3*b*E^(c - (b^2 - d)*x^2))/(4*(b^2 - d)*d^2*Sqrt[Pi]) - (b*E^(c - (b^2 - d
)*x^2))/(2*(b^2 - d)^2*d*Sqrt[Pi]) - (b*E^(c - (b^2 - d)*x^2)*x^2)/(2*(b^2
- d)*d*Sqrt[Pi]) - (3*E^(c + d*x^2)*x*Erfc[b*x])/(4*d^2) + (E^(c + d*x^2)*x
^3*Erfc[b*x])/(2*d) + (3*Defer[Int][E^(c + d*x^2)*Erfc[b*x], x])/(4*d^2)
```

Rubi steps

$$\begin{aligned}\int e^{c+dx^2} x^4 \mathrm{erfc}(bx)\, dx &= \frac{e^{c+dx^2}x^3\mathrm{erfc}(bx)}{2d}-\frac{3\int e^{c+dx^2}x^2\mathrm{erfc}(bx)\, dx}{2d}+\frac{b\int e^{c-\left(b^2-d\right)x^2}x^3\, dx}{d\sqrt{\pi}}\\ &= -\frac{be^{c-\left(b^2-d\right)x^2}x^2}{2\left(b^2-d\right)d\sqrt{\pi}}-\frac{3e^{c+dx^2}x\mathrm{erfc}(bx)}{4d^2}+\frac{e^{c+dx^2}x^3\mathrm{erfc}(bx)}{2d}+\frac{3\int e^{c+dx^2}\mathrm{erfc}(bx)\, dx}{4d^2}-\frac{(3b)}{}\\ &= \frac{3be^{c-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}}-\frac{be^{c-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}}-\frac{be^{c-\left(b^2-d\right)x^2}x^2}{2\left(b^2-d\right)d\sqrt{\pi}}-\frac{3e^{c+dx^2}x\mathrm{erfc}(bx)}{4d^2}+\frac{e^{c+dx^2}x^3\mathrm{erf}}{2d}\end{aligned}$$

Mathematica [A] time = 0.95, size = 0, normalized size = 0.00

$$\int e^{c+dx^2} x^4 \mathrm{erfc}(bx)\, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^4*Erfc[b*x],x]
[Out] Integrate[E^(c + d*x^2)*x^4*Erfc[b*x], x]
```

fricas [A] time = 0.42, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(-\left(x^4\,\mathrm{erf}\left(bx\right)-x^4\right)e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfc(b*x),x, algorithm="fricas")
[Out] integral(-(x^4*erf(b*x) - x^4)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\,\mathrm{erfc}\left(bx\right)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfc(b*x),x, algorithm="giac")
[Out] integrate(x^4*erfc(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.10, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^2+c}x^4\mathrm{erfc}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^4*erfc(b*x),x)
[Out] int(exp(d*x^2+c)*x^4*erfc(b*x),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\,\mathrm{erfc}\left(bx\right)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfc(b*x),x, algorithm="maxima")
[Out] integrate(x^4*erfc(b*x)*e^(d*x^2 + c), x)
```

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

$$\int x^4 \, \mathrm{e}^{d\,x^2+c} \operatorname{erfc}\left(b\,x\right) \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*exp(c + d*x^2)*erfc(b*x),x)
```

```
[Out] int(x^4*exp(c + d*x^2)*erfc(b*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c} \int x^{4} e^{d x^{2}} \operatorname{erfc}{\left(b x \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**4*erfc(b*x),x)
```

```
[Out] exp(c)*Integral(x**4*exp(d*x**2)*erfc(b*x), x)
```

3.163 $\int e^{c+dx^2}x^2\textbf{erfc}(bx)\,dx$

Optimal. Leaf size=84

$$-\frac{\operatorname{Int}\left(\operatorname{erfc}(bx)e^{c+dx^2},x\right)}{2d}-\frac{be^{c-x^2\left(b^2-d\right)}}{2\sqrt{\pi}\,d\left(b^2-d\right)}+\frac{x\operatorname{erfc}(bx)e^{c+dx^2}}{2d}$$

```
[Out] 1/2*exp(d*x^2+c)*x*erfc(b*x)/d-1/2*b*exp(c-(b^2-d)*x^2)/(b^2-d)/d/Pi^(1/2)-
1/2*Unintegrable(exp(d*x^2+c)*erfc(b*x),x)/d
```

Rubi [A] time = 0.09, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}x^2\operatorname{Erfc}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^2*Erfc[b*x],x]
```

```
[Out] -(b*E^(c - (b^2 - d)*x^2))/(2*(b^2 - d)*d*Sqrt[Pi]) + (E^(c + d*x^2)*x*Erfc
[b*x])/(2*d) - Defer[Int][E^(c + d*x^2)*Erfc[b*x], x]/(2*d)
```

Rubi steps

$$\begin{aligned}\int e^{c+dx^2}x^2\operatorname{erfc}(bx)\,dx&=\frac{e^{c+dx^2}x\operatorname{erfc}(bx)}{2d}-\frac{\int e^{c+dx^2}\operatorname{erfc}(bx)\,dx}{2d}+\frac{b\int e^{c-\left(b^2-d\right)x^2}x\,dx}{d\sqrt{\pi}}\\&=-\frac{be^{c-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)d\sqrt{\pi}}+\frac{e^{c+dx^2}x\operatorname{erfc}(bx)}{2d}-\frac{\int e^{c+dx^2}\operatorname{erfc}(bx)\,dx}{2d}\end{aligned}$$

Mathematica [A] time = 0.83, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}x^2\operatorname{erfc}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^2*Erfc[b*x],x]
```

```
[Out] Integrate[E^(c + d*x^2)*x^2*Erfc[b*x], x]
```

fricas [A] time = 0.57, size = 0, normalized size = 0.00

$$\text{integral}\left(-\left(x^2\,\text{erf}\,(bx)-x^2\right)e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfc(b*x),x, algorithm="fricas")
[Out] integral(-(x^2*erf(b*x) - x^2)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfc}\,(bx)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfc(b*x),x, algorithm="giac")
[Out] integrate(x^2*erfc(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.19, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c}x^2\text{erfc}\,(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^2*erfc(b*x),x)
[Out] int(exp(d*x^2+c)*x^2*erfc(b*x),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfc}\,(bx)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfc(b*x),x, algorithm="maxima")
[Out] integrate(x^2*erfc(b*x)*e^(d*x^2 + c), x)
```

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

$$\int x^2\,e^{d\,x^2+c}\,\text{erfc}\,(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(c + d*x^2)*erfc(b*x),x)
```

```
[Out] int(x^2*exp(c + d*x^2)*erfc(b*x), x)
```

sympy [A]   time = 0.00, size = 0, normalized size = 0.00

$$e^c \int x^2 e^{dx^2} \operatorname{erfc}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**2*erfc(b*x),x)
```

```
[Out] exp(c)*Integral(x**2*exp(d*x**2)*erfc(b*x), x)
```

3.164 $\int e^{c+dx^2}\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=17

$$\mathrm{Int}\left(\mathrm{erfc}(bx)e^{c+dx^2},x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erfc(b*x),x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}\mathrm{Erfc}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*Erfc[b*x],x]
[Out] Defer[Int][E^(c + d*x^2)*Erfc[b*x], x]
```

Rubi steps

$$\int e^{c+dx^2}\mathrm{erfc}(bx)\,dx = \int e^{c+dx^2}\mathrm{erfc}(bx)\,dx$$

Mathematica [A] time = 0.03, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}\mathrm{erfc}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*Erfc[b*x],x]
[Out] Integrate[E^(c + d*x^2)*Erfc[b*x], x]
```

fricas [A] time = 0.51, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(-(\mathrm{erf}\,(bx)-1)e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x),x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x),x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.07, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c}\operatorname{erfc}(bx)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x),x)
[Out] int(exp(d*x^2+c)*erfc(b*x),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x),x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.06

$$\int e^{d\,x^2+c}\,\operatorname{erfc}(b\,x)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + d*x^2)*erfc(b*x),x)
[Out] int(exp(c + d*x^2)*erfc(b*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^c\int e^{dx^2}\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x),x)
[Out] exp(c)*Integral(exp(d*x**2)*erfc(b*x), x)
```

3.165 $\int \frac{e^{c+dx^2}\mathbf{erfc}(bx)}{x^2}\,dx$

Optimal. Leaf size=63

$$2d\text{Int}\left(\text{erfc}(bx)e^{c+dx^2},x\right)-\frac{be^c\text{Ei}\left(-\left(\left(b^2-d\right)x^2\right)\right)}{\sqrt{\pi}}-\frac{\text{erfc}(bx)e^{c+dx^2}}{x}$$

```
[Out] -exp(d*x^2+c)*erfc(b*x)/x-b*exp(c)*Ei(-(b^2-d)*x^2)/Pi^(1/2)+2*d*Unintegrab
le(exp(d*x^2+c)*erfc(b*x),x)
```

Rubi [A] time = 0.11, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfc}(bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfc[b*x])/x^2,x]
```

```
[Out] -((E^(c + d*x^2)*Erfc[b*x])/x) - (b*E^c*ExpIntegralEi[-((b^2 - d)*x^2)])/Sq
rt[Pi] + 2*d*Defer[Int][E^(c + d*x^2)*Erfc[b*x], x]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^2}\,dx &= -\frac{e^{c+dx^2}\text{erfc}(bx)}{x}+(2d)\int e^{c+dx^2}\text{erfc}(bx)\,dx-\frac{(2b)\int \frac{e^{c-\left(b^2-d\right)x^2}}{x}\,dx}{\sqrt{\pi}}\\ &= -\frac{e^{c+dx^2}\text{erfc}(bx)}{x}-\frac{be^c\text{Ei}\left(-\left(b^2-d\right)x^2\right)}{\sqrt{\pi}}+(2d)\int e^{c+dx^2}\text{erfc}(bx)\,dx\end{aligned}$$

Mathematica [A] time = 0.86, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x^2,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x^2, x]
```

fricas [A] time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}(bx)-1)e^{\left(dx^2+c\right)}}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^2,x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(d*x^2 + c)/x^2, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\, e^{\left(dx^2+c\right)}}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^2,x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x^2, x)
```

maple [A] time = 0.11, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\text{erfc}(bx)}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x)/x^2,x)
[Out] int(exp(d*x^2+c)*erfc(b*x)/x^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\, e^{\left(dx^2+c\right)}}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^2,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x^2, x)
```

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

$$\int \frac{e^{d\,x^2+c}\,\text{erfc}(b\,x)}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfc(b*x))/x^2,x)
```

```
[Out] int((exp(c + d*x^2)*erfc(b*x))/x^2, x)
```

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

$$e^{c}\int\frac{e^{dx^{2}}\operatorname{erfc}\left(bx\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x)/x**2,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfc(b*x)/x**2, x)
```

3.166 $\int \frac{e^{c+dx^2}\mathbf{erfc}(bx)}{x^4}\,dx$

Optimal. Leaf size=155

$$\frac{4}{3}d^2\text{Int}\left(\text{erfc}(bx)e^{c+dx^2},x\right)-\frac{2be^c d\text{Ei}\left(-\left(\left(b^2-d\right)x^2\right)\right)}{3\sqrt{\pi}}+\frac{be^c\left(b^2-d\right)\text{Ei}\left(-\left(\left(b^2-d\right)x^2\right)\right)}{3\sqrt{\pi}}+\frac{be^{c-x^2\left(b^2-d\right)}}{3\sqrt{\pi}\,x^2}-\frac{2d\text{erfc}(bx)}{3x}$$

```
[Out] -1/3*exp(d*x^2+c)*erfc(b*x)/x^3-2/3*d*exp(d*x^2+c)*erfc(b*x)/x+1/3*b*exp(c-
(b^2-d)*x^2)/x^2/Pi^(1/2)+1/3*b*(b^2-d)*exp(c)*Ei(-(b^2-d)*x^2)/Pi^(1/2)-2/
3*b*d*exp(c)*Ei(-(b^2-d)*x^2)/Pi^(1/2)+4/3*d^2*Unintegrable(exp(d*x^2+c)*er
fc(b*x),x)
```

Rubi [A] time = 0.27, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfc}(bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfc[b*x])/x^4,x]
```

```
[Out] (b*E^(c - (b^2 - d)*x^2))/(3*Sqrt[Pi]*x^2) - (E^(c + d*x^2)*Erfc[b*x])/(3*x
^3) - (2*d*E^(c + d*x^2)*Erfc[b*x])/(3*x) + (b*(b^2 - d)*E^c*ExpIntegralEi[
-((b^2 - d)*x^2)])/(3*Sqrt[Pi]) - (2*b*d*E^c*ExpIntegralEi[-((b^2 - d)*x^2)
])/(3*Sqrt[Pi]) + (4*d^2*Defer[Int][E^(c + d*x^2)*Erfc[b*x], x])/3
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^4}\,dx &= -\frac{e^{c+dx^2}\text{erfc}(bx)}{3x^3}+\frac{1}{3}(2d)\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^2}\,dx-\frac{(2b)\int \frac{e^{c-\left(b^2-d\right)x^2}}{x^3}\,dx}{3\sqrt{\pi}}\\
&= \frac{be^{c-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+dx^2}\text{erfc}(bx)}{3x^3}-\frac{2de^{c+dx^2}\text{erfc}(bx)}{3x}+\frac{1}{3}\left(4d^2\right)\int e^{c+dx^2}\text{erfc}(bx)\,dx+\frac{\left(2b\left(b^2\right.\right.}{}\\
&= \frac{be^{c-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+dx^2}\text{erfc}(bx)}{3x^3}-\frac{2de^{c+dx^2}\text{erfc}(bx)}{3x}+\frac{b\left(b^2-d\right)e^c\text{Ei}\left(-\left(b^2-d\right)x^2\right)}{3\sqrt{\pi}}-\frac{2bde^c}{}
\end{aligned}$$

Mathematica [A] time = 1.02, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfc}(bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x^4,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erfc[b*x])/x^4, x]
```

fricas [A] time = 0.48, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}\,(bx)-1)e^{\left(dx^2+c\right)}}{x^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^4,x, algorithm="fricas")
```

```
[Out] integral(-(erf(b*x) - 1)*e^(d*x^2 + c)/x^4, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx)\,e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^4,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x^4, x)
```

maple [A] time = 0.29, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c}\text{erfc}\,(bx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x)/x^4,x)
```

```
[Out] int(exp(d*x^2+c)*erfc(b*x)/x^4,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx)\,e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x)/x^4,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)*e^(d*x^2 + c)/x^4, x)
```

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

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\mathrm{erfc}\left(b\,x\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfc(b*x))/x^4,x)
[Out] int((exp(c + d*x^2)*erfc(b*x))/x^4, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int\frac{e^{dx^{2}}\operatorname{erfc}{\left(bx \right)}}{x^{4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x)/x**4,x)
[Out] exp(c)*Integral(exp(d*x**2)*erfc(b*x)/x**4, x)
```

3.167 $\int e^{c+b^2x^2}x^5\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=118

$$\frac{2e^cx}{\sqrt{\pi}\,b^5}-\frac{2e^cx^3}{3\sqrt{\pi}\,b^3}+\frac{x^4e^{b^2x^2+c}\text{erfc}(bx)}{2b^2}+\frac{e^{b^2x^2+c}\text{erfc}(bx)}{b^6}-\frac{x^2e^{b^2x^2+c}\text{erfc}(bx)}{b^4}+\frac{e^cx^5}{5\sqrt{\pi}\,b}$$

```
[Out] exp(b^2*x^2+c)*erfc(b*x)/b^6-exp(b^2*x^2+c)*x^2*erfc(b*x)/b^4+1/2*exp(b^2*x
^2+c)*x^4*erfc(b*x)/b^2+2*exp(c)*x/b^5/Pi^(1/2)-2/3*exp(c)*x^3/b^3/Pi^(1/2)
+1/5*exp(c)*x^5/b/Pi^(1/2)
```

Rubi [A] time = 0.15, antiderivative size = 118, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {6386, 6383, 8, 12, 30}

$$\frac{x^4e^{b^2x^2+c}\text{Erfc}(bx)}{2b^2}-\frac{x^2e^{b^2x^2+c}\text{Erfc}(bx)}{b^4}+\frac{e^{b^2x^2+c}\text{Erfc}(bx)}{b^6}-\frac{2e^cx^3}{3\sqrt{\pi}\,b^3}+\frac{2e^cx}{\sqrt{\pi}\,b^5}+\frac{e^cx^5}{5\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^5*Erfc[b*x],x]
```

```
[Out] (2*E^c*x)/(b^5*Sqrt[Pi]) - (2*E^c*x^3)/(3*b^3*Sqrt[Pi]) + (E^c*x^5)/(5*b*Sq
rt[Pi]) + (E^(c + b^2*x^2)*Erfc[b*x])/b^6 - (E^(c + b^2*x^2)*x^2*Erfc[b*x])
/b^4 + (E^(c + b^2*x^2)*x^4*Erfc[b*x])/(2*b^2)
```

Rule 8

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

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
```

```
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x^5\text{erfc}(bx)\,dx &= \frac{e^{c+b^2x^2}x^4\text{erfc}(bx)}{2b^2}-\frac{2\int e^{c+b^2x^2}x^3\text{erfc}(bx)\,dx}{b^2}+\frac{\int e^cx^4\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^{c+b^2x^2}x^2\text{erfc}(bx)}{b^4}+\frac{e^{c+b^2x^2}x^4\text{erfc}(bx)}{2b^2}+\frac{2\int e^{c+b^2x^2}x\text{erfc}(bx)\,dx}{b^4}-\frac{2\int e^cx^2\,dx}{b^3\sqrt{\pi}}+\frac{e^c\int}{b\cdots}\\ &= \frac{e^cx^5}{5b\sqrt{\pi}}+\frac{e^{c+b^2x^2}\text{erfc}(bx)}{b^6}-\frac{e^{c+b^2x^2}x^2\text{erfc}(bx)}{b^4}+\frac{e^{c+b^2x^2}x^4\text{erfc}(bx)}{2b^2}+\frac{2\int e^c\,dx}{b^5\sqrt{\pi}}-\frac{(2e^c)\int}{b^3\cdots}\\ &= \frac{2e^cx}{b^5\sqrt{\pi}}-\frac{2e^cx^3}{3b^3\sqrt{\pi}}+\frac{e^cx^5}{5b\sqrt{\pi}}+\frac{e^{c+b^2x^2}\text{erfc}(bx)}{b^6}-\frac{e^{c+b^2x^2}x^2\text{erfc}(bx)}{b^4}+\frac{e^{c+b^2x^2}x^4\text{erfc}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.05, size = 73, normalized size = 0.62

$$\frac{e^c\left(6b^5x^5-20b^3x^3+15\sqrt{\pi}\,e^{b^2x^2}\left(b^4x^4-2b^2x^2+2\right)\text{erfc}(bx)+60bx\right)}{30\sqrt{\pi}\,b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x^5*Erfc[b*x],x]
```

```
[Out] (E^c*(60*b*x - 20*b^3*x^3 + 6*b^5*x^5 + 15*E^(b^2*x^2)*Sqrt[Pi]*(2 - 2*b^2*
x^2 + b^4*x^4)*Erfc[b*x]))/(30*b^6*Sqrt[Pi])
```

fricas [A] time = 0.47, size = 97, normalized size = 0.82

$$\frac{2\sqrt{\pi}\left(3\,b^5x^5-10\,b^3x^3+30\,bx\right)e^c+15\left(2\,\pi+\pi b^4x^4-2\,\pi b^2x^2-\left(2\,\pi+\pi b^4x^4-2\,\pi b^2x^2\right)\text{erf}\left(bx\right)\right)e^{\left(b^2x^2+c\right)}}{30\,\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^5*erfc(b*x),x, algorithm="fricas")
```

```
[Out] 1/30*(2*sqrt(pi)*(3*b^5*x^5 - 10*b^3*x^3 + 30*b*x)*e^c + 15*(2*pi + pi*b^4*
x^4 - 2*pi*b^2*x^2 - (2*pi + pi*b^4*x^4 - 2*pi*b^2*x^2)*erf(b*x))*e^(b^2*x^
2 + c))/(pi*b^6)
```

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

$$\int x^5 \operatorname{erfc}(bx)e^{(b^2x^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^5*erfc(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^5*erfc(b*x)*e^(b^2*x^2 + c), x)
```

maple [A] time = 0.07, size = 135, normalized size = 1.14

$$\frac{\frac{e^c\left(\frac{e^{b^2x^2}b^4x^4}{2}-b^2x^2e^{b^2x^2}+e^{b^2x^2}\right)}{b^5}-\frac{\operatorname{erf}(bx)e^c\left(\frac{e^{b^2x^2}b^4x^4}{2}-b^2x^2e^{b^2x^2}+e^{b^2x^2}\right)}{b^5}+\frac{e^c\left(\frac{1}{5}b^5x^5-\frac{2}{3}b^3x^3+2bx\right)}{\sqrt{\pi}\,b^5}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^5*erfc(b*x),x)
```

```
[Out] (1/b^5*exp(c)*(1/2*exp(b^2*x^2)*b^4*x^4-b^2*x^2*exp(b^2*x^2)+exp(b^2*x^2))-
erf(b*x)/b^5*exp(c)*(1/2*exp(b^2*x^2)*b^4*x^4-b^2*x^2*exp(b^2*x^2)+exp(b^2*
x^2))+1/Pi^(1/2)/b^5*exp(c)*(1/5*b^5*x^5-2/3*b^3*x^3+2*b*x))/b
```

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

$$\int x^5 \operatorname{erfc}(bx)e^{(b^2x^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^5*erfc(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x^5*erfc(b*x)*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.31, size = 94, normalized size = 0.80

$$\frac{e^c\left(60\,b\,x-20\,b^3\,x^3+6\,b^5\,x^5+30\,\sqrt{\pi}\,e^{b^2\,x^2}\,\operatorname{erfc}(b\,x)-30\,b^2\,x^2\,\sqrt{\pi}\,e^{b^2\,x^2}\,\operatorname{erfc}(b\,x)+15\,b^4\,x^4\,\sqrt{\pi}\,e^{b^2\,x^2}\,\operatorname{erfc}(b\,x)\right.}{30\,b^6\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*exp(c + b^2*x^2)*erfc(b*x),x)
```

```
[Out] (exp(c)*(60*b*x - 20*b^3*x^3 + 6*b^5*x^5 + 30*pi^(1/2)*exp(b^2*x^2)*erfc(b*
x) - 30*b^2*x^2*pi^(1/2)*exp(b^2*x^2)*erfc(b*x) + 15*b^4*x^4*pi^(1/2)*exp(b
^2*x^2)*erfc(b*x)))/(30*b^6*pi^(1/2))
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**5*erfc(b*x),x)
```

```
[Out] Timed out
```

3.168 $\int e^{c+b^2x^2}x^3\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=80

$$-\frac{e^c x}{\sqrt{\pi}\,b^3}+\frac{x^2e^{b^2x^2+c}\operatorname{erfc}(bx)}{2b^2}-\frac{e^{b^2x^2+c}\operatorname{erfc}(bx)}{2b^4}+\frac{e^c x^3}{3\sqrt{\pi}\,b}$$

```
[Out] -1/2*exp(b^2*x^2+c)*erfc(b*x)/b^4+1/2*exp(b^2*x^2+c)*x^2*erfc(b*x)/b^2-exp(
c)*x/b^3/Pi^(1/2)+1/3*exp(c)*x^3/b/Pi^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 80, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {6386, 6383, 8, 12, 30}

$$\frac{x^2e^{b^2x^2+c}\text{Erfc}(bx)}{2b^2}-\frac{e^{b^2x^2+c}\text{Erfc}(bx)}{2b^4}-\frac{e^c x}{\sqrt{\pi}\,b^3}+\frac{e^c x^3}{3\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

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

```
[Out] -((E^c*x)/(b^3*Sqrt[Pi])) + (E^c*x^3)/(3*b*Sqrt[Pi]) - (E^(c + b^2*x^2)*Erf
c[b*x])/(2*b^4) + (E^(c + b^2*x^2)*x^2*Erfc[b*x])/(2*b^2)
```

Rule 8

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

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x^3\text{erfc}(bx)\,dx &= \frac{e^{c+b^2x^2}x^2\text{erfc}(bx)}{2b^2}-\frac{\int e^{c+b^2x^2}x\text{erfc}(bx)\,dx}{b^2}+\frac{\int e^c x^2\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^{c+b^2x^2}\text{erfc}(bx)}{2b^4}+\frac{e^{c+b^2x^2}x^2\text{erfc}(bx)}{2b^2}-\frac{\int e^c\,dx}{b^3\sqrt{\pi}}+\frac{e^c\int x^2\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^c x}{b^3\sqrt{\pi}}+\frac{e^c x^3}{3b\sqrt{\pi}}-\frac{e^{c+b^2x^2}\text{erfc}(bx)}{2b^4}+\frac{e^{c+b^2x^2}x^2\text{erfc}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.03, size = 58, normalized size = 0.72

$$\frac{e^c\left(3\sqrt{\pi}\,e^{b^2x^2}\left(b^2x^2-1\right)\text{erfc}(bx)+2bx\left(b^2x^2-3\right)\right)}{6\sqrt{\pi}\,b^4}$$

Antiderivative was successfully verified.

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

```
[Out] (E^c*(2*b*x*(-3 + b^2*x^2) + 3*E^(b^2*x^2)*Sqrt[Pi]*(-1 + b^2*x^2)*Erfc[b*x
]))/(6*b^4*Sqrt[Pi])
```

fricas [A] time = 0.41, size = 68, normalized size = 0.85

$$\frac{2\sqrt{\pi}\left(b^3x^3-3\,bx\right)e^c-3\left(\pi-\pi b^2x^2-\left(\pi-\pi b^2x^2\right)\text{erf}\left(bx\right)\right)e^{\left(b^2x^2+c\right)}}{6\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/6*(2*sqrt(pi)*(b^3*x^3 - 3*b*x)*e^c - 3*(pi - pi*b^2*x^2 - (pi - pi*b^2*x
^2)*erf(b*x))*e^(b^2*x^2 + c))/(pi*b^4)
```

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

$$\int x^3\,\text{erfc}\left(bx\right)e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.18, size = 99, normalized size = 1.24

$$\frac{\frac{e^{c}\left(\frac{b^{2} x^{2} e^{b^{2} x^{2}}}{2}-\frac{e^{b^{2} x^{2}}}{2}\right)}{b^{3}}-\frac{\operatorname{erf}(b x) e^{c}\left(\frac{b^{2} x^{2} e^{b^{2} x^{2}}}{2}-\frac{e^{b^{2} x^{2}}}{2}\right)}{b^{3}}+\frac{e^{c}\left(\frac{1}{3} b^{3} x^{3}-b x\right)}{\sqrt{\pi}\, b^{3}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (1/b^3*exp(c)*(1/2*b^2*x^2*exp(b^2*x^2)-1/2*exp(b^2*x^2))-erf(b*x)/b^3*exp(
c)*(1/2*b^2*x^2*exp(b^2*x^2)-1/2*exp(b^2*x^2))+1/Pi^(1/2)/b^3*exp(c)*(1/3*b
^3*x^3-b*x))/b
```

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

$$\int x^{3} \operatorname{erfc}(bx)\, e^{\left(b^{2} x^{2}+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^3*erfc(b*x),x, algorithm="maxima")
```

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

mupad [B] time = 0.16, size = 63, normalized size = 0.79

$$-\frac{e^{c}\,\left(6\,b\,x-2\,b^{3}\,x^{3}+3\,\sqrt{\pi}\,e^{b^{2}\,x^{2}}\,\operatorname{erfc}\left(b\,x\right)-3\,b^{2}\,x^{2}\,\sqrt{\pi}\,e^{b^{2}\,x^{2}}\,\operatorname{erfc}\left(b\,x\right)\right)}{6\,b^{4}\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(exp(c)*(6*b*x - 2*b^3*x^3 + 3*pi^(1/2)*exp(b^2*x^2)*erfc(b*x) - 3*b^2*x^2
*pi^(1/2)*exp(b^2*x^2)*erfc(b*x)))/(6*b^4*pi^(1/2))
```

sympy [A] time = 120.01, size = 83, normalized size = 1.04

$$\begin{cases} \frac{x^{3} e^{c}}{3 \sqrt{\pi} b} + \frac{x^{2} e^{c} e^{b^{2} x^{2}} \operatorname{erfc}(bx)}{2 b^{2}} - \frac{x e^{c}}{\sqrt{\pi} b^{3}} - \frac{e^{c} e^{b^{2} x^{2}} \operatorname{erfc}(bx)}{2 b^{4}} & \text{for}\: b \neq 0 \\ \frac{x^{4} e^{c}}{4} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**3*erfc(b*x),x)
```

```
[Out] Piecewise((x**3*exp(c)/(3*sqrt(pi)*b) + x**2*exp(c)*exp(b**2*x**2)*erfc(b*x
)/(2*b**2) - x*exp(c)/(sqrt(pi)*b**3) - exp(c)*exp(b**2*x**2)*erfc(b*x)/(2*
b**4), Ne(b, 0)), (x**4*exp(c)/4, True))
```

3.169 $\int e^{c+b^2x^2}x\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=36

$$\frac{e^{b^2x^2+c}\text{erfc}(bx)}{2b^2}+\frac{e^c x}{\sqrt{\pi}\,b}$$

```
[Out] 1/2*exp(b^2*x^2+c)*erfc(b*x)/b^2+exp(c)*x/b/Pi^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 36, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {6383, 8}

$$\frac{e^{b^2x^2+c}\text{Erfc}(bx)}{2b^2}+\frac{e^c x}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x*Erfc[b*x],x]
```

```
[Out] (E^c*x)/(b*Sqrt[Pi]) + (E^(c + b^2*x^2)*Erfc[b*x])/(2*b^2)
```

Rule 8

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

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x\text{erfc}(bx)\,dx &= \frac{e^{c+b^2x^2}\text{erfc}(bx)}{2b^2}+\frac{\int e^c\,dx}{b\sqrt{\pi}}\\ &= \frac{e^c x}{b\sqrt{\pi}}+\frac{e^{c+b^2x^2}\text{erfc}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.02, size = 36, normalized size = 1.00

$$\frac{e^{b^2x^2+c}\text{erfc}(bx)}{2b^2}+\frac{e^c x}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x*Erfc[b*x],x]
```

```
[Out] (E^c*x)/(b*Sqrt[Pi]) + (E^(c + b^2*x^2)*Erfc[b*x])/(2*b^2)
```

fricas [A] time = 0.96, size = 38, normalized size = 1.06

$$\frac{2\sqrt{\pi}\,bxe^{c} + (\pi - \pi\,\mathrm{erf}\,(bx))e^{\left(b^2x^2+c\right)}}{2\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*(2*sqrt(pi)*b*x*e^c + (pi - pi*erf(b*x))*e^(b^2*x^2 + c))/(pi*b^2)
```

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

$$\int x\,\mathrm{erfc}\,(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(x*erfc(b*x)*e^(b^2*x^2 + c), x)
```

maple [A] time = 0.09, size = 51, normalized size = 1.42

$$\frac{2\,\mathrm{e}^{b^2x^2+c}\mathrm{e}^{-b^2x^2}xb + \mathrm{e}^{b^2x^2+c}\mathrm{erfc}\,(bx)\,\sqrt{\pi}}{2b^2\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x*erfc(b*x),x)
```

```
[Out] 1/2*(2*exp(b^2*x^2+c)*exp(-b^2*x^2)*x*b+exp(b^2*x^2+c)*erfc(b*x)*Pi^(1/2))/
b^2/Pi^(1/2)
```

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

$$\int x\,\mathrm{erfc}\,(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(x*erfc(b*x)*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.17, size = 30, normalized size = 0.83

$$\frac{x\,\mathrm{e}^{c}}{b\,\sqrt{\pi}}+\frac{\mathrm{e}^{b^2\,x^2}\,\mathrm{e}^{c}\,\mathrm{erfc}\left(b\,x\right)}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(c + b^2*x^2)*erfc(b*x),x)
```

```
[Out] (x*exp(c))/(b*pi^(1/2)) + (exp(b^2*x^2)*exp(c)*erfc(b*x))/(2*b^2)
```

sympy [A] time = 13.39, size = 41, normalized size = 1.14

$$\begin{cases} \frac{xe^{c}}{\sqrt{\pi}\,b}+\frac{e^{c}e^{b^2x^2}\,\mathrm{erfc}\left(bx\right)}{2b^2} & \text{for}\ b\neq 0\\ \frac{x^2e^{c}}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x*erfc(b*x),x)
```

```
[Out] Piecewise((x*exp(c)/(sqrt(pi)*b) + exp(c)*exp(b**2*x**2)*erfc(b*x)/(2*b**2)
, Ne(b, 0)), (x**2*exp(c)/2, True))
```

3.170 $\int \frac{e^{c+b^2x^2}\mathbf{erfc}(bx)}{x}\,dx$

Optimal. Leaf size=48

$$\frac{1}{2}e^c\mathrm{Ei}\left(b^2x^2\right)-\frac{2be^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

```
[Out] 1/2*exp(c)*Ei(b^2*x^2)-2*b*exp(c)*x*HypergeometricPFQ([1/2, 1],[3/2, 3/2],b
^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.12, antiderivative size = 48, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {6389, 2210, 6388}

$$\frac{1}{2}e^c\mathrm{Ei}\left(b^2x^2\right)-\frac{2be^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

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

```
[Out] (E^c*ExpIntegralEi[b^2*x^2])/2 - (2*b*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/
2, 3/2}, b^2*x^2])/Sqrt[Pi]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6388

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*b
*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi], x] /; Fr
eeQ[{b, c, d}, x] && EqQ[d, b^2]
```

Rule 6389

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)])/(x_), x_Symbol] :> Int[E^(c
 + d*x^2)/x, x] - Int[(E^(c + d*x^2)*Erf[b*x])/x, x] /; FreeQ[{b, c, d}, x]
 && EqQ[d, b^2]
```

Rubi steps

$$\int \frac{e^{c+b^2x^2}\text{erfc}(bx)}{x}\,dx = \int \frac{e^{c+b^2x^2}}{x}\,dx - \int \frac{e^{c+b^2x^2}\text{erf}(bx)}{x}\,dx$$
$$= \frac{1}{2}e^c\text{Ei}\left(b^2x^2\right) - \frac{2be^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

Mathematica [A] time = 0.19, size = 45, normalized size = 0.94

$$\frac{1}{2}e^c\left(\text{Ei}\left(b^2x^2\right) - \frac{4bx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}\right)$$

Antiderivative was successfully verified.

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

```
[Out] (E^c*(ExpIntegralEi[b^2*x^2] - (4*b*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2
}, b^2*x^2])/Sqrt[Pi]))/2
```

fricas [F] time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}\,(bx) - 1)e^{\left(b^2x^2+c\right)}}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(-(erf(b*x) - 1)*e^(b^2*x^2 + c)/x, x)
```

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

$$\int \frac{\text{erfc}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [F] time = 0.06, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^2x^2+c}\operatorname{erfc}(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfc(b*x)/x,x)
[Out] int(exp(b^2*x^2+c)*erfc(b*x)/x,x)
```

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

$$\int \frac{\operatorname{erfc}(bx)\,e^{\left(b^2x^2+c\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c)/x, x)
```

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

$$\int \frac{\mathrm{e}^{b^2\,x^2+c}\,\operatorname{erfc}(b\,x)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfc(b*x))/x,x)
[Out] int((exp(c + b^2*x^2)*erfc(b*x))/x, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfc(b*x)/x,x)
[Out] Exception raised: AttributeError
```

3.171 $\int \frac{e^{c+b^2x^2}\textbf{erfc}(bx)}{x^3}\,dx$

Optimal. Leaf size=88

$$-\frac{2b^3e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{b^2x^2+c}\text{erfc}(bx)}{2x^2}+\frac{1}{2}b^2e^c\text{Ei}\left(b^2x^2\right)+\frac{be^c}{\sqrt{\pi}\,x}$$

```
[Out] 1/2*b^2*exp(c)*Ei(b^2*x^2)-1/2*exp(b^2*x^2+c)*erfc(b*x)/x^2+b*exp(c)/x/Pi^(
1/2)-2*b^3*exp(c)*x*HypergeometricPFQ([1/2, 1],[3/2, 3/2],b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.17, antiderivative size = 88, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6392, 6389, 2210, 6388, 12, 30}

$$-\frac{2b^3e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{b^2x^2+c}\text{Erfc}(bx)}{2x^2}+\frac{1}{2}b^2e^c\text{Ei}\left(b^2x^2\right)+\frac{be^c}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Int[(E^(c + b^2*x^2)*Erfc[b*x])/x^3,x]
```

```
[Out] (b*E^c)/(Sqrt[Pi]*x) - (E^(c + b^2*x^2)*Erfc[b*x])/(2*x^2) + (b^2*E^c*ExpIn
tegralEi[b^2*x^2])/2 - (2*b^3*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2},
 b^2*x^2])/Sqrt[Pi]
```

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 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6388

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*b
*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi], x] /; Fr
eeQ[{b, c, d}, x] && EqQ[d, b^2]
```

Rule 6389

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)])/(x_), x_Symbol] :> Int[E^(c
 + d*x^2)/x, x] - Int[(E^(c + d*x^2)*Erf[b*x])/x, x] /; FreeQ[{b, c, d}, x]
 && EqQ[d, b^2]
```

Rule 6392

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

Rubi steps

$$\begin{aligned}\int \frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{x^3}\,dx &= -\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{2x^2}+b^2\int \frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{x}\,dx-\frac{b\int \frac{e^c}{x^2}\,dx}{\sqrt{\pi}}\\ &= -\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{2x^2}+b^2\int \frac{e^{c+b^2x^2}}{x}\,dx-b^2\int \frac{e^{c+b^2x^2}\operatorname{erf}(bx)}{x}\,dx-\frac{(be^c)\int \frac{1}{x^2}\,dx}{\sqrt{\pi}}\\ &= \frac{be^c}{\sqrt{\pi}\,x}-\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{2x^2}+\frac{1}{2}b^2e^c\operatorname{Ei}\left(b^2x^2\right)-\frac{2b^3e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.22, size = 65, normalized size = 0.74

$$-\frac{e^c\left(-\frac{4bx\,{}_2F_2\left(-\frac{1}{2},1;\frac{1}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}-b^2x^2\operatorname{Ei}\left(b^2x^2\right)+e^{b^2x^2}\right)}{2x^2}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(E^(c + b^2*x^2)*Erfc[b*x])/x^3,x]
```

```
[Out] -1/2*(E^c*(E^(b^2*x^2) - b^2*x^2*ExpIntegralEi[b^2*x^2] - (4*b*x*Hypergeome
tricPFQ[{-1/2, 1}, {1/2, 3/2}, b^2*x^2])/Sqrt[Pi]))/x^2
```

fricas [F] time = 0.40, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}\,(bx)-1)e^{\left(b^2x^2+c\right)}}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^3,x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(b^2*x^2 + c)/x^3, x)
```

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

$$\int \frac{\text{erfc}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^3,x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c)/x^3, x)
```

maple [F] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{e^{b^2x^2+c}\text{erfc}\,(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfc(b*x)/x^3,x)
[Out] int(exp(b^2*x^2+c)*erfc(b*x)/x^3,x)
```

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

$$\int \frac{\text{erfc}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^3,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c)/x^3, x)
```

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

$$\int \frac{e^{b^2\,x^2+c}\,\text{erfc}\,(b\,x)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfc(b*x))/x^3,x)
```

```
[Out] int((exp(c + b^2*x^2)*erfc(b*x))/x^3, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfc(b*x)/x**3,x)
```

```
[Out] Exception raised: AttributeError
```

3.172 $\int \frac{e^{c+b^2x^2}\mathbf{erfc}(bx)}{x^5}\,dx$

Optimal. Leaf size=134

$$-\frac{b^5e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}+\frac{b^3e^c}{2\sqrt{\pi}\,x}-\frac{b^2e^{b^2x^2+c}\text{erfc}(bx)}{4x^2}-\frac{e^{b^2x^2+c}\text{erfc}(bx)}{4x^4}+\frac{1}{4}b^4e^c\text{Ei}\left(b^2x^2\right)+\frac{be^c}{6\sqrt{\pi}\,x^3}$$

```
[Out] 1/4*b^4*exp(c)*Ei(b^2*x^2)-1/4*exp(b^2*x^2+c)*erfc(b*x)/x^4-1/4*b^2*exp(b^2
*x^2+c)*erfc(b*x)/x^2+1/6*b*exp(c)/x^3/Pi^(1/2)+1/2*b^3*exp(c)/x/Pi^(1/2)-b
^5*exp(c)*x*HypergeometricPFQ([1/2, 1],[3/2, 3/2],b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.20, antiderivative size = 134, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6392, 6389, 2210, 6388, 12, 30}

$$-\frac{b^5e^cx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}-\frac{b^2e^{b^2x^2+c}\text{Erfc}(bx)}{4x^2}-\frac{e^{b^2x^2+c}\text{Erfc}(bx)}{4x^4}+\frac{1}{4}b^4e^c\text{Ei}\left(b^2x^2\right)+\frac{b^3e^c}{2\sqrt{\pi}\,x}+\frac{be^c}{6\sqrt{\pi}\,x^3}$$

Antiderivative was successfully verified.

```
[In] Int[(E^(c + b^2*x^2)*Erfc[b*x])/x^5,x]
```

```
[Out] (b*E^c)/(6*Sqrt[Pi]*x^3) + (b^3*E^c)/(2*Sqrt[Pi]*x) - (E^(c + b^2*x^2)*Erfc
[b*x])/(4*x^4) - (b^2*E^(c + b^2*x^2)*Erfc[b*x])/(4*x^2) + (b^4*E^c*ExpInte
gralEi[b^2*x^2])/4 - (b^5*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2
*x^2])/Sqrt[Pi]
```

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 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6388

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*b
*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi], x] /; Fr
eeQ[{b, c, d}, x] && EqQ[d, b^2]
```

Rule 6389

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)])/(x_), x_Symbol] :> Int[E^(c
 + d*x^2)/x, x] - Int[(E^(c + d*x^2)*Erf[b*x])/x, x] /; FreeQ[{b, c, d}, x]
 && EqQ[d, b^2]
```

Rule 6392

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

Rubi steps

$$\int \frac{e^{c+b^2x^2}\text{erfc}(bx)}{x^5}\,dx = -\frac{e^{c+b^2x^2}\text{erfc}(bx)}{4x^4} + \frac{1}{2}b^2\int \frac{e^{c+b^2x^2}\text{erfc}(bx)}{x^3}\,dx - \frac{b\int \frac{e^c}{x^4}\,dx}{2\sqrt{\pi}}$$

$$= -\frac{e^{c+b^2x^2}\text{erfc}(bx)}{4x^4} - \frac{b^2e^{c+b^2x^2}\text{erfc}(bx)}{4x^2} + \frac{1}{2}b^4\int \frac{e^{c+b^2x^2}\text{erfc}(bx)}{x}\,dx - \frac{b^3\int \frac{e^c}{x^2}\,dx}{2\sqrt{\pi}} - \frac{(be^c)\int}{2\sqrt{}}$$

$$= \frac{be^c}{6\sqrt{\pi}\,x^3} - \frac{e^{c+b^2x^2}\text{erfc}(bx)}{4x^4} - \frac{b^2e^{c+b^2x^2}\text{erfc}(bx)}{4x^2} + \frac{1}{2}b^4\int \frac{e^{c+b^2x^2}}{x}\,dx - \frac{1}{2}b^4\int \frac{e^{c+b^2x^2}\text{erf}(b}{x}$$

$$= \frac{be^c}{6\sqrt{\pi}\,x^3} + \frac{b^3e^c}{2\sqrt{\pi}\,x} - \frac{e^{c+b^2x^2}\text{erfc}(bx)}{4x^4} - \frac{b^2e^{c+b^2x^2}\text{erfc}(bx)}{4x^2} + \frac{1}{4}b^4e^c\text{Ei}\left(b^2x^2\right) - \frac{b^5e^cx\,{}_2F_2\left(\frac{1}{2}\right.}{\sqrt{}}$$

Mathematica [A] time = 0.26, size = 83, normalized size = 0.62

$$-\frac{e^c\left(3\sqrt{\pi}\left(e^{b^2x^2}\left(b^2x^2+1\right)-b^4x^4\text{Ei}\left(b^2x^2\right)\right)-8bx\,{}_2F_2\left(-\frac{3}{2},1;-\frac{1}{2},\frac{3}{2};b^2x^2\right)\right)}{12\sqrt{\pi}\,x^4}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(E^(c + b^2*x^2)*Erfc[b*x])/x^5,x]
```

```
[Out] -1/12*(E^c*(3*Sqrt[Pi]*(E^(b^2*x^2)*(1 + b^2*x^2) - b^4*x^4*ExpIntegralEi[b
^2*x^2]) - 8*b*x*HypergeometricPFQ[{-3/2, 1}, {-1/2, 3/2}, b^2*x^2]))/(Sqrt
[Pi]*x^4)
```

fricas [F] time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}(bx)-1)e^{\left(b^2x^2+c\right)}}{x^5},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^5,x, algorithm="fricas")
```

```
[Out] integral(-(erf(b*x) - 1)*e^(b^2*x^2 + c)/x^5, x)
```

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

$$\int \frac{\text{erfc}(bx)\,e^{\left(b^2x^2+c\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^5,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c)/x^5, x)
```

maple [F] time = 0.25, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^2x^2+c}\text{erfc}(bx)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfc(b*x)/x^5,x)
```

```
[Out] int(exp(b^2*x^2+c)*erfc(b*x)/x^5,x)
```

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

$$\int \frac{\text{erfc}(bx)\,e^{\left(b^2x^2+c\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^5,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c)/x^5, x)
```

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

$$\int \frac{e^{b^2 x^2+c} \operatorname{erfc}(b x)}{x^5} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfc(b*x))/x^5,x)
```

```
[Out] int((exp(c + b^2*x^2)*erfc(b*x))/x^5, x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfc(b*x)/x**5,x)
```

```
[Out] Timed out
```

3.173 $\int e^{c+b^2x^2}x^4\textbf{erfc}(bx)\,dx$

Optimal. Leaf size=138

$$-\frac{3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{4\sqrt{\pi}\,b^3}+\frac{3\sqrt{\pi}\,e^c\text{erfi}(bx)}{8b^5}-\frac{3e^cx^2}{4\sqrt{\pi}\,b^3}+\frac{x^3e^{b^2x^2+c}\text{erfc}(bx)}{2b^2}-\frac{3xe^{b^2x^2+c}\text{erfc}(bx)}{4b^4}+\frac{e^cx^4}{4\sqrt{\pi}\,b}$$

```
[Out] -3/4*exp(b^2*x^2+c)*x*erfc(b*x)/b^4+1/2*exp(b^2*x^2+c)*x^3*erfc(b*x)/b^2-3/
4*exp(c)*x^2/b^3/Pi^(1/2)+1/4*exp(c)*x^4/b/Pi^(1/2)-3/4*exp(c)*x^2*Hypergeo
metricPFQ([1, 1],[3/2, 2],b^2*x^2)/b^3/Pi^(1/2)+3/8*exp(c)*erfi(b*x)*Pi^(1/
2)/b^5
```

Rubi [A] time = 0.14, antiderivative size = 138, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6386, 6377, 2204, 6376, 12, 30}

$$-\frac{3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{4\sqrt{\pi}\,b^3}+\frac{x^3e^{b^2x^2+c}\text{Erfc}(bx)}{2b^2}-\frac{3xe^{b^2x^2+c}\text{Erfc}(bx)}{4b^4}+\frac{3\sqrt{\pi}\,e^c\text{Erfi}(bx)}{8b^5}-\frac{3e^cx^2}{4\sqrt{\pi}\,b^3}+\frac{e^cx^4}{4\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^4*Erfc[b*x],x]
```

```
[Out] (-3*E^c*x^2)/(4*b^3*Sqrt[Pi]) + (E^c*x^4)/(4*b*Sqrt[Pi]) - (3*E^(c + b^2*x^
2)*x*Erfc[b*x])/(4*b^4) + (E^(c + b^2*x^2)*x^3*Erfc[b*x])/(2*b^2) + (3*E^c*
Sqrt[Pi]*Erfi[b*x])/(8*b^5) - (3*E^c*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}
, b^2*x^2])/(4*b^3*Sqrt[Pi])
```

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 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x^4\operatorname{erfc}(bx)\,dx &= \frac{e^{c+b^2x^2}x^3\operatorname{erfc}(bx)}{2b^2}-\frac{3\int e^{c+b^2x^2}x^2\operatorname{erfc}(bx)\,dx}{2b^2}+\frac{\int e^cx^3\,dx}{b\sqrt{\pi}}\\ &= -\frac{3e^{c+b^2x^2}x\operatorname{erfc}(bx)}{4b^4}+\frac{e^{c+b^2x^2}x^3\operatorname{erfc}(bx)}{2b^2}+\frac{3\int e^{c+b^2x^2}\operatorname{erfc}(bx)\,dx}{4b^4}-\frac{3\int e^cx\,dx}{2b^3\sqrt{\pi}}+\frac{e^c\int x}{b\sqrt{\pi}}\\ &= \frac{e^cx^4}{4b\sqrt{\pi}}-\frac{3e^{c+b^2x^2}x\operatorname{erfc}(bx)}{4b^4}+\frac{e^{c+b^2x^2}x^3\operatorname{erfc}(bx)}{2b^2}+\frac{3\int e^{c+b^2x^2}\,dx}{4b^4}-\frac{3\int e^{c+b^2x^2}\operatorname{erf}(bx)\,d}{4b^4}\\ &= -\frac{3e^cx^2}{4b^3\sqrt{\pi}}+\frac{e^cx^4}{4b\sqrt{\pi}}-\frac{3e^{c+b^2x^2}x\operatorname{erfc}(bx)}{4b^4}+\frac{e^{c+b^2x^2}x^3\operatorname{erfc}(bx)}{2b^2}+\frac{3e^c\sqrt{\pi}\operatorname{erfi}(bx)}{8b^5}-\frac{3e^cx^2}{}\end{aligned}$$

Mathematica [A] time = 0.30, size = 147, normalized size = 1.07

$$-\frac{e^c\left(-6b^2x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)-2b^4x^4+2\sqrt{\pi}\,bxe^{b^2x^2}\left(2b^2x^2-3\right)\operatorname{erf}(bx)+6b^2x^2+6\sqrt{\pi}\,bxe^{b^2x^2}-4\sqrt{\pi}\,b^3x^3\right.}{8\sqrt{\pi}\,b^5}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[E^(c + b^2*x^2)*x^4*Erfc[b*x],x]
```

```
[Out] -1/8*(E^c*(6*b*E^(b^2*x^2)*Sqrt[Pi]*x + 6*b^2*x^2 - 4*b^3*E^(b^2*x^2)*Sqrt[
Pi]*x^3 - 2*b^4*x^4 + 2*b*E^(b^2*x^2)*Sqrt[Pi]*x*(-3 + 2*b^2*x^2)*Erf[b*x]
- 3*Pi*Erfi[b*x] + 3*Pi*Erf[b*x]*Erfi[b*x] - 6*b^2*x^2*HypergeometricPFQ[{1
, 1}, {3/2, 2}, -(b^2*x^2)]))/(b^5*Sqrt[Pi])
```

fricas [F] time = 0.56, size = 0, normalized size = 0.00

$$\text{integral}\left(-\left(x^4 \operatorname{erf}(bx) - x^4\right)e^{\left(b^2x^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^4*erfc(b*x),x, algorithm="fricas")
[Out] integral(-(x^4*erf(b*x) - x^4)*e^(b^2*x^2 + c), x)
```

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

$$\int x^4 \operatorname{erfc}(bx)\, e^{\left(b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^4*erfc(b*x),x, algorithm="giac")
[Out] integrate(x^4*erfc(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int e^{b^2x^2+c}x^4 \operatorname{erfc}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^4*erfc(b*x),x)
[Out] int(exp(b^2*x^2+c)*x^4*erfc(b*x),x)
```

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

$$\int x^4 \operatorname{erfc}(bx)\, e^{\left(b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^4*erfc(b*x),x, algorithm="maxima")
[Out] integrate(x^4*erfc(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int x^4\,e^{b^2\,x^2+c}\,\mathrm{erfc}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*exp(c + b^2*x^2)*erfc(b*x),x)
[Out] int(x^4*exp(c + b^2*x^2)*erfc(b*x), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**4*erfc(b*x),x)
[Out] Timed out
```

3.174 $\int e^{c+b^2x^2}x^2\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=95

$$\frac{e^c x^2\, {}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}\,b}-\frac{\sqrt{\pi}\,e^c\operatorname{erfi}(bx)}{4b^3}+\frac{xe^{b^2x^2+c}\operatorname{erfc}(bx)}{2b^2}+\frac{e^cx^2}{2\sqrt{\pi}\,b}$$

```
[Out] 1/2*exp(b^2*x^2+c)*x*erfc(b*x)/b^2+1/2*exp(c)*x^2/b/Pi^(1/2)+1/2*exp(c)*x^2
*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/b/Pi^(1/2)-1/4*exp(c)*erfi(b*x)
*Pi^(1/2)/b^3
```

Rubi [A] time = 0.08, antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6386, 6377, 2204, 6376, 12, 30}

$$\frac{e^c x^2\, {}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}\,b}+\frac{xe^{b^2x^2+c}\text{Erfc}(bx)}{2b^2}-\frac{\sqrt{\pi}\,e^c\text{Erfi}(bx)}{4b^3}+\frac{e^cx^2}{2\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^2*Erfc[b*x],x]
```

```
[Out] (E^c*x^2)/(2*b*Sqrt[Pi]) + (E^(c + b^2*x^2)*x*Erfc[b*x])/(2*b^2) - (E^c*Sqr
t[Pi]*Erfi[b*x])/(4*b^3) + (E^c*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2
*x^2])/(2*b*Sqrt[Pi])
```

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 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x^2\text{erfc}(bx)\,dx &= \frac{e^{c+b^2x^2}x\text{erfc}(bx)}{2b^2}-\frac{\int e^{c+b^2x^2}\text{erfc}(bx)\,dx}{2b^2}+\frac{\int e^cx\,dx}{b\sqrt{\pi}}\\ &= \frac{e^{c+b^2x^2}x\text{erfc}(bx)}{2b^2}-\frac{\int e^{c+b^2x^2}\,dx}{2b^2}+\frac{\int e^{c+b^2x^2}\text{erf}(bx)\,dx}{2b^2}+\frac{e^c\int x\,dx}{b\sqrt{\pi}}\\ &= \frac{e^cx^2}{2b\sqrt{\pi}}+\frac{e^{c+b^2x^2}x\text{erfc}(bx)}{2b^2}-\frac{e^c\sqrt{\pi}\,\text{erfi}(bx)}{4b^3}+\frac{e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2b\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.34, size = 104, normalized size = 1.09

$$-\frac{e^c\left(2b^2x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)+\text{erf}(bx)\left(2\sqrt{\pi}\,bxe^{b^2x^2}-\pi\text{erfi}(bx)\right)-2b^2x^2-2\sqrt{\pi}\,bxe^{b^2x^2}+\pi\text{erfi}(bx)\right)}{4\sqrt{\pi}\,b^3}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[E^(c + b^2*x^2)*x^2*Erfc[b*x],x]
```

```
[Out] -1/4*(E^c*(-2*b*E^(b^2*x^2)*Sqrt[Pi]*x - 2*b^2*x^2 + Pi*Erfi[b*x] + Erf[b*x
]*(2*b*E^(b^2*x^2)*Sqrt[Pi]*x - Pi*Erfi[b*x]) + 2*b^2*x^2*HypergeometricPFQ
[{1, 1}, {3/2, 2}, -(b^2*x^2)]))/(b^3*Sqrt[Pi])
```

fricas [F] time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(-\left(x^2\,\text{erf}\,(bx) - x^2\right)e^{\left(b^2x^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^2*erfc(b*x),x, algorithm="fricas")
[Out] integral(-(x^2*erf(b*x) - x^2)*e^(b^2*x^2 + c), x)
```

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

$$\int x^2\,\text{erfc}\,(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^2*erfc(b*x),x, algorithm="giac")
[Out] integrate(x^2*erfc(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.18, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{b^2x^2+c}x^2\text{erfc}\,(bx)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^2*erfc(b*x),x)
[Out] int(exp(b^2*x^2+c)*x^2*erfc(b*x),x)
```

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

$$\int x^2\,\text{erfc}\,(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^2*erfc(b*x),x, algorithm="maxima")
[Out] integrate(x^2*erfc(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int x^2\,\mathrm{e}^{b^2\,x^2+c}\,\text{erfc}\,(b\,x)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(c + b^2*x^2)*erfc(b*x),x)
```

```
[Out] int(x^2*exp(c + b^2*x^2)*erfc(b*x), x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**2*erfc(b*x),x)
```

```
[Out] Exception raised: AttributeError
```

3.175 $\int e^{c+b^2x^2}\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=50

$$\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)}{2b}-\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}$$

```
[Out] -b*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)+1/2*exp(c
)*erfi(b*x)*Pi^(1/2)/b
```

Rubi [A] time = 0.03, antiderivative size = 50, 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 = {6377, 2204, 6376}

$$\frac{\sqrt{\pi}\,e^c\text{Erfi}(bx)}{2b}-\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*Erfc[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x])/(2*b) - (b*E^c*x^2*HypergeometricPFQ[{1, 1}, {3/2,
 2}, b^2*x^2])/Sqrt[Pi]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rubi steps

$$\int e^{c+b^2x^2}\operatorname{erfc}(bx)\,dx = \int e^{c+b^2x^2}\,dx - \int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx$$
$$= \frac{e^c\sqrt{\pi}\operatorname{erfi}(bx)}{2b} - \frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}$$

Mathematica [F] time = 0.11, size = 0, normalized size = 0.00

$$\int e^{c+b^2x^2}\operatorname{erfc}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + b^2*x^2)*Erfc[b*x],x]
[Out] Integrate[E^(c + b^2*x^2)*Erfc[b*x], x]
```

fricas [F] time = 0.58, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-(\operatorname{erf}(bx)-1)e^{\left(b^2x^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x),x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(b^2*x^2 + c), x)
```

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

$$\int \operatorname{erfc}(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x),x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.06, size = 0, normalized size = 0.00

$$\int e^{b^2x^2+c}\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfc(b*x),x)
[Out] int(exp(b^2*x^2+c)*erfc(b*x),x)
```

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

$$\int \operatorname{erfc}(bx)\, e^{\left(b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x),x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c), x)
```

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

$$\int \mathrm{e}^{b^2\,x^2+c}\, \operatorname{erfc}(b\,x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + b^2*x^2)*erfc(b*x),x)
[Out] int(exp(c + b^2*x^2)*erfc(b*x), x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfc(b*x),x)
[Out] Exception raised: AttributeError
```

3.176 $\int \frac{e^{c+b^2x^2}\mathbf{erfc}(bx)}{x^2}\,dx$

Optimal. Leaf size=80

$$-\frac{2b^3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{b^2x^2+c}\mathrm{erfc}(bx)}{x}+\sqrt{\pi}\,be^c\mathrm{erfi}(bx)-\frac{2be^c\log(x)}{\sqrt{\pi}}$$

```
[Out] -exp(b^2*x^2+c)*erfc(b*x)/x-2*b^3*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2,
 2],b^2*x^2)/Pi^(1/2)-2*b*exp(c)*ln(x)/Pi^(1/2)+b*exp(c)*erfi(b*x)*Pi^(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 80, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6392, 6377, 2204, 6376, 12, 29}

$$-\frac{2b^3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{b^2x^2+c}\mathrm{Erfc}(bx)}{x}+\sqrt{\pi}\,be^c\mathrm{Erfi}(bx)-\frac{2be^c\log(x)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

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

```
[Out] -((E^(c + b^2*x^2)*Erfc[b*x])/x) + b*E^c*Sqrt[Pi]*Erfi[b*x] - (2*b^3*E^c*x^
2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi] - (2*b*E^c*Log[x])
/Sqrt[Pi]
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 29

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

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
```

```
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6392

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

Rubi steps

$$
\begin{aligned}
\int \frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{x^2}\,dx &= -\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{x} + \left(2b^2\right)\int e^{c+b^2x^2}\operatorname{erfc}(bx)\,dx - \frac{(2b)\int \frac{e^c}{x}\,dx}{\sqrt{\pi}}\\
&= -\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{x} + \left(2b^2\right)\int e^{c+b^2x^2}\,dx - \left(2b^2\right)\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx - \frac{(2be^c)\int \frac{1}{x}\,dx}{\sqrt{\pi}}\\
&= -\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{x} + be^c\sqrt{\pi}\operatorname{erfi}(bx) - \frac{2b^3e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}} - \frac{2be^c\log(x)}{\sqrt{\pi}}
\end{aligned}
$$

Mathematica [A] time = 0.31, size = 99, normalized size = 1.24

$$
-\frac{e^c\left(-2b^3x^3\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)+\operatorname{erf}(bx)\left(\pi bx\operatorname{erfi}(bx)-\sqrt{\pi}\,e^{b^2x^2}\right)+\sqrt{\pi}\,e^{b^2x^2}-\pi bx\operatorname{erfi}(bx)+2bx\log(x)\right)}{\sqrt{\pi}\,x}
$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(E^(c + b^2*x^2)*Erfc[b*x])/x^2,x]
```

```
[Out] -((E^c*(E^(b^2*x^2)*Sqrt[Pi] - b*Pi*x*Erfi[b*x] + Erf[b*x]*(-(E^(b^2*x^2)*S
qrt[Pi]) + b*Pi*x*Erfi[b*x]) - 2*b^3*x^3*HypergeometricPFQ[{1, 1}, {3/2, 2}
, -(b^2*x^2)] + 2*b*x*Log[x]))/(Sqrt[Pi]*x))
```

fricas [F] time = 0.41, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}(bx)-1)e^{\left(b^2x^2+c\right)}}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^2,x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(b^2*x^2 + c)/x^2, x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\,e^{\left(b^2x^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^2,x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c)/x^2, x)
```

maple [F] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^2x^2+c}\text{erfc}(bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfc(b*x)/x^2,x)
[Out] int(exp(b^2*x^2+c)*erfc(b*x)/x^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\,e^{\left(b^2x^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^2,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c)/x^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{b^2\,x^2+c}\,\text{erfc}(b\,x)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfc(b*x))/x^2,x)
```

```
[Out] int((exp(c + b^2*x^2)*erfc(b*x))/x^2, x)
```

sympy **[F(-2)]** time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfc(b*x)/x**2,x)
```

```
[Out] Exception raised: AttributeError
```

3.177 $\int \frac{e^{c+b^2x^2}\mathbf{erfc}(bx)}{x^4}\,dx$

Optimal. Leaf size=134

$$-\frac{4b^5e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{3\sqrt{\pi}}+\frac{2}{3}\sqrt{\pi}\,b^3e^c\text{erfi}(bx)-\frac{4b^3e^c\log(x)}{3\sqrt{\pi}}-\frac{2b^2e^{b^2x^2+c}\text{erfc}(bx)}{3x}-\frac{e^{b^2x^2+c}\text{erfc}(bx)}{3x^3}+\frac{be^c}{3\sqrt{\pi}\,x^2}$$

```
[Out] -1/3*exp(b^2*x^2+c)*erfc(b*x)/x^3-2/3*b^2*exp(b^2*x^2+c)*erfc(b*x)/x+1/3*b*
exp(c)/x^2/Pi^(1/2)-4/3*b^5*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^
2*x^2)/Pi^(1/2)-4/3*b^3*exp(c)*ln(x)/Pi^(1/2)+2/3*b^3*exp(c)*erfi(b*x)*Pi^(
1/2)
```

Rubi [A] time = 0.13, antiderivative size = 134, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 7, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.368, Rules used = {6392, 6377, 2204, 6376, 12, 29, 30}

$$-\frac{4b^5e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{3\sqrt{\pi}}-\frac{2b^2e^{b^2x^2+c}\text{Erfc}(bx)}{3x}-\frac{e^{b^2x^2+c}\text{Erfc}(bx)}{3x^3}+\frac{2}{3}\sqrt{\pi}\,b^3e^c\text{Erfi}(bx)-\frac{4b^3e^c\log(x)}{3\sqrt{\pi}}+\frac{be^c}{3\sqrt{\pi}\,x^2}$$

Antiderivative was successfully verified.

```
[In] Int[(E^(c + b^2*x^2)*Erfc[b*x])/x^4,x]
```

```
[Out] (b*E^c)/(3*Sqrt[Pi]*x^2) - (E^(c + b^2*x^2)*Erfc[b*x])/(3*x^3) - (2*b^2*E^(
c + b^2*x^2)*Erfc[b*x])/(3*x) + (2*b^3*E^c*Sqrt[Pi]*Erfi[b*x])/3 - (4*b^5*E
^c*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(3*Sqrt[Pi]) - (4*b^3*
E^c*Log[x])/(3*Sqrt[Pi])
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6392

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfc[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x],
x]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{x^4}\,dx = -\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{3x^3}+\frac{1}{3}\left(2b^2\right)\int \frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{x^2}\,dx-\frac{(2b)\int \frac{e^c}{x^3}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{3x^3}-\frac{2b^2e^{c+b^2x^2}\operatorname{erfc}(bx)}{3x}+\frac{1}{3}\left(4b^4\right)\int e^{c+b^2x^2}\operatorname{erfc}(bx)\,dx-\frac{\left(4b^3\right)\int \frac{e^c}{x}\,dx}{3\sqrt{\pi}}-\cdots$$

$$= \frac{be^c}{3\sqrt{\pi}\,x^2}-\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{3x^3}-\frac{2b^2e^{c+b^2x^2}\operatorname{erfc}(bx)}{3x}+\frac{1}{3}\left(4b^4\right)\int e^{c+b^2x^2}\,dx-\frac{1}{3}\left(4b^4\right)\int e^{c+b^2x^2}\cdots$$

$$= \frac{be^c}{3\sqrt{\pi}\,x^2}-\frac{e^{c+b^2x^2}\operatorname{erfc}(bx)}{3x^3}-\frac{2b^2e^{c+b^2x^2}\operatorname{erfc}(bx)}{3x}+\frac{2}{3}b^3e^c\sqrt{\pi}\operatorname{erfi}(bx)-\frac{4b^5e^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},\cdots\right.}{3\sqrt{\pi}}$$

Mathematica [A] time = 0.24, size = 151, normalized size = 1.13

$$\frac{e^c\left(4b^5x^5\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)-2\pi b^3x^3\operatorname{erf}(bx)\operatorname{erfi}(bx)+2\pi b^3x^3\operatorname{erfi}(bx)-4b^3x^3\log(x)+\sqrt{\pi}\,e^{b^2x^2}\left(2b^2x^2+1\right)\right.}{3\sqrt{\pi}\,x^3}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(E^(c + b^2*x^2)*Erfc[b*x])/x^4,x]
```

```
[Out] (E^c*(-(E^(b^2*x^2)*Sqrt[Pi]) + b*x - 2*b^2*E^(b^2*x^2)*Sqrt[Pi]*x^2 + E^(b
^2*x^2)*Sqrt[Pi]*(1 + 2*b^2*x^2)*Erf[b*x] + 2*b^3*Pi*x^3*Erfi[b*x] - 2*b^3*
Pi*x^3*Erf[b*x]*Erfi[b*x] + 4*b^5*x^5*HypergeometricPFQ[{1, 1}, {3/2, 2}, -
(b^2*x^2)] - 4*b^3*x^3*Log[x]))/(3*Sqrt[Pi]*x^3)
```

fricas [F] time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\operatorname{erf}(bx)-1)e^{\left(b^2x^2+c\right)}}{x^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^4,x, algorithm="fricas")
```

```
[Out] integral(-(erf(b*x) - 1)*e^(b^2*x^2 + c)/x^4, x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)\,e^{\left(b^2x^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^4,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c)/x^4, x)
```

maple [F] time = 0.24, size = 0, normalized size = 0.00

$$\int \frac{e^{b^2x^2+c}\operatorname{erfc}(bx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfc(b*x)/x^4,x)
```

```
[Out] int(exp(b^2*x^2+c)*erfc(b*x)/x^4,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)\,e^{\left(b^2x^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfc(b*x)/x^4,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)*e^(b^2*x^2 + c)/x^4, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{b^2\,x^2+c}\,\operatorname{erfc}\left(b\,x\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfc(b*x))/x^4,x)
```

```
[Out] int((exp(c + b^2*x^2)*erfc(b*x))/x^4, x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfc(b*x)/x**4,x)
```

```
[Out] Timed out
```

3.178 $\int e^{-b^2x^2}x^5\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=135

$$-\frac{43\text{erf}\left(\sqrt{2}\,bx\right)}{32\sqrt{2}\,b^6}-\frac{x^4e^{-b^2x^2}\text{erfc}(bx)}{2b^2}-\frac{e^{-b^2x^2}\text{erfc}(bx)}{b^6}+\frac{11xe^{-2b^2x^2}}{16\sqrt{\pi}\,b^5}-\frac{x^2e^{-b^2x^2}\text{erfc}(bx)}{b^4}+\frac{x^3e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

```
[Out] -erfc(b*x)/b^6/exp(b^2*x^2)-x^2*erfc(b*x)/b^4/exp(b^2*x^2)-1/2*x^4*erfc(b*x
)/b^2/exp(b^2*x^2)-43/64*erf(b*x*2^(1/2))/b^6*2^(1/2)+11/16*x/b^5/exp(2*b^2
*x^2)/Pi^(1/2)+1/4*x^3/b^3/exp(2*b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.19, antiderivative size = 135, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6386, 6383, 2205, 2212}

$$-\frac{43\text{Erf}\left(\sqrt{2}\,bx\right)}{32\sqrt{2}\,b^6}-\frac{x^4e^{-b^2x^2}\text{Erfc}(bx)}{2b^2}-\frac{x^2e^{-b^2x^2}\text{Erfc}(bx)}{b^4}-\frac{e^{-b^2x^2}\text{Erfc}(bx)}{b^6}+\frac{x^3e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}+\frac{11xe^{-2b^2x^2}}{16\sqrt{\pi}\,b^5}$$

Antiderivative was successfully verified.

```
[In] Int[(x^5*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] (11*x)/(16*b^5*E^(2*b^2*x^2)*Sqrt[Pi]) + x^3/(4*b^3*E^(2*b^2*x^2)*Sqrt[Pi])
 - (43*Erf[Sqrt[2]*b*x])/(32*Sqrt[2]*b^6) - Erfc[b*x]/(b^6*E^(b^2*x^2)) - (
x^2*Erfc[b*x])/(b^4*E^(b^2*x^2)) - (x^4*Erfc[b*x])/(2*b^2*E^(b^2*x^2))
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
```

```
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{-b^2x^2}x^5\text{erfc}(bx)\,dx = -\frac{e^{-b^2x^2}x^4\text{erfc}(bx)}{2b^2} + \frac{2\int e^{-b^2x^2}x^3\text{erfc}(bx)\,dx}{b^2} - \frac{\int e^{-2b^2x^2}x^4\,dx}{b\sqrt{\pi}}$$

$$= \frac{e^{-2b^2x^2}x^3}{4b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}x^2\text{erfc}(bx)}{b^4} - \frac{e^{-b^2x^2}x^4\text{erfc}(bx)}{2b^2} + \frac{2\int e^{-b^2x^2}x\text{erfc}(bx)\,dx}{b^4} - \frac{3\int e^{-2b^2x^2}x^2 \cdots}{4b^3\sqrt{\pi}}$$

$$= \frac{11e^{-2b^2x^2}x}{16b^5\sqrt{\pi}} + \frac{e^{-2b^2x^2}x^3}{4b^3\sqrt{\pi}} - \frac{e^{-b^2x^2}\text{erfc}(bx)}{b^6} - \frac{e^{-b^2x^2}x^2\text{erfc}(bx)}{b^4} - \frac{e^{-b^2x^2}x^4\text{erfc}(bx)}{2b^2} - \frac{3\int e^{-2b \cdots}}{16b^5 \cdots}$$

$$= \frac{11e^{-2b^2x^2}x}{16b^5\sqrt{\pi}} + \frac{e^{-2b^2x^2}x^3}{4b^3\sqrt{\pi}} - \frac{43\text{erf}\left(\sqrt{2}\,bx\right)}{32\sqrt{2}\,b^6} - \frac{e^{-b^2x^2}\text{erfc}(bx)}{b^6} - \frac{e^{-b^2x^2}x^2\text{erfc}(bx)}{b^4} - \frac{e^{-b^2x^2}x^4\text{er}\cdots}{2b^2}$$

Mathematica [A] time = 0.17, size = 87, normalized size = 0.64

$$\frac{4e^{-2b^2x^2}\left(\frac{bx\left(4b^2x^2+11\right)}{\sqrt{\pi}} - 8e^{b^2x^2}\left(b^4x^4+2b^2x^2+2\right)\text{erfc}(bx)\right) - 43\sqrt{2}\,\text{erf}\left(\sqrt{2}\,bx\right)}{64b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^5*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] (-43*Sqrt[2]*Erf[Sqrt[2]*b*x] + (4*((b*x*(11 + 4*b^2*x^2))/Sqrt[Pi] - 8*E^(
b^2*x^2)*(2 + 2*b^2*x^2 + b^4*x^4)*Erfc[b*x]))/E^(2*b^2*x^2))/(64*b^6)
```

fricas [A] time = 0.42, size = 121, normalized size = 0.90

$$-\frac{43\sqrt{2}\,\pi\sqrt{b^2}\,\text{erf}\left(\sqrt{2}\sqrt{b^2}\,x\right) - 4\sqrt{\pi}\left(4\,b^4x^3 + 11\,b^2x\right)e^{\left(-2\,b^2x^2\right)} + 32\left(\pi b^5x^4 + 2\,\pi b^3x^2 + 2\,\pi b - \left(\pi b^5x^4 + 2\,\pi b^3x \cdots\right.\right.}{64\,\pi b^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfc(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] -1/64*(43*sqrt(2)*pi*sqrt(b^2)*erf(sqrt(2)*sqrt(b^2)*x) - 4*sqrt(pi)*(4*b^4
*x^3 + 11*b^2*x)*e^(-2*b^2*x^2) + 32*(pi*b^5*x^4 + 2*pi*b^3*x^2 + 2*pi*b -
(pi*b^5*x^4 + 2*pi*b^3*x^2 + 2*pi*b)*erf(b*x))*e^(-b^2*x^2))/(pi*b^7)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5 \operatorname{erfc}(bx)\, e^{\left(-b^2x^2\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfc(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x^5*erfc(b*x)*e^(-b^2*x^2), x)
```

maple [A] time = 0.09, size = 172, normalized size = 1.27

$$\frac{\frac{-\frac{e^{-b^2x^2}b^4x^4}{2}-e^{-b^2x^2}b^2x^2-e^{-b^2x^2}}{b^5}-\frac{\operatorname{erf}(bx)\left(-\frac{e^{-b^2x^2}b^4x^4}{2}-e^{-b^2x^2}b^2x^2-e^{-b^2x^2}\right)}{b^5}+\frac{-\frac{43\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(bx\sqrt{2}\right)}{64}+\frac{11\,e^{-2b^2x^2}bx}{16}+\frac{e^{-2b^2x^2}b^3x^3}{4}}{\sqrt{\pi}\,b^5}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfc(b*x)/exp(b^2*x^2),x)
```

```
[Out] (1/b^5*(-1/2/exp(b^2*x^2)*b^4*x^4-1/exp(b^2*x^2)*b^2*x^2-1/exp(b^2*x^2))-er
f(b*x)/b^5*(-1/2/exp(b^2*x^2)*b^4*x^4-1/exp(b^2*x^2)*b^2*x^2-1/exp(b^2*x^2)
)+1/Pi^(1/2)/b^5*(-43/64*2^(1/2)*Pi^(1/2)*erf(b*x*2^(1/2))+11/16/exp(b^2*x^
2)^2*b*x+1/4/exp(b^2*x^2)^2*b^3*x^3))/b
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5 \operatorname{erfc}(bx)\, e^{\left(-b^2x^2\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfc(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x^5*erfc(b*x)*e^(-b^2*x^2), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^5\, e^{-b^2\,x^2}\, \operatorname{erfc}\left(b\,x\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*exp(-b^2*x^2)*erfc(b*x),x)
```

```
[Out] int(x^5*exp(-b^2*x^2)*erfc(b*x), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*erfc(b*x)/exp(b**2*x**2),x)
```

```
[Out] Timed out
```

3.179 $\int e^{-b^2x^2}x^3\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=90

$$-\frac{5\mathrm{erf}\left(\sqrt{2}\,bx\right)}{8\sqrt{2}\,b^4}-\frac{x^2e^{-b^2x^2}\mathrm{erfc}(bx)}{2b^2}-\frac{e^{-b^2x^2}\mathrm{erfc}(bx)}{2b^4}+\frac{xe^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

```
[Out] -1/2*erfc(b*x)/b^4/exp(b^2*x^2)-1/2*x^2*erfc(b*x)/b^2/exp(b^2*x^2)-5/16*erf
(b*x*2^(1/2))/b^4*2^(1/2)+1/4*x/b^3/exp(2*b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.10, antiderivative size = 90, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6386, 6383, 2205, 2212}

$$-\frac{5\mathrm{Erf}\left(\sqrt{2}\,bx\right)}{8\sqrt{2}\,b^4}-\frac{x^2e^{-b^2x^2}\mathrm{Erfc}(bx)}{2b^2}-\frac{e^{-b^2x^2}\mathrm{Erfc}(bx)}{2b^4}+\frac{xe^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] x/(4*b^3*E^(2*b^2*x^2)*Sqrt[Pi]) - (5*Erf[Sqrt[2]*b*x])/(8*Sqrt[2]*b^4) - E
rfc[b*x]/(2*b^4*E^(b^2*x^2)) - (x^2*Erfc[b*x])/(2*b^2*E^(b^2*x^2))
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}x^3\operatorname{erfc}(bx)\,dx &= -\frac{e^{-b^2x^2}x^2\operatorname{erfc}(bx)}{2b^2}+\frac{\int e^{-b^2x^2}x\operatorname{erfc}(bx)\,dx}{b^2}-\frac{\int e^{-2b^2x^2}x^2\,dx}{b\sqrt{\pi}}\\ &= \frac{e^{-2b^2x^2}x}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2b^4}-\frac{e^{-b^2x^2}x^2\operatorname{erfc}(bx)}{2b^2}-\frac{\int e^{-2b^2x^2}\,dx}{4b^3\sqrt{\pi}}-\frac{\int e^{-2b^2x^2}\,dx}{b^3\sqrt{\pi}}\\ &= \frac{e^{-2b^2x^2}x}{4b^3\sqrt{\pi}}-\frac{5\operatorname{erf}\left(\sqrt{2}\,bx\right)}{8\sqrt{2}\,b^4}-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2b^4}-\frac{e^{-b^2x^2}x^2\operatorname{erfc}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.09, size = 69, normalized size = 0.77

$$\frac{4e^{-2b^2x^2}\left(\frac{bx}{\sqrt{\pi}}-2e^{b^2x^2}\left(b^2x^2+1\right)\operatorname{erfc}(bx)\right)-5\sqrt{2}\operatorname{erf}\left(\sqrt{2}\,bx\right)}{16b^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^3*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] (-5*Sqrt[2]*Erf[Sqrt[2]*b*x] + (4*((b*x)/Sqrt[Pi] - 2*E^(b^2*x^2)*(1 + b^2*
x^2)*Erfc[b*x]))/E^(2*b^2*x^2))/(16*b^4)
```

fricas [A] time = 0.48, size = 90, normalized size = 1.00

$$\frac{4\sqrt{\pi}\,b^2xe^{\left(-2\,b^2x^2\right)}-5\sqrt{2}\,\pi\sqrt{b^2}\operatorname{erf}\left(\sqrt{2}\sqrt{b^2}\,x\right)-8\left(\pi b^3x^2+\pi b-\left(\pi b^3x^2+\pi b\right)\operatorname{erf}\left(bx\right)\right)e^{\left(-b^2x^2\right)}}{16\,\pi b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfc(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] 1/16*(4*sqrt(pi)*b^2*x*e^(-2*b^2*x^2) - 5*sqrt(2)*pi*sqrt(b^2)*erf(sqrt(2)*
sqrt(b^2)*x) - 8*(pi*b^3*x^2 + pi*b - (pi*b^3*x^2 + pi*b)*erf(b*x))*e^(-b^2
*x^2))/(pi*b^5)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{erfc}(bx) e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfc(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x^3*erfc(b*x)*e^(-b^2*x^2), x)
```

maple [A] time = 0.22, size = 118, normalized size = 1.31

$$\frac{\frac{-\frac{e^{-b^2x^2}b^2x^2}{2}-\frac{e^{-b^2x^2}}{2}}{b^3}-\frac{\operatorname{erf}(bx)\left(-\frac{e^{-b^2x^2}b^2x^2}{2}-\frac{e^{-b^2x^2}}{2}\right)}{b^3}+\frac{-\frac{5\sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(bx\sqrt{2}\right)}{16}+\frac{e^{-2b^2x^2}bx}{4}}{b^3\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfc(b*x)/exp(b^2*x^2),x)
```

```
[Out] (1/b^3*(-1/2/exp(b^2*x^2)*b^2*x^2-1/2/exp(b^2*x^2))-erf(b*x)/b^3*(-1/2/exp(
b^2*x^2)*b^2*x^2-1/2/exp(b^2*x^2))+1/b^3/Pi^(1/2)*(-5/16*2^(1/2)*Pi^(1/2)*e
rf(b*x*2^(1/2))+1/4/exp(b^2*x^2)^2*b*x))/b
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{erfc}(bx) e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfc(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x^3*erfc(b*x)*e^(-b^2*x^2), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^3\,e^{-b^2\,x^2}\,\operatorname{erfc}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*exp(-b^2*x^2)*erfc(b*x),x)
```

```
[Out] int(x^3*exp(-b^2*x^2)*erfc(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 e^{-b^2 x^2} \operatorname{erfc}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*erfc(b*x)/exp(b**2*x**2),x)
```

```
[Out] Integral(x**3*exp(-b**2*x**2)*erfc(b*x), x)
```

3.180 $\int e^{-b^2x^2}x\,\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=43

$$-\frac{\operatorname{erf}\left(\sqrt{2}\,bx\right)}{2\sqrt{2}\,b^2}-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2b^2}$$

```
[Out] -1/2*erfc(b*x)/b^2/exp(b^2*x^2)-1/4*erf(b*x*2^(1/2))/b^2*2^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 43, 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 = {6383, 2205}

$$-\frac{\operatorname{Erf}\left(\sqrt{2}\,bx\right)}{2\sqrt{2}\,b^2}-\frac{e^{-b^2x^2}\operatorname{Erfc}(bx)}{2b^2}$$

Antiderivative was successfully verified.

```
[In] Int[(x*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] -Erf[Sqrt[2]*b*x]/(2*Sqrt[2]*b^2) - Erfc[b*x]/(2*b^2*E^(b^2*x^2))
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}x\operatorname{erfc}(bx)\,dx&=-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2b^2}-\frac{\int e^{-2b^2x^2}\,dx}{b\sqrt{\pi}}\\&=-\frac{\operatorname{erf}\left(\sqrt{2}\,bx\right)}{2\sqrt{2}\,b^2}-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.02, size = 39, normalized size = 0.91

$$-\frac{2e^{-b^2x^2}\text{erfc}(bx)+\sqrt{2}\,\text{erf}\left(\sqrt{2}\,bx\right)}{4b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] -1/4*(Sqrt[2]*Erf[Sqrt[2]*b*x] + (2*Erfc[b*x])/E^(b^2*x^2))/b^2
```

fricas [A] time = 0.41, size = 47, normalized size = 1.09

$$-\frac{\sqrt{2}\,\sqrt{b^2}\,\operatorname{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)-2\,(b\operatorname{erf}(bx)-b)e^{\left(-b^2x^2\right)}}{4\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] -1/4*(sqrt(2)*sqrt(b^2)*erf(sqrt(2)*sqrt(b^2)*x) - 2*(b*erf(b*x) - b)*e^(-b
^2*x^2))/b^3
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{erfc}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x*erfc(b*x)*e^(-b^2*x^2), x)
```

maple [A] time = 0.08, size = 53, normalized size = 1.23

$$\frac{-\frac{\mathrm{e}^{-b^2x^2}}{2b}+\frac{\operatorname{erf}(bx)\mathrm{e}^{-b^2x^2}}{2b}-\frac{\sqrt{2}\,\operatorname{erf}\left(bx\sqrt{2}\right)}{4b}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfc(b*x)/exp(b^2*x^2),x)
```

```
[Out] (-1/2/b*exp(-b^2*x^2)+1/2*erf(b*x)/b*exp(-b^2*x^2)-1/4/b*2^(1/2)*erf(b*x*2^
(1/2)))/b
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{erfc}\left(bx\right)e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x)/exp(b^2*x^2),x, algorithm="maxima")
[Out] integrate(x*erfc(b*x)*e^(-b^2*x^2), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int x\,\mathrm{e}^{-b^2\,x^2}\,\mathrm{erfc}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(-b^2*x^2)*erfc(b*x),x)
[Out] int(x*exp(-b^2*x^2)*erfc(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int xe^{-b^2x^2}\,\mathrm{erfc}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfc(b*x)/exp(b**2*x**2),x)
[Out] Integral(x*exp(-b**2*x**2)*erfc(b*x), x)
```

3.181 $\int \frac{e^{-b^2x^2}\,\mathbf{erfc}(bx)}{x}\,dx$

Optimal. Leaf size=21

$$\operatorname{Int}\left(\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x},x\right)$$

[Out] Unintegrable(erfc(b*x)/exp(b^2*x^2)/x,x)

Rubi [A] time = 0.03, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{-b^2x^2}\operatorname{Erfc}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

[In] Int[Erfc[b*x]/(E^(b^2*x^2)*x),x]

[Out] Defer[Int][Erfc[b*x]/(E^(b^2*x^2)*x), x]

Rubi steps

$$\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x}\,dx = \int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x}\,dx$$

Mathematica [A] time = 0.17, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[Erfc[b*x]/(E^(b^2*x^2)*x),x]

[Out] Integrate[Erfc[b*x]/(E^(b^2*x^2)*x), x]

fricas [A] time = 0.42, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-\frac{(\operatorname{erf}(bx)-1)e^{\left(-b^2x^2\right)}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x,x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(-b^2*x^2)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)e^{\left(-b^2x^2\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x,x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x, x)
```

maple [A] time = 0.08, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)\,\mathrm{e}^{-b^2x^2}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/exp(b^2*x^2)/x,x)
[Out] int(erfc(b*x)/exp(b^2*x^2)/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)e^{\left(-b^2x^2\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\operatorname{erfc}(b\,x)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfc(b*x))/x,x)
[Out] int((exp(-b^2*x^2)*erfc(b*x))/x, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b**2*x**2)/x,x)
```

```
[Out] Integral(exp(-b**2*x**2)*erfc(b*x)/x, x)
```

3.182 $\int \frac{e^{-b^2x^2}\mathbf{erfc}(bx)}{x^3}\,dx$

Optimal. Leaf size=86

$$-b^2\mathrm{Int}\left(\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x},x\right)+\sqrt{2}\,b^2\operatorname{erf}\left(\sqrt{2}\,bx\right)-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2x^2}+\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*erfc(b*x)/exp(b^2*x^2)/x^2+b^2*erf(b*x*2^(1/2))*2^(1/2)+b/exp(2*b^2*x^
2)/x/Pi^(1/2)-b^2*Unintegrable(erfc(b*x)/exp(b^2*x^2)/x,x)
```

Rubi [A] time = 0.09, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{-b^2x^2}\operatorname{Erfc}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfc[b*x]/(E^(b^2*x^2)*x^3),x]
```

```
[Out] b/(E^(2*b^2*x^2)*Sqrt[Pi]*x) + Sqrt[2]*b^2*Erf[Sqrt[2]*b*x] - Erfc[b*x]/(2*
E^(b^2*x^2)*x^2) - b^2*Defer[Int][Erfc[b*x]/(E^(b^2*x^2)*x), x]
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^3}\,dx &= -\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2x^2}-b^2\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x}\,dx-\frac{b\int \frac{e^{-2b^2x^2}}{x^2}\,dx}{\sqrt{\pi}}\\
&= \frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2x^2}-b^2\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x}\,dx+\frac{\left(4b^3\right)\int e^{-2b^2x^2}\,dx}{\sqrt{\pi}}\\
&= \frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}+\sqrt{2}\,b^2\operatorname{erf}\left(\sqrt{2}\,bx\right)-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2x^2}-b^2\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x}\,dx
\end{aligned}$$

Mathematica [A] time = 0.30, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfc[b*x]/(E^(b^2*x^2)*x^3),x]
```

```
[Out] Integrate[Erfc[b*x]/(E^(b^2*x^2)*x^3), x]
```

fricas [A] time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}(bx)-1)e^{\left(-b^2x^2\right)}}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^3,x, algorithm="fricas")
[Out] integral(-(erf(b*x) - 1)*e^(-b^2*x^2)/x^3, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\,e^{\left(-b^2x^2\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^3,x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x^3, x)
```

maple [A] time = 0.26, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\,\mathrm{e}^{-b^2x^2}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/exp(b^2*x^2)/x^3,x)
[Out] int(erfc(b*x)/exp(b^2*x^2)/x^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx)\,e^{\left(-b^2x^2\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^3,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x^3, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{-b^2 x^2} \operatorname{erfc}(b x)}{x^3} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfc(b*x))/x^3,x)
```

```
[Out] int((exp(-b^2*x^2)*erfc(b*x))/x^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2} \operatorname{erfc}(bx)}{x^3} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b**2*x**2)/x**3,x)
```

```
[Out] Integral(exp(-b**2*x**2)*erfc(b*x)/x**3, x)
```

3.183 $\int \frac{e^{-b^2x^2}\mathbf{erfc}(bx)}{x^5}\,dx$

Optimal. Leaf size=162

$$\frac{1}{2}b^4\text{Int}\left(\frac{e^{-b^2x^2}\text{erfc}(bx)}{x},x\right)-\frac{2}{3}\sqrt{2}\,b^4\text{erf}\left(\sqrt{2}\,bx\right)-\frac{b^4\text{erf}\left(\sqrt{2}\,bx\right)}{\sqrt{2}}+\frac{b^2e^{-b^2x^2}\text{erfc}(bx)}{4x^2}-\frac{e^{-b^2x^2}\text{erfc}(bx)}{4x^4}+\frac{be^{-2b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{7b^3e^{-}}{6\sqrt{}}$$

```
[Out] -1/4*erfc(b*x)/exp(b^2*x^2)/x^4+1/4*b^2*erfc(b*x)/exp(b^2*x^2)/x^2-7/6*b^4*
erf(b*x*2^(1/2))*2^(1/2)+1/6*b/exp(2*b^2*x^2)/x^3/Pi^(1/2)-7/6*b^3/exp(2*b^
2*x^2)/x/Pi^(1/2)+1/2*b^4*Unintegrable(erfc(b*x)/exp(b^2*x^2)/x,x)
```

Rubi [A] time = 0.18, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{-b^2x^2}\text{Erfc}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfc[b*x]/(E^(b^2*x^2)*x^5),x]
```

```
[Out] b/(6*E^(2*b^2*x^2)*Sqrt[Pi]*x^3) - (7*b^3)/(6*E^(2*b^2*x^2)*Sqrt[Pi]*x) - (
b^4*Erf[Sqrt[2]*b*x])/Sqrt[2] - (2*Sqrt[2]*b^4*Erf[Sqrt[2]*b*x])/3 - Erfc[b
*x]/(4*E^(b^2*x^2)*x^4) + (b^2*Erfc[b*x])/(4*E^(b^2*x^2)*x^2) + (b^4*Defer[
Int][Erfc[b*x]/(E^(b^2*x^2)*x), x])/2
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{-b^2x^2}\text{erfc}(bx)}{x^5}\,dx &= -\frac{e^{-b^2x^2}\text{erfc}(bx)}{4x^4}-\frac{1}{2}b^2\int \frac{e^{-b^2x^2}\text{erfc}(bx)}{x^3}\,dx-\frac{b\int \frac{e^{-2b^2x^2}}{x^4}\,dx}{2\sqrt{\pi}}\\
&= \frac{be^{-2b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{e^{-b^2x^2}\text{erfc}(bx)}{4x^4}+\frac{b^2e^{-b^2x^2}\text{erfc}(bx)}{4x^2}+\frac{1}{2}b^4\int \frac{e^{-b^2x^2}\text{erfc}(bx)}{x}\,dx+\frac{b^3\int \frac{e^{-2b^2x^2}}{x^2}\,dx}{2\sqrt{\pi}}+\\
&= \frac{be^{-2b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{7b^3e^{-2b^2x^2}}{6\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\text{erfc}(bx)}{4x^4}+\frac{b^2e^{-b^2x^2}\text{erfc}(bx)}{4x^2}+\frac{1}{2}b^4\int \frac{e^{-b^2x^2}\text{erfc}(bx)}{x}\,dx-\frac{(2}{}\\
&= \frac{be^{-2b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{7b^3e^{-2b^2x^2}}{6\sqrt{\pi}\,x}-\frac{b^4\text{erf}\left(\sqrt{2}\,bx\right)}{\sqrt{2}}-\frac{2}{3}\sqrt{2}\,b^4\text{erf}\left(\sqrt{2}\,bx\right)-\frac{e^{-b^2x^2}\text{erfc}(bx)}{4x^4}+\frac{b^2e^{-b^2x^2}\text{er}}{4x^2}
\end{aligned}$$

Mathematica [A] time = 0.28, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\text{erfc}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfc[b*x]/(E^(b^2*x^2)*x^5),x]
```

```
[Out] Integrate[Erfc[b*x]/(E^(b^2*x^2)*x^5), x]
```

fricas [A] time = 0.41, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}\,(bx)-1)e^{\left(-b^2x^2\right)}}{x^5},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^5,x, algorithm="fricas")
```

```
[Out] integral(-(erf(b*x) - 1)*e^(-b^2*x^2)/x^5, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^5,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x^5, x)
```

maple [A] time = 0.28, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx)\,\mathrm{e}^{-b^2x^2}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/exp(b^2*x^2)/x^5,x)
```

```
[Out] int(erfc(b*x)/exp(b^2*x^2)/x^5,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^5,x, algorithm="maxima")
[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x^5, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\mathrm{erfc}\left(b\,x\right)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfc(b*x))/x^5,x)
[Out] int((exp(-b^2*x^2)*erfc(b*x))/x^5, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\,\mathrm{erfc}\left(bx\right)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b**2*x**2)/x**5,x)
[Out] Integral(exp(-b**2*x**2)*erfc(b*x)/x**5, x)
```

3.184 $\int e^{-b^2x^2}x^4\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=112

$$-\frac{3\sqrt{\pi}\,\mathrm{erfc}(bx)^2}{16b^5}-\frac{x^3e^{-b^2x^2}\mathrm{erfc}(bx)}{2b^2}+\frac{e^{-2b^2x^2}}{2\sqrt{\pi}\,b^5}-\frac{3xe^{-b^2x^2}\mathrm{erfc}(bx)}{4b^4}+\frac{x^2e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

```
[Out] -3/4*x*erfc(b*x)/b^4/exp(b^2*x^2)-1/2*x^3*erfc(b*x)/b^2/exp(b^2*x^2)+1/2/b^
5/exp(2*b^2*x^2)/Pi^(1/2)+1/4*x^2/b^3/exp(2*b^2*x^2)/Pi^(1/2)-3/16*erfc(b*x
)^2*Pi^(1/2)/b^5
```

Rubi [A] time = 0.17, antiderivative size = 112, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.278, Rules used = {6386, 6374, 30, 2209, 2212}

$$-\frac{x^3e^{-b^2x^2}\mathrm{Erfc}(bx)}{2b^2}-\frac{3xe^{-b^2x^2}\mathrm{Erfc}(bx)}{4b^4}-\frac{3\sqrt{\pi}\,\mathrm{Erfc}(bx)^2}{16b^5}+\frac{x^2e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}+\frac{e^{-2b^2x^2}}{2\sqrt{\pi}\,b^5}$$

Antiderivative was successfully verified.

```
[In] Int[(x^4*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] 1/(2*b^5*E^(2*b^2*x^2)*Sqrt[Pi]) + x^2/(4*b^3*E^(2*b^2*x^2)*Sqrt[Pi]) - (3*
x*Erfc[b*x])/(4*b^4*E^(b^2*x^2)) - (x^3*Erfc[b*x])/(2*b^2*E^(b^2*x^2)) - (3
*Sqrt[Pi]*Erfc[b*x]^2)/(16*b^5)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
```

```
0])
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}
\int e^{-b^2x^2}x^4\text{erfc}(bx)\,dx &= -\frac{e^{-b^2x^2}x^3\text{erfc}(bx)}{2b^2}+\frac{3\int e^{-b^2x^2}x^2\text{erfc}(bx)\,dx}{2b^2}-\frac{\int e^{-2b^2x^2}x^3\,dx}{b\sqrt{\pi}}\\
&= \frac{e^{-2b^2x^2}x^2}{4b^3\sqrt{\pi}}-\frac{3e^{-b^2x^2}x\text{erfc}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^3\text{erfc}(bx)}{2b^2}+\frac{3\int e^{-b^2x^2}\text{erfc}(bx)\,dx}{4b^4}-\frac{\int e^{-2b^2x^2}x\,dx}{2b^3\sqrt{\pi}}\\
&= \frac{e^{-2b^2x^2}}{2b^5\sqrt{\pi}}+\frac{e^{-2b^2x^2}x^2}{4b^3\sqrt{\pi}}-\frac{3e^{-b^2x^2}x\text{erfc}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^3\text{erfc}(bx)}{2b^2}-\frac{\left(3\sqrt{\pi}\right)\text{Subst}(\int x\,dx,x,\text{er}}{8b^5}\\
&= \frac{e^{-2b^2x^2}}{2b^5\sqrt{\pi}}+\frac{e^{-2b^2x^2}x^2}{4b^3\sqrt{\pi}}-\frac{3e^{-b^2x^2}x\text{erfc}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^3\text{erfc}(bx)}{2b^2}-\frac{3\sqrt{\pi}\,\text{erfc}(bx)^2}{16b^5}
\end{aligned}$$

Mathematica [A] time = 0.18, size = 112, normalized size = 1.00

$$-\frac{-4\sqrt{\pi}\,bxe^{-b^2x^2}\left(2b^2x^2+3\right)\text{erf}(bx)-4e^{-2b^2x^2}\left(b^2x^2+2\right)+4\sqrt{\pi}\,bxe^{-b^2x^2}\left(2b^2x^2+3\right)+3\pi\text{erf}(bx)^2-6\pi\text{erf}(bx)}{16\sqrt{\pi}\,b^5}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^4*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] -1/16*((-4*(2 + b^2*x^2))/E^(2*b^2*x^2) + (4*b*Sqrt[Pi]*x*(3 + 2*b^2*x^2))/
E^(b^2*x^2) - 6*Pi*Erf[b*x] - (4*b*Sqrt[Pi]*x*(3 + 2*b^2*x^2)*Erf[b*x])/E^(
b^2*x^2) + 3*Pi*Erf[b*x]^2)/(b^5*Sqrt[Pi])
```

fricas [A] time = 0.45, size = 97, normalized size = 0.87

$$-\frac{4\left(2\,\pi b^3x^3+3\,\pi bx-\left(2\,\pi b^3x^3+3\,\pi bx\right)\operatorname{erf}\left(bx\right)\right)e^{\left(-b^2x^2\right)}+\sqrt{\pi}\left(3\,\pi\operatorname{erf}\left(bx\right)^2-6\,\pi\operatorname{erf}\left(bx\right)-4\left(b^2x^2+2\right)e^{\left(-2\,b^2\right.}\right.}{16\,\pi b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfc(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] -1/16*(4*(2*pi*b^3*x^3 + 3*pi*b*x - (2*pi*b^3*x^3 + 3*pi*b*x)*erf(b*x))*e^(
-b^2*x^2) + sqrt(pi)*(3*pi*erf(b*x)^2 - 6*pi*erf(b*x) - 4*(b^2*x^2 + 2)*e^(
-2*b^2*x^2)))/(pi*b^5)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\operatorname{erfc}\left(bx\right)e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfc(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x^4*erfc(b*x)*e^(-b^2*x^2), x)
```

maple [F] time = 0.22, size = 0, normalized size = 0.00

$$\int x^4\operatorname{erfc}\left(bx\right)\mathrm{e}^{-b^2x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfc(b*x)/exp(b^2*x^2),x)
```

```
[Out] int(x^4*erfc(b*x)/exp(b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\operatorname{erfc}\left(bx\right)e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfc(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x^4*erfc(b*x)*e^(-b^2*x^2), x)
```

mupad [B] time = 0.20, size = 90, normalized size = 0.80

$$\frac{8\,\mathrm{e}^{-2\,b^2\,x^2}-3\,\pi\,\operatorname{erfc}\left(b\,x\right)^2}{16\,b^5\,\sqrt{\pi}}+\frac{x^2\,\mathrm{e}^{-2\,b^2\,x^2}}{4\,b^3\,\sqrt{\pi}}-\frac{3\,x\,\mathrm{e}^{-b^2\,x^2}\,\operatorname{erfc}\left(b\,x\right)}{4\,b^4}-\frac{x^3\,\mathrm{e}^{-b^2\,x^2}\,\operatorname{erfc}\left(b\,x\right)}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*exp(-b^2*x^2)*erfc(b*x),x)
```

```
[Out] (8*exp(-2*b^2*x^2) - 3*pi*erfc(b*x)^2)/(16*b^5*pi^(1/2)) + (x^2*exp(-2*b^2*
x^2))/(4*b^3*pi^(1/2)) - (3*x*exp(-b^2*x^2)*erfc(b*x))/(4*b^4) - (x^3*exp(-
b^2*x^2)*erfc(b*x))/(2*b^2)
```

sympy [A] time = 34.17, size = 112, normalized size = 1.00

$$\begin{cases} -\frac{x^3e^{-b^2x^2}\,\mathrm{erfc}\,(bx)}{2b^2}+\frac{x^2e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}-\frac{3xe^{-b^2x^2}\,\mathrm{erfc}\,(bx)}{4b^4}-\frac{3\sqrt{\pi}\,\mathrm{erfc}^2\,(bx)}{16b^5}+\frac{e^{-2b^2x^2}}{2\sqrt{\pi}\,b^5} & \text{for } b\neq 0\\ \frac{x^5}{5} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*erfc(b*x)/exp(b**2*x**2),x)
```

```
[Out] Piecewise((-x**3*exp(-b**2*x**2)*erfc(b*x)/(2*b**2) + x**2*exp(-2*b**2*x**2
)/(4*sqrt(pi)*b**3) - 3*x*exp(-b**2*x**2)*erfc(b*x)/(4*b**4) - 3*sqrt(pi)*e
rfc(b*x)**2/(16*b**5) + exp(-2*b**2*x**2)/(2*sqrt(pi)*b**5), Ne(b, 0)), (x*
*5/5, True))
```

3.185 $\int e^{-b^2x^2}x^2\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=63

$$-\frac{\sqrt{\pi}\,\mathrm{erfc}(bx)^2}{8b^3}-\frac{xe^{-b^2x^2}\mathrm{erfc}(bx)}{2b^2}+\frac{e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

```
[Out] -1/2*x*erfc(b*x)/b^2/exp(b^2*x^2)+1/4/b^3/exp(2*b^2*x^2)/Pi^(1/2)-1/8*erfc(
b*x)^2*Pi^(1/2)/b^3
```

Rubi [A] time = 0.08, antiderivative size = 63, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6386, 6374, 30, 2209}

$$-\frac{xe^{-b^2x^2}\mathrm{Erfc}(bx)}{2b^2}-\frac{\sqrt{\pi}\,\mathrm{Erfc}(bx)^2}{8b^3}+\frac{e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] 1/(4*b^3*E^(2*b^2*x^2)*Sqrt[Pi]) - (x*Erfc[b*x])/(2*b^2*E^(b^2*x^2)) - (Sqr
t[Pi]*Erfc[b*x]^2)/(8*b^3)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
```

```
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}x^2\text{erfc}(bx)\,dx &= -\frac{e^{-b^2x^2}x\text{erfc}(bx)}{2b^2}+\frac{\int e^{-b^2x^2}\text{erfc}(bx)\,dx}{2b^2}-\frac{\int e^{-2b^2x^2}x\,dx}{b\sqrt{\pi}}\\ &= \frac{e^{-2b^2x^2}}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}x\text{erfc}(bx)}{2b^2}-\frac{\sqrt{\pi}\ \text{Subst}(\int x\,dx,x,\text{erfc}(bx))}{4b^3}\\ &= \frac{e^{-2b^2x^2}}{4b^3\sqrt{\pi}}-\frac{e^{-b^2x^2}x\text{erfc}(bx)}{2b^2}-\frac{\sqrt{\pi}\,\text{erfc}(bx)^2}{8b^3}\end{aligned}$$

Mathematica [A] time = 0.15, size = 79, normalized size = 1.25

$$\frac{\left(4bxe^{-b^2x^2}+2\sqrt{\pi}\right)\text{erf}(bx)+2e^{-2b^2x^2}\left(\frac{1}{\sqrt{\pi}}-2bxe^{b^2x^2}\right)-\sqrt{\pi}\,\text{erf}(bx)^2}{8b^3}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^2*Erfc[b*x])/E^(b^2*x^2),x]
```

```
[Out] ((2*(1/Sqrt[Pi] - 2*b*E^(b^2*x^2)*x))/E^(2*b^2*x^2) + (2*Sqrt[Pi] + (4*b*x)
/E^(b^2*x^2))*Erf[b*x] - Sqrt[Pi]*Erf[b*x]^2)/(8*b^3)
```

fricas [A] time = 0.44, size = 66, normalized size = 1.05

$$\frac{4\left(\pi bx\,\text{erf}\left(bx\right)-\pi bx\right)e^{\left(-b^2x^2\right)}-\sqrt{\pi}\left(\pi\,\text{erf}\left(bx\right)^2-2\,\pi\,\text{erf}\left(bx\right)-2\,e^{\left(-2\,b^2x^2\right)}\right)}{8\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfc(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] 1/8*(4*(pi*b*x*erf(b*x) - pi*b*x)*e^(-b^2*x^2) - sqrt(pi)*(pi*erf(b*x)^2 -
2*pi*erf(b*x) - 2*e^(-2*b^2*x^2)))/(pi*b^3)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfc}\left(bx\right)e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfc(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x^2*erfc(b*x)*e^(-b^2*x^2), x)
```

maple [F] time = 0.20, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfc}(bx)\,\mathrm{e}^{-b^2x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfc(b*x)/exp(b^2*x^2),x)
```

```
[Out] int(x^2*erfc(b*x)/exp(b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfc}(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfc(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x^2*erfc(b*x)*e^(-b^2*x^2), x)
```

mupad [B] time = 0.19, size = 49, normalized size = 0.78

$$\frac{2\,\mathrm{e}^{-2\,b^2\,x^2}-\pi\,\operatorname{erfc}\left(b\,x\right)^2}{8\,b^3\,\sqrt{\pi}}-\frac{x\,\mathrm{e}^{-b^2\,x^2}\,\operatorname{erfc}\left(b\,x\right)}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(-b^2*x^2)*erfc(b*x),x)
```

```
[Out] (2*exp(-2*b^2*x^2) - pi*erfc(b*x)^2)/(8*b^3*pi^(1/2)) - (x*exp(-b^2*x^2)*er
fc(b*x))/(2*b^2)
```

sympy [A] time = 5.78, size = 63, normalized size = 1.00

$$\begin{cases} -\frac{xe^{-b^2x^2}\operatorname{erfc}(bx)}{2b^2}-\frac{\sqrt{\pi}\operatorname{erfc}^2(bx)}{8b^3}+\frac{e^{-2b^2x^2}}{4\sqrt{\pi}\,b^3} & \text{for } b\neq 0\\ \frac{x^3}{3} & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erfc(b*x)/exp(b**2*x**2),x)
```

```
[Out] Piecewise((-x*exp(-b**2*x**2)*erfc(b*x)/(2*b**2) - sqrt(pi)*erfc(b*x)**2/(8
*b**3) + exp(-2*b**2*x**2)/(4*sqrt(pi)*b**3), Ne(b, 0)), (x**3/3, True))
```

3.186 $\int e^{-b^2x^2}\,\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=18

$$-\frac{\sqrt{\pi}\,\mathrm{erfc}(bx)^2}{4b}$$

[Out] -1/4*erfc(b*x)^2*Pi^(1/2)/b

Rubi [A] time = 0.02, antiderivative size = 18, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {6374, 30}

$$-\frac{\sqrt{\pi}\,\mathrm{Erfc}(bx)^2}{4b}$$

Antiderivative was successfully verified.

[In] Int[Erfc[b*x]/E^(b^2*x^2),x]

[Out] -(Sqrt[Pi]*Erfc[b*x]^2)/(4*b)

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}\mathrm{erfc}(bx)\,dx &= -\frac{\sqrt{\pi}\ \mathrm{Subst}\left(\int x\,dx, x, \mathrm{erfc}(bx)\right)}{2b}\\ &= -\frac{\sqrt{\pi}\,\mathrm{erfc}(bx)^2}{4b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 18, normalized size = 1.00

$$-\frac{\sqrt{\pi}\,\mathrm{erfc}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/E^(b^2*x^2),x]
[Out] -1/4*(Sqrt[Pi]*Erfc[b*x]^2)/b
```

fricas [A] time = 0.46, size = 21, normalized size = 1.17

$$-\frac{\sqrt{\pi}\left(\operatorname{erf}(bx)^2 - 2\operatorname{erf}(bx)\right)}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2),x, algorithm="fricas")
[Out] -1/4*sqrt(pi)*(erf(b*x)^2 - 2*erf(b*x))/b
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx)\, e^{\left(-b^2x^2\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2),x, algorithm="giac")
[Out] integrate(erfc(b*x)*e^(-b^2*x^2), x)
```

maple [A] time = 0.04, size = 22, normalized size = 1.22

$$\frac{\sqrt{\pi}\,\left(\operatorname{erf}(bx) - \frac{\operatorname{erf}(bx)^2}{2}\right)}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/exp(b^2*x^2),x)
[Out] 1/2*Pi^(1/2)/b*(erf(b*x)-1/2*erf(b*x)^2)
```

maxima [A] time = 0.30, size = 14, normalized size = 0.78

$$-\frac{\sqrt{\pi}\,\operatorname{erfc}(bx)^2}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] -1/4*sqrt(pi)*erfc(b*x)^2/b
```

mupad [B] time = 0.07, size = 14, normalized size = 0.78

$$-\frac{\sqrt{\pi}\ \mathrm{erfc}\left(b\,x\right)^2}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2)*erfc(b*x),x)
[Out] -(pi^(1/2)*erfc(b*x)^2)/(4*b)
```

sympy [A] time = 0.92, size = 17, normalized size = 0.94

$$\begin{cases} -\frac{\sqrt{\pi}\,\mathrm{erfc}^2\,(bx)}{4b} & \text{for } b \neq 0 \\ x & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b**2*x**2),x)
[Out] Piecewise((-sqrt(pi)*erfc(b*x)**2/(4*b), Ne(b, 0)), (x, True))
```

3.187 $\int \frac{e^{-b^2x^2}\textbf{erfc}(bx)}{x^2}\,dx$

Optimal. Leaf size=53

$$-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x}-\frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}}+\frac{1}{2}\sqrt{\pi}\,b\operatorname{erfc}(bx)^2$$

```
[Out] -erfc(b*x)/exp(b^2*x^2)/x-b*Ei(-2*b^2*x^2)/Pi^(1/2)+1/2*b*erfc(b*x)^2*Pi^(1
/2)
```

Rubi [A] time = 0.09, antiderivative size = 53, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6392, 6374, 30, 2210}

$$-\frac{e^{-b^2x^2}\operatorname{Erfc}(bx)}{x}-\frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}}+\frac{1}{2}\sqrt{\pi}\,b\operatorname{Erfc}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/(E^(b^2*x^2)*x^2),x]
```

```
[Out] -(Erfc[b*x]/(E^(b^2*x^2)*x)) + (b*Sqrt[Pi]*Erfc[b*x]^2)/2 - (b*ExpIntegralE
i[-2*b^2*x^2])/Sqrt[Pi]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6392

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfc[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
```

```
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x],
x]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^2}\,dx &= -\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x} - \left(2b^2\right)\int e^{-b^2x^2}\operatorname{erfc}(bx)\,dx - \frac{(2b)\int \frac{e^{-2b^2x^2}}{x}\,dx}{\sqrt{\pi}}\\ &= -\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x} - \frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}} + \left(b\sqrt{\pi}\right)\operatorname{Subst}\left(\int x\,dx, x, \operatorname{erfc}(bx)\right)\\ &= -\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x} + \frac{1}{2}b\sqrt{\pi}\operatorname{erfc}(bx)^2 - \frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.02, size = 53, normalized size = 1.00

$$-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x} - \frac{b\operatorname{Ei}\left(-2b^2x^2\right)}{\sqrt{\pi}} + \frac{1}{2}\sqrt{\pi}\,b\operatorname{erfc}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/(E^(b^2*x^2)*x^2),x]
```

```
[Out] -(Erfc[b*x]/(E^(b^2*x^2)*x)) + (b*Sqrt[Pi]*Erfc[b*x]^2)/2 - (b*ExpIntegralE
i[-2*b^2*x^2])/Sqrt[Pi]
```

fricas [A] time = 0.42, size = 77, normalized size = 1.45

$$-\frac{2\,\pi^{\frac{3}{2}}\sqrt{b^2}\,x\operatorname{erf}\left(\sqrt{b^2}\,x\right) + 2\,(\pi - \pi\operatorname{erf}(bx))e^{\left(-b^2x^2\right)} - \sqrt{\pi}\left(\pi bx\operatorname{erf}(bx)^2 - 2\,bx\operatorname{Ei}\left(-2\,b^2x^2\right)\right)}{2\,\pi x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^2,x, algorithm="fricas")
```

```
[Out] -1/2*(2*pi^(3/2)*sqrt(b^2)*x*erf(sqrt(b^2)*x) + 2*(pi - pi*erf(b*x))*e^(-b^
2*x^2) - sqrt(pi)*(pi*b*x*erf(b*x)^2 - 2*b*x*Ei(-2*b^2*x^2)))/(pi*x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)\,e^{\left(-b^2x^2\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^2,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x^2, x)
```

maple [F] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)\, \mathrm{e}^{-b^2x^2}}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/exp(b^2*x^2)/x^2,x)
```

```
[Out] int(erfc(b*x)/exp(b^2*x^2)/x^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx)\, e^{\left(-b^2x^2\right)}}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^2,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\, \operatorname{erfc}(b\,x)}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfc(b*x))/x^2,x)
```

```
[Out] int((exp(-b^2*x^2)*erfc(b*x))/x^2, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2} \operatorname{erfc}(bx)}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b**2*x**2)/x**2,x)
```

```
[Out] Integral(exp(-b**2*x**2)*erfc(b*x)/x**2, x)
```

3.188 $\int \frac{e^{-b^2x^2}\textbf{erfc}(bx)}{x^4}\,dx$

Optimal. Leaf size=108

$$-\frac{1}{3}\sqrt{\pi}\,b^3\text{erfc}(bx)^2+\frac{2b^2e^{-b^2x^2}\text{erfc}(bx)}{3x}-\frac{e^{-b^2x^2}\text{erfc}(bx)}{3x^3}+\frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2}+\frac{4b^3\text{Ei}\left(-2b^2x^2\right)}{3\sqrt{\pi}}$$

```
[Out] -1/3*erfc(b*x)/exp(b^2*x^2)/x^3+2/3*b^2*erfc(b*x)/exp(b^2*x^2)/x+1/3*b/exp(
2*b^2*x^2)/x^2/Pi^(1/2)+4/3*b^3*Ei(-2*b^2*x^2)/Pi^(1/2)-1/3*b^3*erfc(b*x)^2
*Pi^(1/2)
```

Rubi [A] time = 0.16, antiderivative size = 108, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.278, Rules used = {6392, 6374, 30, 2210, 2214}

$$\frac{2b^2e^{-b^2x^2}\text{Erfc}(bx)}{3x}-\frac{e^{-b^2x^2}\text{Erfc}(bx)}{3x^3}-\frac{1}{3}\sqrt{\pi}\,b^3\text{Erfc}(bx)^2+\frac{4b^3\text{Ei}\left(-2b^2x^2\right)}{3\sqrt{\pi}}+\frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/(E^(b^2*x^2)*x^4),x]
```

```
[Out] b/(3*E^(2*b^2*x^2)*Sqrt[Pi]*x^2) - Erfc[b*x]/(3*E^(b^2*x^2)*x^3) + (2*b^2*E
rfc[b*x])/(3*E^(b^2*x^2)*x) - (b^3*Sqrt[Pi]*Erfc[b*x]^2)/3 + (4*b^3*ExpInte
gralEi[-2*b^2*x^2])/(3*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
```

```
] && LeQ[-n, m + 1]))
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6392

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfc[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x],
x]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^4}\,dx = -\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{3x^3} - \frac{1}{3}\left(2b^2\right)\int \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^2}\,dx - \frac{(2b)\int \frac{e^{-2b^2x^2}}{x^3}\,dx}{3\sqrt{\pi}}$$

$$= \frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{3x^3} + \frac{2b^2e^{-b^2x^2}\operatorname{erfc}(bx)}{3x} + \frac{1}{3}\left(4b^4\right)\int e^{-b^2x^2}\operatorname{erfc}(bx)\,dx + 2\frac{\left(4b^3\right)\int \frac{e^{-}}{}}{3\sqrt{\pi}}$$

$$= \frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{3x^3} + \frac{2b^2e^{-b^2x^2}\operatorname{erfc}(bx)}{3x} + \frac{4b^3\operatorname{Ei}\left(-2b^2x^2\right)}{3\sqrt{\pi}} - \frac{1}{3}\left(2b^3\sqrt{\pi}\right)\operatorname{Subst}(\int x$$

$$= \frac{be^{-2b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{3x^3} + \frac{2b^2e^{-b^2x^2}\operatorname{erfc}(bx)}{3x} - \frac{1}{3}b^3\sqrt{\pi}\operatorname{erfc}(bx)^2 + \frac{4b^3\operatorname{Ei}\left(-2b^2x^2\right)}{3\sqrt{\pi}}$$

Mathematica [A] time = 0.07, size = 85, normalized size = 0.79

$$\frac{1}{3}\left(-\sqrt{\pi}\,b^3\operatorname{erfc}(bx)^2 + \frac{e^{-b^2x^2}\left(2b^2x^2-1\right)\operatorname{erfc}(bx)}{x^3} + \frac{b\left(4b^2\operatorname{Ei}\left(-2b^2x^2\right) + \frac{e^{-2b^2x^2}}{x^2}\right)}{\sqrt{\pi}}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/(E^(b^2*x^2)*x^4),x]
```

[Out] (((-1 + 2*b^2*x^2)*Erfc[b*x])/(E^(b^2*x^2)*x^3) - b^3*Sqrt[Pi]*Erfc[b*x]^2 + (b*(1/(E^(2*b^2*x^2)*x^2) + 4*b^2*ExpIntegralEi[-2*b^2*x^2]))/Sqrt[Pi])/3

fricas [A] time = 0.42, size = 122, normalized size = 1.13

$$\frac{2\,\pi^{\frac{3}{2}}\sqrt{b^2}\,b^2x^3\,\mathrm{erf}\left(\sqrt{b^2}\,x\right) - \left(\pi - 2\,\pi b^2x^2 - \left(\pi - 2\,\pi b^2x^2\right)\mathrm{erf}\left(bx\right)\right)e^{\left(-b^2x^2\right)} - \sqrt{\pi}\left(\pi b^3x^3\,\mathrm{erf}\left(bx\right)^2 - 4\,b^3x^3\mathrm{Ei}\left(-2\right.\right.}{3\,\pi x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^4,x, algorithm="fricas")

[Out] 1/3*(2*pi^(3/2)*sqrt(b^2)*b^2*x^3*erf(sqrt(b^2)*x) - (pi - 2*pi*b^2*x^2 - (pi - 2*pi*b^2*x^2)*erf(b*x))*e^(-b^2*x^2) - sqrt(pi)*(pi*b^3*x^3*erf(b*x)^2 - 4*b^3*x^3*Ei(-2*b^2*x^2) - b*x*e^(-2*b^2*x^2)))/(pi*x^3)

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfc}\left(bx\right)e^{\left(-b^2x^2\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^4,x, algorithm="giac")

[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x^4, x)

maple [F] time = 0.28, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfc}\left(bx\right)\mathrm{e}^{-b^2x^2}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(erfc(b*x)/exp(b^2*x^2)/x^4,x)

[Out] int(erfc(b*x)/exp(b^2*x^2)/x^4,x)

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfc}\left(bx\right)e^{\left(-b^2x^2\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^4,x, algorithm="maxima")

```
[Out] integrate(erfc(b*x)*e^(-b^2*x^2)/x^4, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\mathrm{erfc}\left(b\,x\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfc(b*x))/x^4,x)
```

```
[Out] int((exp(-b^2*x^2)*erfc(b*x))/x^4, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{-b^2x^2}\,\mathrm{erfc}\left(bx\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b**2*x**2)/x**4,x)
```

```
[Out] Integral(exp(-b**2*x**2)*erfc(b*x)/x**4, x)
```

3.189 $\int e^{c+dx^2}x^3\mathbf{erfc}(a+bx)\,dx$

Optimal. Leaf size=342

$$-\frac{be^{\frac{a^2d}{b^2-d}+c}\text{erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)}{2d^2\sqrt{b^2-d}}+\frac{be^{\frac{a^2d}{b^2-d}+c}\text{erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)}{4d\left(b^2-d\right)^{3/2}}+\frac{ab^2e^{-a^2-2abx-x^2\left(b^2-d\right)+c}}{2\sqrt{\pi}\,d\left(b^2-d\right)^2}-\frac{bxe^{-a^2-2abx-x^2\left(b^2-d\right)+c}}{2\sqrt{\pi}\,d\left(b^2-d\right)}+\frac{a^2b^3e^{\frac{a^2d}{b^2-d}+c}\text{er}}{2d(b^2}$$

```
[Out] 1/2*a^2*b^3*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/(b^2-d)
^(5/2)/d+1/4*b*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/(b^2
-d)^(3/2)/d-1/2*exp(d*x^2+c)*erfc(b*x+a)/d^2+1/2*exp(d*x^2+c)*x^2*erfc(b*x+
a)/d-1/2*b*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/d^2/(b^2
-d)^(1/2)+1/2*a*b^2*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/(b^2-d)^2/d/Pi^(1/2)-1/
2*b*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)*x/(b^2-d)/d/Pi^(1/2)
```

Rubi [A] time = 0.47, antiderivative size = 342, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}} = 0.316$, Rules used = {6386, 6383, 2234, 2205, 2241, 2240}

$$-\frac{be^{\frac{a^2d}{b^2-d}+c}\text{Erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)}{2d^2\sqrt{b^2-d}}+\frac{a^2b^3e^{\frac{a^2d}{b^2-d}+c}\text{Erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)}{2d\left(b^2-d\right)^{5/2}}+\frac{be^{\frac{a^2d}{b^2-d}+c}\text{Erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)}{4d\left(b^2-d\right)^{3/2}}+\frac{ab^2e^{-a^2-2abx-x^2\left(b^2-d\right)+c}}{2\sqrt{\pi}\,d\left(b^2-d\right)^2}-\frac{bxe^{-a^2}}{2\sqrt{}}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x^3*Erfc[a + b*x],x]
```

```
[Out] (a*b^2*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(2*(b^2 - d)^2*d*Sqrt[Pi]) -
 (b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2)*x)/(2*(b^2 - d)*d*Sqrt[Pi]) - (b
*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/(2*Sqrt[
b^2 - d]*d^2) + (a^2*b^3*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/
Sqrt[b^2 - d]])/(2*(b^2 - d)^(5/2)*d) + (b*E^(c + (a^2*d)/(b^2 - d))*Erf[(a
*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/(4*(b^2 - d)^(3/2)*d) - (E^(c + d*x^2)*Er
fc[a + b*x])/(2*d^2) + (E^(c + d*x^2)*x^2*Erfc[a + b*x])/(2*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2240

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)*((d_.) + (e_.)*(x_)), x_Symbol
] :> Simp[(e*F^(a + b*x + c*x^2))/(2*c*Log[F]), x] - Dist[(b*e - 2*c*d)/(2*
c), Int[F^(a + b*x + c*x^2), x], x] /; FreeQ[{F, a, b, c, d, e}, x] && NeQ[
b*e - 2*c*d, 0]
```

Rule 2241

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)*((d_.) + (e_.)*(x_))^(m_), x_S
ymbol] :> Simp[(e*(d + e*x)^(m - 1)*F^(a + b*x + c*x^2))/(2*c*Log[F]), x] +
 (-Dist[(b*e - 2*c*d)/(2*c), Int[(d + e*x)^(m - 1)*F^(a + b*x + c*x^2), x],
 x] - Dist[((m - 1)*e^2)/(2*c*Log[F]), Int[(d + e*x)^(m - 2)*F^(a + b*x + c
*x^2), x], x]) /; FreeQ[{F, a, b, c, d, e}, x] && NeQ[b*e - 2*c*d, 0] && Gt
Q[m, 1]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6386

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x]) /; FreeQ
[{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{c+dx^2}x^3\text{erfc}(a+bx)\,dx = \frac{e^{c+dx^2}x^2\text{erfc}(a+bx)}{2d} - \frac{\int e^{c+dx^2}x\text{erfc}(a+bx)\,dx}{d} + \frac{b\int e^{-a^2+c-2abx+(-b^2+d)x^2}x^2\,dx}{d\sqrt{\pi}}$$

$$= -\frac{be^{-a^2+c-2abx-(b^2-d)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erfc}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erfc}(a+bx)}{2d} - \frac{b\int e^{-a^2+c-2a}}{d^2}$$

$$= \frac{ab^2e^{-a^2+c-2abx-(b^2-d)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{be^{-a^2+c-2abx-(b^2-d)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erfc}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erfc}}{2d}$$

$$= \frac{ab^2e^{-a^2+c-2abx-(b^2-d)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{be^{-a^2+c-2abx-(b^2-d)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{be^{\frac{b^2c+a^2d-cd}{b^2-d}}\text{erf}\left(\frac{ab+(b^2-d)x}{\sqrt{b^2-d}}\right)}{2\sqrt{b^2-d}\,d^2} + \frac{be^{\frac{b^2c}{}}}{}$$

$$= \frac{ab^2e^{-a^2+c-2abx-(b^2-d)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{be^{-a^2+c-2abx-(b^2-d)x^2}x}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{be^{\frac{b^2c+a^2d-cd}{b^2-d}}\text{erf}\left(\frac{ab+(b^2-d)x}{\sqrt{b^2-d}}\right)}{2\sqrt{b^2-d}\,d^2} + \frac{a^2b^3}{}$$

Mathematica [A] time = 2.62, size = 256, normalized size = 0.75

$$-\frac{e^c\left(-\frac{bde^{-a^2-2abx+x^2(d-b^2)}\left(\sqrt{\pi}\sqrt{b^2-d}\left(\left(2a^2+1\right)b^2-d\right)e^{\frac{\left(ab+x\left(b^2-d\right)\right)^2}{b^2-d}}\text{erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)+2\left(b^2-d\right)\left(ab+x\left(d-b^2\right)\right)\right)}{\sqrt{\pi}\left(b^2-d\right)^3} + \frac{2be^{\frac{a^2d}{b^2-d}}\text{erfi}\left(\frac{x\left(d-b^2\right)-ab}{\sqrt{d-b^2}}\right)}{\sqrt{d-b^2}} + 2e\right.}{4d^2}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[E^(c + d*x^2)*x^3*Erfc[a + b*x],x]
```

```
[Out] -1/4*(E^c*(-2*E^(d*x^2)*(-1 + d*x^2) + 2*E^(d*x^2)*(-1 + d*x^2)*Erf[a + b*x
] - (b*d*E^(-a^2 - 2*a*b*x + (-b^2 + d)*x^2)*(2*(b^2 - d)*(a*b + (-b^2 + d)
*x) + Sqrt[b^2 - d]*((1 + 2*a^2)*b^2 - d)*E^((a*b + (b^2 - d)*x)^2/(b^2 - d
))*Sqrt[Pi]*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]]))/((b^2 - d)^3*Sqrt[Pi])
 + (2*b*E^((a^2*d)/(b^2 - d))*Erfi[(-(a*b) + (-b^2 + d)*x)/Sqrt[-b^2 + d]])
/Sqrt[-b^2 + d]))/d^2
```

fricas [A] time = 0.49, size = 328, normalized size = 0.96

$$-\frac{\pi\left(2\,b^5 - \left(2\,a^2+5\right)b^3 d + 3\,bd^2\right)\sqrt{b^2-d}\,\operatorname{erf}\left(\frac{ab+\left(b^2-d\right)x}{\sqrt{b^2-d}}\right)e^{\left(\frac{b^2c+\left(a^2-c\right)d}{b^2-d}\right)} - 2\,\sqrt{\pi}\,\left(ab^4d - ab^2d^2 - \left(b^5d - 2\,b^3d^2 + bd^3\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfc(b*x+a),x, algorithm="fricas")
```

```
[Out] -1/4*(pi*(2*b^5 - (2*a^2 + 5)*b^3*d + 3*b*d^2)*sqrt(b^2 - d)*erf((a*b + (b^
2 - d)*x)/sqrt(b^2 - d))*e^((b^2*c + (a^2 - c)*d)/(b^2 - d)) - 2*sqrt(pi)*(
a*b^4*d - a*b^2*d^2 - (b^5*d - 2*b^3*d^2 + b*d^3)*x)*e^(-b^2*x^2 - 2*a*b*x
+ d*x^2 - a^2 + c) - 2*(pi*(b^6*d - 3*b^4*d^2 + 3*b^2*d^3 - d^4)*x^2 - pi*(
b^6 - 3*b^4*d + 3*b^2*d^2 - d^3) - (pi*(b^6*d - 3*b^4*d^2 + 3*b^2*d^3 - d^4
)*x^2 - pi*(b^6 - 3*b^4*d + 3*b^2*d^2 - d^3))*erf(b*x + a))*e^(d*x^2 + c))/
(pi*(b^6*d^2 - 3*b^4*d^3 + 3*b^2*d^4 - d^5))
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{erfc}\left(bx+a\right) e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfc(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(x^3*erfc(b*x + a)*e^(d*x^2 + c), x)
```

maple [F] time = 0.27, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^2+c} x^3 \operatorname{erfc}\left(bx+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^3*erfc(b*x+a),x)
```

```
[Out] int(exp(d*x^2+c)*x^3*erfc(b*x+a),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{erfc}\left(bx+a\right) e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfc(b*x+a),x, algorithm="maxima")
```

```
[Out] integrate(x^3*erfc(b*x + a)*e^(d*x^2 + c), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.00

$$\int x^3 \operatorname{erfc}(a + b x)\, e^{d x^2 + c}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfc(a + b*x)*exp(c + d*x^2),x)
[Out] int(x^3*erfc(a + b*x)*exp(c + d*x^2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**3*erfc(b*x+a),x)
[Out] Timed out
```

3.190 $\int e^{c+dx^2} x\,\mathbf{erfc}(a+bx)\,dx$

Optimal. Leaf size=86

$$\frac{be^{\frac{a^2d}{b^2-d}+c}\operatorname{erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{2d\sqrt{b^2-d}}+\frac{e^{c+dx^2}\operatorname{erfc}(a+bx)}{2d}$$

```
[Out] 1/2*exp(d*x^2+c)*erfc(b*x+a)/d+1/2*b*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*
x)/(b^2-d)^(1/2))/d/(b^2-d)^(1/2)
```

Rubi [A] time = 0.05, antiderivative size = 86, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.176, Rules used = {6383, 2234, 2205}

$$\frac{be^{\frac{a^2d}{b^2-d}+c}\operatorname{Erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{2d\sqrt{b^2-d}}+\frac{e^{c+dx^2}\operatorname{Erfc}(a+bx)}{2d}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x*Erfc[a + b*x],x]
```

```
[Out] (b*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/(2*Sqr
t[b^2 - d]*d) + (E^(c + d*x^2)*Erfc[a + b*x])/(2*d)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 6383

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfc[a + b*x])/(2*d), x] + Dist[b/(d*Sqrt[Pi]), Int[E^(-a
^2 + c - 2*a*b*x - (b^2 - d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int e^{c+dx^2}x\text{erfc}(a+bx)\,dx = \frac{e^{c+dx^2}\text{erfc}(a+bx)}{2d} + \frac{b\int e^{-a^2+c-2abx-(b^2-d)x^2}\,dx}{d\sqrt{\pi}}$$
$$= \frac{e^{c+dx^2}\text{erfc}(a+bx)}{2d} + \frac{\left(be^{\frac{b^2c+a^2d-cd}{b^2-d}}\right)\int \exp\left(\frac{\left(-2ab+2(-b^2+d)x\right)^2}{4(-b^2+d)}\right)dx}{d\sqrt{\pi}}$$
$$= \frac{be^{\frac{b^2c+a^2d-cd}{b^2-d}}\text{erf}\left(\frac{ab+(b^2-d)x}{\sqrt{b^2-d}}\right)}{2\sqrt{b^2-d}\,d} + \frac{e^{c+dx^2}\text{erfc}(a+bx)}{2d}$$

Mathematica [A] time = 0.12, size = 81, normalized size = 0.94

$$\frac{e^c\left(\frac{be^{\frac{a^2d}{b^2-d}}\text{erfi}\left(\frac{x(d-b^2)-ab}{\sqrt{d-b^2}}\right)}{\sqrt{d-b^2}} + e^{dx^2}\text{erfc}(a+bx)\right)}{2d}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x*Erfc[a + b*x],x]
```

```
[Out] (E^c*(E^(d*x^2)*Erfc[a + b*x] + (b*E^((a^2*d)/(b^2 - d))*Erfi[(-(a*b) + (-b
^2 + d)*x)/Sqrt[-b^2 + d]])/Sqrt[-b^2 + d]))/(2*d)
```

fricas [A] time = 0.51, size = 108, normalized size = 1.26

$$\frac{\sqrt{b^2-d}\,b\,\text{erf}\left(\frac{ab+(b^2-d)x}{\sqrt{b^2-d}}\right)e^{\left(\frac{b^2c+(a^2-c)d}{b^2-d}\right)} + \left(b^2-(b^2-d)\,\text{erf}(bx+a)-d\right)e^{(dx^2+c)}}{2\left(b^2d-d^2\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfc(b*x+a),x, algorithm="fricas")
```

```
[Out] 1/2*(sqrt(b^2 - d)*b*erf((a*b + (b^2 - d)*x)/sqrt(b^2 - d))*e^((b^2*c + (a^
2 - c)*d)/(b^2 - d)) + (b^2 - (b^2 - d)*erf(b*x + a) - d)*e^(d*x^2 + c))/(b
^2*d - d^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{erfc}(bx+a)\,e^{(dx^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfc(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(x*erfc(b*x + a)*e^(d*x^2 + c), x)
```

maple [B] time = 0.25, size = 175, normalized size = 2.03

$$\frac{\frac{b\,\mathrm{e}^{\frac{(bx+a)^2 d}{b^2}-\frac{2ad(bx+a)}{b^2}+\frac{a^2 d}{b^2}+c}}{2d}-\frac{\mathrm{erf}(bx+a)b\,\mathrm{e}^{\frac{(bx+a)^2 d}{b^2}-\frac{2ad(bx+a)}{b^2}+\frac{a^2 d}{b^2}+c}}{2d}+\frac{b\,\mathrm{e}^{\frac{a^2 d}{b^2}+c-\frac{a^2 d^2}{b^4\left(-1+\frac{d}{b^2}\right)}}\,\mathrm{erf}\left(\sqrt{1-\frac{d}{b^2}}\,(bx+a)+\frac{ad}{b^2\sqrt{1-\frac{d}{b^2}}}\right)}{2d\sqrt{1-\frac{d}{b^2}}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x*erfc(b*x+a),x)
```

```
[Out] (1/2*b/d*exp((b*x+a)^2/b^2*d-2/b^2*a*d*(b*x+a)+1/b^2*a^2*d+c)-1/2*erf(b*x+a
)*b/d*exp((b*x+a)^2/b^2*d-2/b^2*a*d*(b*x+a)+1/b^2*a^2*d+c)+1/2*b/d*exp(1/b^
2*a^2*d+c-a^2*d^2/b^4/(-1+d/b^2))/(1-d/b^2)^(1/2)*erf((1-d/b^2)^(1/2)*(b*x+
a)+a*d/b^2/(1-d/b^2)^(1/2)))/b
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{erfc}\,(bx+a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfc(b*x+a),x, algorithm="maxima")
```

```
[Out] integrate(x*erfc(b*x + a)*e^(d*x^2 + c), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x\,\mathrm{erfc}\,(a+b\,x)\;\mathrm{e}^{d\,x^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfc(a + b*x)*exp(c + d*x^2),x)
```

```
[Out] int(x*erfc(a + b*x)*exp(c + d*x^2), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int xe^{dx^2}\,\mathrm{erfc}\,(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x*erfc(b*x+a),x)
```

```
[Out] exp(c)*Integral(x*exp(d*x**2)*erfc(a + b*x), x)
```

3.191 $\int \frac{e^{c+dx^2}\,\mathbf{erfc}(a+bx)}{x}\,dx$

Optimal. Leaf size=22

$$\operatorname{Int}\left(\frac{e^{c+dx^2}\operatorname{erfc}(a+bx)}{x},x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erfc(b*x+a)/x,x)
```

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\operatorname{Erfc}(a+bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfc[a + b*x])/x,x]
```

```
[Out] Defer[Int][(E^(c + d*x^2)*Erfc[a + b*x])/x, x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\operatorname{erfc}(a+bx)}{x}\,dx=\int \frac{e^{c+dx^2}\operatorname{erfc}(a+bx)}{x}\,dx$$

Mathematica [A] time = 0.77, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\operatorname{erfc}(a+bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfc[a + b*x])/x,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erfc[a + b*x])/x, x]
```

fricas [A] time = 0.64, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-\frac{(\operatorname{erf}(bx+a)-1)e^{\left(dx^2+c\right)}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x,x, algorithm="fricas")
[Out] integral(-(erf(b*x + a) - 1)*e^(d*x^2 + c)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)\,e^{\left(dx^2+c\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x,x, algorithm="giac")
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c)/x, x)
```

maple [A] time = 0.06, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\operatorname{erfc}(bx+a)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x+a)/x,x)
[Out] int(exp(d*x^2+c)*erfc(b*x+a)/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)\,e^{\left(dx^2+c\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x,x, algorithm="maxima")
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c)/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{erfc}\left(a+b\,x\right)\,e^{d\,x^2+c}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erfc(a + b*x)*exp(c + d*x^2))/x,x)
[Out] int((erfc(a + b*x)*exp(c + d*x^2))/x, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\operatorname{erfc}\left(a+bx\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x+a)/x,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfc(a + b*x)/x, x)
```

3.192 $\int \frac{e^{c+dx^2}\mathbf{erfc}(a+bx)}{x^3}\,dx$

Optimal. Leaf size=183

$$\frac{2ab^2\mathrm{Int}\left(\frac{e^{-a^2-2abx+x^2\left(d-b^2\right)+c}}{x},x\right)}{\sqrt{\pi}}+d\mathrm{Int}\left(\frac{e^{c+dx^2}\mathrm{erfc}(a+bx)}{x},x\right)+b\sqrt{b^2-d}\,e^{\frac{a^2d}{b^2-d}+c}\mathrm{erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)+\frac{be^{-a^2-2abx-x^2}}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*exp(d*x^2+c)*erfc(b*x+a)/x^2+b*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x
)/(b^2-d)^(1/2))*(b^2-d)^(1/2)+b*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/x/Pi^(1/2)
+2*a*b^2*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2+d)*x^2)/x,x)/Pi^(1/2)+d*Unin
tegrable(exp(d*x^2+c)*erfc(b*x+a)/x,x)
```

Rubi [A] time = 0.41, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\mathrm{Erfc}(a+bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfc[a + b*x])/x^3,x]
```

```
[Out] (b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(Sqrt[Pi]*x) + b*Sqrt[b^2 - d]*E
^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]] - (E^(c + d
*x^2)*Erfc[a + b*x])/(2*x^2) + (2*a*b^2*Defer[Int][E^(-a^2 + c - 2*a*b*x +
(-b^2 + d)*x^2)/x, x])/Sqrt[Pi] + d*Defer[Int][(E^(c + d*x^2)*Erfc[a + b*x]
)/x, x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x^3}\,dx = -\frac{e^{c+dx^2}\text{erfc}(a+bx)}{2x^2} + d\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x}\,dx - \frac{b\int \frac{e^{-a^2+c-2abx+(-b^2+d)x^2}}{x^2}\,dx}{\sqrt{\pi}}$$

$$= \frac{be^{-a^2+c-2abx-(b^2-d)x^2}}{\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfc}(a+bx)}{2x^2} + d\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x}\,dx + \frac{(2ab^2)\int \frac{e^{-a^2\cdots}}{}}{}$$

$$= \frac{be^{-a^2+c-2abx-(b^2-d)x^2}}{\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfc}(a+bx)}{2x^2} + d\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x}\,dx + \frac{(2ab^2)\int \frac{e^{-a^2\cdots}}{}}{}$$

$$= \frac{be^{-a^2+c-2abx-(b^2-d)x^2}}{\sqrt{\pi}\,x} + b\sqrt{b^2-d}\,e^{\frac{b^2c+a^2d-cd}{b^2-d}}\text{erf}\left(\frac{ab+(b^2-d)x}{\sqrt{b^2-d}}\right) - \frac{e^{c+dx^2}\text{erfc}(a+bx)}{2x^2} + \cdots$$

Mathematica [A] time = 1.03, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfc[a + b*x])/x^3,x]
[Out] Integrate[(E^(c + d*x^2)*Erfc[a + b*x])/x^3, x]
```

fricas [A] time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}(bx+a)-1)e^{(dx^2+c)}}{x^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x^3,x, algorithm="fricas")
[Out] integral(-(erf(b*x + a) - 1)*e^(d*x^2 + c)/x^3, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}(bx+a)\,e^{(dx^2+c)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x^3,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c)/x^3, x)
```

maple [A] time = 0.39, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^{2}+c}\operatorname{erfc}\left(bx+a\right)}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x+a)/x^3,x)
```

```
[Out] int(exp(d*x^2+c)*erfc(b*x+a)/x^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}\left(bx+a\right)e^{\left(dx^{2}+c\right)}}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x^3,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c)/x^3, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{erfc}\left(a+b\,x\right)\,e^{d\,x^{2}+c}}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erfc(a + b*x)*exp(c + d*x^2))/x^3,x)
```

```
[Out] int((erfc(a + b*x)*exp(c + d*x^2))/x^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\operatorname{erfc}\left(a+bx\right)}{x^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x+a)/x**3,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfc(a + b*x)/x**3, x)
```

3.193 $\int e^{c+dx^2}x^4\textbf{erfc}(a+bx)\,dx$

Optimal. Leaf size=527

$$\frac{3\text{Int}\left(e^{c+dx^2}\text{erfc}(a+bx),x\right)}{4d^2}+\frac{3ab^2e^{\frac{a^2d}{b^2-d}+c}\text{erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{4d^2\left(b^2-d\right)^{3/2}}+\frac{3be^{-a^2-2abx-x^2(b^2-d)+c}}{4\sqrt{\pi}\,d^2\left(b^2-d\right)}-\frac{3ab^2e^{\frac{a^2d}{b^2-d}+c}\text{erf}\left(\frac{ab+x(b^2-d)}{\sqrt{b^2-d}}\right)}{4d\left(b^2-d\right)^{5/2}}+\frac{ab^2\ldots}{}$$

```
[Out] 3/4*a*b^2*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/(b^2-d)^(
3/2)/d^2-1/2*a^3*b^4*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2)
)/(b^2-d)^(7/2)/d-3/4*a*b^2*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d
)^(1/2))/(b^2-d)^(5/2)/d-3/4*exp(d*x^2+c)*x*erfc(b*x+a)/d^2+1/2*exp(d*x^2+c
)*x^3*erfc(b*x+a)/d+3/4*b*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/(b^2-d)/d^2/Pi^(1
/2)-1/2*a^2*b^3*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/(b^2-d)^3/d/Pi^(1/2)-1/2*b*
exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/(b^2-d)^2/d/Pi^(1/2)+1/2*a*b^2*exp(-a^2+c-2
*a*b*x-(b^2-d)*x^2)*x/(b^2-d)^2/d/Pi^(1/2)-1/2*b*exp(-a^2+c-2*a*b*x-(b^2-d)
*x^2)*x^2/(b^2-d)/d/Pi^(1/2)+3/4*Unintegrable(exp(d*x^2+c)*erfc(b*x+a),x)/d
^2
```

Rubi [A] time = 0.91, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}x^4\text{Erfc}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^4*Erfc[a + b*x],x]
```

```
[Out] (3*b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(4*(b^2 - d)*d^2*Sqrt[Pi]) - (
a^2*b^3*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(2*(b^2 - d)^3*d*Sqrt[Pi])
- (b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(2*(b^2 - d)^2*d*Sqrt[Pi]) + (
a*b^2*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2)*x)/(2*(b^2 - d)^2*d*Sqrt[Pi])
- (b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2)*x^2)/(2*(b^2 - d)*d*Sqrt[Pi]) +
 (3*a*b^2*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])
/(4*(b^2 - d)^(3/2)*d^2) - (a^3*b^4*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b
^2 - d)*x)/Sqrt[b^2 - d]])/(2*(b^2 - d)^(7/2)*d) - (3*a*b^2*E^(c + (a^2*d)/
(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/(4*(b^2 - d)^(5/2)*d) -
(3*E^(c + d*x^2)*x*Erfc[a + b*x])/(4*d^2) + (E^(c + d*x^2)*x^3*Erfc[a + b*x
])/(2*d) + (3*Defer[Int][E^(c + d*x^2)*Erfc[a + b*x], x])/(4*d^2)
```

Rubi steps

$$\int e^{c+dx^2}x^4\text{erfc}(a+bx)\,dx = \frac{e^{c+dx^2}x^3\text{erfc}(a+bx)}{2d} - \frac{3\int e^{c+dx^2}x^2\text{erfc}(a+bx)\,dx}{2d} + \frac{b\int e^{-a^2+c-2abx+\left(-b^2+d\right)x^2}x^3\,dx}{d\sqrt{\pi}}$$

$$= -\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}x^2}{2\left(b^2-d\right)d\sqrt{\pi}} - \frac{3e^{c+dx^2}x\text{erfc}(a+bx)}{4d^2} + \frac{e^{c+dx^2}x^3\text{erfc}(a+bx)}{2d} + \frac{3\int e^{c+dx^2}}{}$$

$$= \frac{3be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}} - \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}x}{2\left(b^2-d\right)^2d\sqrt{\pi}} - \frac{be^{-a^2+c-2}}{2\left(b^2\right.}$$

$$= \frac{3be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}} - \frac{a^2b^3e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^3d\sqrt{\pi}} - \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{ab^2e^{-a^2+c}}{2\left(b^2\right.}$$

$$= \frac{3be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}} - \frac{a^2b^3e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^3d\sqrt{\pi}} - \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{ab^2e^{-a^2+c}}{2\left(b^2\right.}$$

$$= \frac{3be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{4\left(b^2-d\right)d^2\sqrt{\pi}} - \frac{a^2b^3e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^3d\sqrt{\pi}} - \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)^2d\sqrt{\pi}} + \frac{ab^2e^{-a^2+c}}{2\left(b^2\right.}$$

Mathematica [A] time = 1.20, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}x^4\text{erfc}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^4*Erfc[a + b*x],x]
[Out] Integrate[E^(c + d*x^2)*x^4*Erfc[a + b*x], x]
```

fricas [A] time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(-\left(x^4\,\text{erf}\,(bx+a) - x^4\right)e^{\left(dx^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfc(b*x+a),x, algorithm="fricas")
[Out] integral(-(x^4*erf(b*x + a) - x^4)*e^(d*x^2 + c), x)
```

giac [A]   time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erfc}(bx+a)e^{(dx^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfc(b*x+a),x, algorithm="giac")
[Out] integrate(x^4*erfc(b*x + a)*e^(d*x^2 + c), x)
```

maple [A]   time = 0.11, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^2+c}x^4\operatorname{erfc}(bx+a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^4*erfc(b*x+a),x)
[Out] int(exp(d*x^2+c)*x^4*erfc(b*x+a),x)
```

maxima [A]   time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erfc}(bx+a)e^{(dx^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfc(b*x+a),x, algorithm="maxima")
[Out] integrate(x^4*erfc(b*x + a)*e^(d*x^2 + c), x)
```

mupad [A]   time = 0.00, size = -1, normalized size = -0.00

$$\int x^4 \operatorname{erfc}\left(a+b\,x\right)\,\mathrm{e}^{d\,x^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfc(a + b*x)*exp(c + d*x^2),x)
[Out] int(x^4*erfc(a + b*x)*exp(c + d*x^2), x)
```

sympy [F(-1)]   time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**4*erfc(b*x+a),x)
[Out] Timed out
```

3.194 $\int e^{c+dx^2}x^2\textbf{erfc}(a+bx)\,dx$

Optimal. Leaf size=164

$$-\frac{\text{Int}\left(e^{c+dx^2}\text{erfc}(a+bx),x\right)}{2d}-\frac{ab^2e^{\frac{a^2d}{b^2-d}+c}\text{erf}\left(\frac{ab+x\left(b^2-d\right)}{\sqrt{b^2-d}}\right)}{2d\left(b^2-d\right)^{3/2}}-\frac{be^{-a^2-2abx-x^2\left(b^2-d\right)+c}}{2\sqrt{\pi}\,d\left(b^2-d\right)}+\frac{xe^{c+dx^2}\text{erfc}(a+bx)}{2d}$$

```
[Out] -1/2*a*b^2*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))/(b^2-d)^
(3/2)/d+1/2*exp(d*x^2+c)*x*erfc(b*x+a)/d-1/2*b*exp(-a^2+c-2*a*b*x-(b^2-d)*x
^2)/(b^2-d)/d/Pi^(1/2)-1/2*Unintegrable(exp(d*x^2+c)*erfc(b*x+a),x)/d
```

Rubi [A] time = 0.18, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}x^2\text{Erfc}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^2*Erfc[a + b*x],x]
```

```
[Out] -(b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(2*(b^2 - d)*d*Sqrt[Pi]) - (a*b
^2*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/(2*(b^
2 - d)^(3/2)*d) + (E^(c + d*x^2)*x*Erfc[a + b*x])/(2*d) - Defer[Int][E^(c +
 d*x^2)*Erfc[a + b*x], x]/(2*d)
```

Rubi steps

$$\int e^{c+dx^2}x^2\text{erfc}(a+bx)\,dx=\frac{e^{c+dx^2}x\text{erfc}(a+bx)}{2d}-\frac{\int e^{c+dx^2}\text{erfc}(a+bx)\,dx}{2d}+\frac{b\int e^{-a^2+c-2abx+\left(-b^2+d\right)x^2}x\,dx}{d\sqrt{\pi}}$$

$$=-\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)d\sqrt{\pi}}+\frac{e^{c+dx^2}x\text{erfc}(a+bx)}{2d}-\frac{\int e^{c+dx^2}\text{erfc}(a+bx)\,dx}{2d}-\frac{\left(ab^2\right)\int e^{\cdots}}{\cdots}$$

$$=-\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)d\sqrt{\pi}}+\frac{e^{c+dx^2}x\text{erfc}(a+bx)}{2d}-\frac{\int e^{c+dx^2}\text{erfc}(a+bx)\,dx}{2d}-\frac{\left(ab^2e^{\frac{b^2c+a\cdots}{b^2\cdots}}\cdots\right.}{\cdots}$$

$$=-\frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{2\left(b^2-d\right)d\sqrt{\pi}}-\frac{ab^2e^{\frac{b^2c+a^2d-cd}{b^2-d}}\text{erf}\left(\frac{ab+\left(b^2-d\right)x}{\sqrt{b^2-d}}\right)}{2\left(b^2-d\right)^{3/2}d}+\frac{e^{c+dx^2}x\text{erfc}(a+bx)}{2d}-\frac{\int e^{c+\cdots}}{\cdots}$$

Mathematica [A] time = 1.00, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}x^2\text{erfc}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^2*Erfc[a + b*x],x]
[Out] Integrate[E^(c + d*x^2)*x^2*Erfc[a + b*x], x]
```

fricas [A] time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(-\left(x^2\,\text{erf}\,(bx+a)-x^2\right)e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfc(b*x+a),x, algorithm="fricas")
[Out] integral(-(x^2*erf(b*x + a) - x^2)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfc}\,(bx+a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfc(b*x+a),x, algorithm="giac")
[Out] integrate(x^2*erfc(b*x + a)*e^(d*x^2 + c), x)
```

maple [A] time = 0.22, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c}x^2\text{erfc}\,(bx+a)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^2*erfc(b*x+a),x)
[Out] int(exp(d*x^2+c)*x^2*erfc(b*x+a),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfc}\,(bx+a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfc(b*x+a),x, algorithm="maxima")
```

```
[Out] integrate(x^2*erfc(b*x + a)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int x^2 \operatorname{erfc}(a + b x) e^{d x^2 + c} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfc(a + b*x)*exp(c + d*x^2),x)
```

```
[Out] int(x^2*erfc(a + b*x)*exp(c + d*x^2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**2*erfc(b*x+a),x)
```

```
[Out] Timed out
```

3.195 $\int e^{c+dx^2}\,\mathbf{erfc}(a+bx)\,dx$

Optimal. Leaf size=19

$$\mathrm{Int}\left(e^{c+dx^2}\mathrm{erfc}(a+bx),x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erfc(b*x+a),x)
```

Rubi [A] time = 0.01, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}\mathrm{Erfc}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*Erfc[a + b*x],x]
```

```
[Out] Defer[Int][E^(c + d*x^2)*Erfc[a + b*x], x]
```

Rubi steps

$$\int e^{c+dx^2}\mathrm{erfc}(a+bx)\,dx=\int e^{c+dx^2}\mathrm{erfc}(a+bx)\,dx$$

Mathematica [A] time = 0.04, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}\mathrm{erfc}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*Erfc[a + b*x],x]
```

```
[Out] Integrate[E^(c + d*x^2)*Erfc[a + b*x], x]
```

fricas [A] time = 0.45, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(-(\mathrm{erf}\,(bx+a)-1)e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a),x, algorithm="fricas")
```

```
[Out] integral(-(erf(b*x + a) - 1)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx+a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a),x, algorithm="giac")
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c), x)
```

maple [A] time = 0.10, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^2+c}\operatorname{erfc}(bx+a)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x+a),x)
[Out] int(exp(d*x^2+c)*erfc(b*x+a),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx+a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a),x, algorithm="maxima")
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \operatorname{erfc}(a+b\,x)\;\mathrm{e}^{d\,x^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(a + b*x)*exp(c + d*x^2),x)
[Out] int(erfc(a + b*x)*exp(c + d*x^2), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int e^{dx^2}\operatorname{erfc}(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x+a),x)
[Out] exp(c)*Integral(exp(d*x**2)*erfc(a + b*x), x)
```

3.196 $\int \frac{e^{c+dx^2}\mathbf{erfc}(a+bx)}{x^2}\,dx$

Optimal. Leaf size=83

$$-\frac{2b\text{Int}\left(\frac{e^{-a^2-2abx+x^2(d-b^2)+c}}{x},x\right)}{\sqrt{\pi}}+2d\text{Int}\left(e^{c+dx^2}\text{erfc}(a+bx),x\right)-\frac{e^{c+dx^2}\text{erfc}(a+bx)}{x}$$

```
[Out] -exp(d*x^2+c)*erfc(b*x+a)/x-2*b*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2+d)*x^
2)/x,x)/Pi^(1/2)+2*d*Unintegrable(exp(d*x^2+c)*erfc(b*x+a),x)
```

Rubi [A] time = 0.20, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfc}(a+bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfc[a + b*x])/x^2,x]
```

```
[Out] -((E^(c + d*x^2)*Erfc[a + b*x])/x) - (2*b*Defer[Int][E^(-a^2 + c - 2*a*b*x
+ (-b^2 + d)*x^2)/x, x])/Sqrt[Pi] + 2*d*Defer[Int][E^(c + d*x^2)*Erfc[a + b
*x], x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x^2}\,dx=-\frac{e^{c+dx^2}\text{erfc}(a+bx)}{x}+(2d)\int e^{c+dx^2}\text{erfc}(a+bx)\,dx-\frac{(2b)\int \frac{e^{-a^2+c-2abx+\left(-b^2+d\right)x^2}}{x}\,dx}{\sqrt{\pi}}$$

Mathematica [A] time = 1.09, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfc[a + b*x])/x^2,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erfc[a + b*x])/x^2, x]
```

fricas [A] time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}\,(bx+a)-1)e^{\left(dx^2+c\right)}}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x^2,x, algorithm="fricas")
```

```
[Out] integral(-(erf(b*x + a) - 1)*e^(d*x^2 + c)/x^2, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x^2,x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c)/x^2, x)
```

maple [A] time = 0.14, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\text{erfc}\,(bx+a)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x+a)/x^2,x)
```

```
[Out] int(exp(d*x^2+c)*erfc(b*x+a)/x^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x^2,x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c)/x^2, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\text{erfc}\,(a+b\,x)\;e^{d\,x^2+c}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erfc(a + b*x)*exp(c + d*x^2))/x^2,x)
```

```
[Out] int((erfc(a + b*x)*exp(c + d*x^2))/x^2, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^c \int \frac{e^{dx^2} \operatorname{erfc}(a + bx)}{x^2} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x+a)/x**2,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfc(a + b*x)/x**2, x)
```

3.197 $\int \frac{e^{c+dx^2}\mathbf{erfc}(a+bx)}{x^4}\,dx$

Optimal. Leaf size=355

$$\frac{2b\left(b^2-d\right)\mathrm{Int}\left(\frac{e^{-a^2-2abx+x^2\left(d-b^2\right)+c}}{x},x\right)}{3\sqrt{\pi}}-\frac{4bd\mathrm{Int}\left(\frac{e^{-a^2-2abx+x^2\left(d-b^2\right)+c}}{x},x\right)}{3\sqrt{\pi}}-\frac{4a^2b^3\mathrm{Int}\left(\frac{e^{-a^2-2abx+x^2\left(d-b^2\right)+c}}{x},x\right)}{3\sqrt{\pi}}+\frac{4}{3}d^2\mathrm{Int}\left(e^{c+d\ldots}\right.$$

```
[Out] -1/3*exp(d*x^2+c)*erfc(b*x+a)/x^3-2/3*d*exp(d*x^2+c)*erfc(b*x+a)/x-2/3*a*b^
2*exp(c+a^2*d/(b^2-d))*erf((a*b+(b^2-d)*x)/(b^2-d)^(1/2))*(b^2-d)^(1/2)+1/3
*b*exp(-a^2+c-2*a*b*x-(b^2-d)*x^2)/x^2/Pi^(1/2)-2/3*a*b^2*exp(-a^2+c-2*a*b*
x-(b^2-d)*x^2)/x/Pi^(1/2)-4/3*a^2*b^3*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2
+d)*x^2)/x,x)/Pi^(1/2)+2/3*b*(b^2-d)*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2+
d)*x^2)/x,x)/Pi^(1/2)-4/3*b*d*Unintegrable(exp(-a^2+c-2*a*b*x+(-b^2+d)*x^2)
/x,x)/Pi^(1/2)+4/3*d^2*Unintegrable(exp(d*x^2+c)*erfc(b*x+a),x)
```

Rubi [A] time = 0.87, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\mathrm{Erfc}(a+bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfc[a + b*x])/x^4,x]
```

```
[Out] (b*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(3*Sqrt[Pi]*x^2) - (2*a*b^2*E^(-
a^2 + c - 2*a*b*x - (b^2 - d)*x^2))/(3*Sqrt[Pi]*x) - (2*a*b^2*Sqrt[b^2 - d]
*E^(c + (a^2*d)/(b^2 - d))*Erf[(a*b + (b^2 - d)*x)/Sqrt[b^2 - d]])/3 - (E^(
c + d*x^2)*Erfc[a + b*x])/(3*x^3) - (2*d*E^(c + d*x^2)*Erfc[a + b*x])/(3*x)
 - (4*a^2*b^3*Defer[Int][E^(-a^2 + c - 2*a*b*x + (-b^2 + d)*x^2)/x, x])/(3*
Sqrt[Pi]) + (2*b*(b^2 - d)*Defer[Int][E^(-a^2 + c - 2*a*b*x + (-b^2 + d)*x^
2)/x, x])/(3*Sqrt[Pi]) - (4*b*d*Defer[Int][E^(-a^2 + c - 2*a*b*x + (-b^2 +
d)*x^2)/x, x])/(3*Sqrt[Pi]) + (4*d^2*Defer[Int][E^(c + d*x^2)*Erfc[a + b*x]
, x])/3
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x^4}\,dx = -\frac{e^{c+dx^2}\text{erfc}(a+bx)}{3x^3} + \frac{1}{3}(2d)\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x^2}\,dx - \frac{(2b)\int \frac{e^{-a^2+c-2abx+\left(-b^2+d\right)x^2}}{x^3}\,dx}{3\sqrt{\pi}}$$

$$= \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2} - \frac{e^{c+dx^2}\text{erfc}(a+bx)}{3x^3} - \frac{2de^{c+dx^2}\text{erfc}(a+bx)}{3x} + \frac{1}{3}\left(4d^2\right)\int e^{c+dx^2}\text{er}$$

$$= \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2} - \frac{2ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfc}(a+bx)}{3x^3} - \frac{2de^{c+dx^2}\text{erfc}(a}{3x}$$

$$= \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2} - \frac{2ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfc}(a+bx)}{3x^3} - \frac{2de^{c+dx^2}\text{erfc}(a}{3x}$$

$$= \frac{be^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x^2} - \frac{2ab^2e^{-a^2+c-2abx-\left(b^2-d\right)x^2}}{3\sqrt{\pi}\,x} - \frac{2}{3}ab^2\sqrt{b^2-d}\,e^{\frac{b^2c+a^2d-cd}{b^2-d}}\text{erf}\left(\frac{ab+\left(b^2\right.}{\sqrt{b^2-}}\right.$$

Mathematica [A] time = 1.30, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfc}(a+bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfc[a + b*x])/x^4,x]
[Out] Integrate[(E^(c + d*x^2)*Erfc[a + b*x])/x^4, x]
```

fricas [A] time = 0.41, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{(\text{erf}\,(bx+a)-1)e^{\left(dx^2+c\right)}}{x^4}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x^4,x, algorithm="fricas")
[Out] integral(-(erf(b*x + a) - 1)*e^(d*x^2 + c)/x^4, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfc}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x^4,x, algorithm="giac")
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c)/x^4, x)
```

maple [A] time = 0.34, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\operatorname{erfc}(bx+a)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfc(b*x+a)/x^4,x)
[Out] int(exp(d*x^2+c)*erfc(b*x+a)/x^4,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfc}(bx+a)\,e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfc(b*x+a)/x^4,x, algorithm="maxima")
[Out] integrate(erfc(b*x + a)*e^(d*x^2 + c)/x^4, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{erfc}(a+b\,x)\;e^{d\,x^2+c}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erfc(a + b*x)*exp(c + d*x^2))/x^4,x)
[Out] int((erfc(a + b*x)*exp(c + d*x^2))/x^4, x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfc(b*x+a)/x**4,x)
[Out] Timed out
```

3.198 $\int \left(\frac{e^{-b^2x^2}\mathbf{erfc}(bx)}{x^3}+\frac{b^2e^{-b^2x^2}\mathbf{erfc}(bx)}{x}\right)dx$

Optimal. Leaf size=60

$$\sqrt{2}\, b^2\mathrm{erf}\left(\sqrt{2}\, bx\right)-\frac{e^{-b^2x^2}\mathrm{erfc}(bx)}{2x^2}+\frac{be^{-2b^2x^2}}{\sqrt{\pi}\, x}$$

```
[Out] -1/2*erfc(b*x)/exp(b^2*x^2)/x^2+b^2*erf(b*x*2^(1/2))*2^(1/2)+b/exp(2*b^2*x^
2)/x/Pi^(1/2)
```

Rubi [A] time = 0.13, antiderivative size = 60, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 40, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.075, Rules used = {6392, 2214, 2205}

$$\sqrt{2}\, b^2\mathrm{Erf}\left(\sqrt{2}\, bx\right)-\frac{e^{-b^2x^2}\mathrm{Erfc}(bx)}{2x^2}+\frac{be^{-2b^2x^2}}{\sqrt{\pi}\, x}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]/(E^(b^2*x^2)*x^3) + (b^2*Erfc[b*x])/(E^(b^2*x^2)*x),x]
```

```
[Out] b/(E^(2*b^2*x^2)*Sqrt[Pi]*x) + Sqrt[2]*b^2*Erf[Sqrt[2]*b*x] - Erfc[b*x]/(2*
E^(b^2*x^2)*x^2)
```

Rule 2205

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erf[(c + d*x)*Rt[-(b*Log[F]), 2]])/(2*d*Rt[-(b*Log[F]), 2]), x] /; Fr
eeQ[{F, a, b, c, d}, x] && NegQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6392

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfc[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
```

```
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfc[a + b*x], x], x] + Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(-a^2 + c - 2*a*b*x - (b^2 - d)*x^2), x],
x]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int\left(\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^3}+\frac{b^2e^{-b^2x^2}\operatorname{erfc}(bx)}{x}\right)dx &= b^2\int\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x}\,dx+\int\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{x^3}\,dx\\ &= -\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2x^2}-\frac{b\int\frac{e^{-2b^2x^2}}{x^2}\,dx}{\sqrt{\pi}}\\ &= \frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2x^2}+\frac{\left(4b^3\right)\int e^{-2b^2x^2}\,dx}{\sqrt{\pi}}\\ &= \frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}+\sqrt{2}\,b^2\operatorname{erf}\left(\sqrt{2}\,bx\right)-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2x^2}\end{aligned}$$

Mathematica [A] time = 0.10, size = 60, normalized size = 1.00

$$\sqrt{2}\,b^2\operatorname{erf}\left(\sqrt{2}\,bx\right)-\frac{e^{-b^2x^2}\operatorname{erfc}(bx)}{2x^2}+\frac{be^{-2b^2x^2}}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfc[b*x]/(E^(b^2*x^2)*x^3) + (b^2*Erfc[b*x])/(E^(b^2*x^2)*x),x]
```

```
[Out] b/(E^(2*b^2*x^2)*Sqrt[Pi]*x) + Sqrt[2]*b^2*Erf[Sqrt[2]*b*x] - Erfc[b*x]/(2*
E^(b^2*x^2)*x^2)
```

fricas [A] time = 0.43, size = 71, normalized size = 1.18

$$\frac{2\sqrt{2}\,\pi\sqrt{b^2}\,bx^2\operatorname{erf}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)+2\sqrt{\pi}\,bxe^{\left(-2\,b^2x^2\right)}-(\pi-\pi\operatorname{erf}(bx))e^{\left(-b^2x^2\right)}}{2\,\pi x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^3+b^2*erfc(b*x)/exp(b^2*x^2)/x,x, algori
thm="fricas")
```

```
[Out] 1/2*(2*sqrt(2)*pi*sqrt(b^2)*b*x^2*erf(sqrt(2)*sqrt(b^2)*x) + 2*sqrt(pi)*b*x
*e^(-2*b^2*x^2) - (pi - pi*erf(b*x))*e^(-b^2*x^2))/(pi*x^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{b^2 \operatorname{erfc}(bx) e^{(-b^2x^2)}}{x} + \frac{\operatorname{erfc}(bx) e^{(-b^2x^2)}}{x^3} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^3+b^2*erfc(b*x)/exp(b^2*x^2)/x,x, algori
thm="giac")
```

```
[Out] integrate(b^2*erfc(b*x)*e^(-b^2*x^2)/x + erfc(b*x)*e^(-b^2*x^2)/x^3, x)
```

maple [A] time = 0.28, size = 84, normalized size = 1.40

$$\frac{-\frac{b\,e^{-b^2x^2}}{2x^2} + \frac{\operatorname{erf}(bx) b\,e^{-b^2x^2}}{2x^2} - \frac{b^3\left(-\frac{e^{-2b^2x^2}}{bx} - \sqrt{2}\,\sqrt{\pi}\,\operatorname{erf}\left(bx\sqrt{2}\right)\right)}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)/exp(b^2*x^2)/x^3+b^2*erfc(b*x)/exp(b^2*x^2)/x,x)
```

```
[Out] (-1/2*b/exp(b^2*x^2)/x^2+1/2*erf(b*x)*b/exp(b^2*x^2)/x^2-1/Pi^(1/2)*b^3*(-1
/exp(b^2*x^2)^2/b/x-2^(1/2)*Pi^(1/2)*erf(b*x*2^(1/2))))/b
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{b^2 \operatorname{erfc}(bx) e^{(-b^2x^2)}}{x} + \frac{\operatorname{erfc}(bx) e^{(-b^2x^2)}}{x^3} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b^2*x^2)/x^3+b^2*erfc(b*x)/exp(b^2*x^2)/x,x, algori
thm="maxima")
```

```
[Out] integrate(b^2*erfc(b*x)*e^(-b^2*x^2)/x + erfc(b*x)*e^(-b^2*x^2)/x^3, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{e^{-b^2\,x^2}\,\operatorname{erfc}(b\,x)}{x^3} + \frac{b^2\,e^{-b^2\,x^2}\,\operatorname{erfc}(b\,x)}{x} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfc(b*x))/x^3 + (b^2*exp(-b^2*x^2)*erfc(b*x))/x,x)
```

```
[Out] int((exp(-b^2*x^2)*erfc(b*x))/x^3 + (b^2*exp(-b^2*x^2)*erfc(b*x))/x, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\left(b^2x^2+1\right)e^{-b^2x^2}\operatorname{erfc}(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)/exp(b**2*x**2)/x**3+b**2*erfc(b*x)/exp(b**2*x**2)/x,x)
[Out] Integral((b**2*x**2 + 1)*exp(-b**2*x**2)*erfc(b*x)/x**3, x)
```

3.199 $\int \textbf{erfc}(bx)\sin\left(c+ib^2x^2\right)\,dx$

Optimal. Leaf size=91

$$-\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{i\sqrt{\pi}\,e^{ic}\text{erfc}(bx)^2}{8b}+\frac{i\sqrt{\pi}\,e^{-ic}\text{erfi}(bx)}{4b}$$

```
[Out] -1/2*I*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/exp(I*c)/Pi^(1/2)+1
/8*I*exp(I*c)*erfc(b*x)^2*Pi^(1/2)/b+1/4*I*erfi(b*x)*Pi^(1/2)/b/exp(I*c)
```

Rubi [A] time = 0.08, antiderivative size = 91, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6405, 6377, 2204, 6376, 6374, 30}

$$-\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{i\sqrt{\pi}\,e^{ic}\text{Erfc}(bx)^2}{8b}+\frac{i\sqrt{\pi}\,e^{-ic}\text{Erfi}(bx)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]*Sin[c + I*b^2*x^2],x]
```

```
[Out] ((I/8)*E^(I*c)*Sqrt[Pi]*Erfc[b*x]^2)/b + ((I/4)*Sqrt[Pi]*Erfi[b*x])/(b*E^(I
*c)) - ((I/2)*b*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(E^(I*c)*
Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6405

```
Int[Erfc[(b_.)*(x_)]*Sin[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[I/2, Int[
E^(-(I*c) - I*d*x^2)*Erfc[b*x], x], x] - Dist[I/2, Int[E^(I*c + I*d*x^2)*Er
fc[b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erfc}(bx)\sin\left(c+ib^2x^2\right)dx &= -\left(\frac{1}{2}i\int e^{ic-b^2x^2}\operatorname{erfc}(bx)\,dx\right)+\frac{1}{2}i\int e^{-ic+b^2x^2}\operatorname{erfc}(bx)\,dx\\ &= \frac{1}{2}i\int e^{-ic+b^2x^2}\,dx-\frac{1}{2}i\int e^{-ic+b^2x^2}\operatorname{erf}(bx)\,dx+\frac{\left(ie^{ic}\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erfc}(bx\\ &= \frac{ie^{ic}\sqrt{\pi}\operatorname{erfc}(bx)^2}{8b}+\frac{ie^{-ic}\sqrt{\pi}\operatorname{erfi}(bx)}{4b}-\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.67, size = 94, normalized size = 1.03

$$\frac{(\sin(c)+i\cos(c))\left(-4b^2x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)+\pi\left(\operatorname{erf}(bx)^2(\cos(2c)+i\sin(2c))-2\operatorname{erf}(bx)(\cos(2c)+i\sin(2c)\right)\right)}{8\sqrt{\pi}\,b}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Erfc[b*x]*Sin[c + I*b^2*x^2],x]
```

```
[Out] ((I*Cos[c] + Sin[c])*(-4*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^
2] + Pi*(2*Erfi[b*x] - 2*Erf[b*x]*(Cos[2*c] + I*Sin[2*c]) + Erf[b*x]^2*(Cos
[2*c] + I*Sin[2*c]))))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.53, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{1}{2}\left((i\operatorname{erf}(bx)-i)e^{\left(-2\,b^2x^2+2i\,c\right)}-i\operatorname{erf}(bx)+i\right)e^{\left(b^2x^2-i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)*sin(c+I*b^2*x^2),x, algorithm="fricas")
```

```
[Out] integral(1/2*((I*erf(b*x) - I)*e^(-2*b^2*x^2 + 2*I*c) - I*erf(b*x) + I)*e^(
b^2*x^2 - I*c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx)\sin\left(i\,b^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)*sin(c+I*b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)*sin(I*b^2*x^2 + c), x)
```

maple [F] time = 0.23, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx)\sin\left(ib^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)*sin(c+I*b^2*x^2),x)
```

```
[Out] int(erfc(b*x)*sin(c+I*b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\frac{i\sqrt{\pi}\,\cos(c)\operatorname{erfc}(bx)^2}{8\,b}-\frac{\sqrt{\pi}\,\operatorname{erfc}(bx)^2\sin(c)}{8\,b}+\frac{1}{2}i\,\cos(c)\int \operatorname{erfc}(bx)\,e^{\left(b^2x^2\right)}\,dx+\frac{1}{2}\int \operatorname{erfc}(bx)\,e^{\left(b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)*sin(c+I*b^2*x^2),x, algorithm="maxima")
```

```
[Out] 1/8*I*sqrt(pi)*cos(c)*erfc(b*x)^2/b - 1/8*sqrt(pi)*erfc(b*x)^2*sin(c)/b + 1
/2*I*cos(c)*integrate(erfc(b*x)*e^(b^2*x^2), x) + 1/2*integrate(erfc(b*x)*e
^(b^2*x^2), x)*sin(c)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \sin\left(b^2\,x^2\,1\mathrm{i}+c\right)\,\operatorname{erfc}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sin(c + b^2*x^2*1i)*erfc(b*x),x)
```

```
[Out] int(sin(c + b^2*x^2*1i)*erfc(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \sin\left(ib^2x^2 + c\right)\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)*sin(c+I*b**2*x**2),x)
```

```
[Out] Integral(sin(I*b**2*x**2 + c)*erfc(b*x), x)
```

3.200 $\int \textbf{erfc}(bx) \sin\left(c - ib^2x^2\right) \, dx$

Optimal. Leaf size=91

$$\frac{ibe^{ic}x^2 \, {}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}} - \frac{i\sqrt{\pi}\,e^{-ic}\text{erfc}(bx)^2}{8b} - \frac{i\sqrt{\pi}\,e^{ic}\text{erfi}(bx)}{4b}$$

```
[Out] 1/2*I*b*exp(I*c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)-1/
8*I*erfc(b*x)^2*Pi^(1/2)/b/exp(I*c)-1/4*I*exp(I*c)*erfi(b*x)*Pi^(1/2)/b
```

Rubi [A] time = 0.08, antiderivative size = 91, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6405, 6374, 30, 6377, 2204, 6376}

$$\frac{ibe^{ic}x^2 \, {}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}} - \frac{i\sqrt{\pi}\,e^{-ic}\text{Erfc}(bx)^2}{8b} - \frac{i\sqrt{\pi}\,e^{ic}\text{Erfi}(bx)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]*Sin[c - I*b^2*x^2],x]
```

```
[Out] ((-I/8)*Sqrt[Pi]*Erfc[b*x]^2)/(b*E^(I*c)) - ((I/4)*E^(I*c)*Sqrt[Pi]*Erfi[b*
x])/b + ((I/2)*b*E^(I*c)*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/
Sqrt[Pi]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6405

```
Int[Erfc[(b_.)*(x_)]*Sin[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[I/2, Int[
E^(-(I*c) - I*d*x^2)*Erfc[b*x], x], x] - Dist[I/2, Int[E^(I*c + I*d*x^2)*Er
fc[b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erfc}(bx)\sin\left(c-ib^2x^2\right)\,dx &= \frac{1}{2}i\int e^{-ic-b^2x^2}\operatorname{erfc}(bx)\,dx-\frac{1}{2}i\int e^{ic+b^2x^2}\operatorname{erfc}(bx)\,dx\\ &= -\left(\frac{1}{2}i\int e^{ic+b^2x^2}\,dx\right)+\frac{1}{2}i\int e^{ic+b^2x^2}\operatorname{erf}(bx)\,dx-\frac{\left(ie^{-ic}\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erfc}\end{aligned}$$

$$= -\frac{ie^{-ic}\sqrt{\pi}\operatorname{erfc}(bx)^2}{8b}-\frac{ie^{ic}\sqrt{\pi}\operatorname{erfi}(bx)}{4b}+\frac{ibe^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}$$

Mathematica [A] time = 0.55, size = 101, normalized size = 1.11

$$\frac{1}{2}i\left(\frac{bx^2(\cos(c)+i\sin(c))\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{\sqrt{\pi}}-\frac{\sqrt{\pi}\left(\operatorname{erf}(bx)^2(\cos(c)-i\sin(c))-2\operatorname{erf}(bx)(\cos(c)-i\sin(c))+2\right.}{4b}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Erfc[b*x]*Sin[c - I*b^2*x^2],x]
```

```
[Out] (I/2)*(-1/4*(Sqrt[Pi]*(-2*Erf[b*x]*(Cos[c] - I*Sin[c]) + Erf[b*x]^2*(Cos[c]
 - I*Sin[c]) + 2*Erfi[b*x]*(Cos[c] + I*Sin[c])))/b + (b*x^2*HypergeometricP
FQ[{1, 1}, {3/2, 2}, b^2*x^2]*(Cos[c] + I*Sin[c]))/Sqrt[Pi])
```

fricas [F] time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{1}{2}\left((-i\ \text{erf}\,(bx)+i)e^{\left(-2\,b^2x^2-2i\,c\right)}+i\ \text{erf}\,(bx)-i\right)e^{\left(b^2x^2+i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfc(b*x)*sin(-c+I*b^2*x^2),x, algorithm="fricas")
```

```
[Out] integral(1/2*((-I*erf(b*x) + I)*e^(-2*b^2*x^2 - 2*I*c) + I*erf(b*x) - I)*e^
(b^2*x^2 + I*c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int -\text{erfc}\,(bx)\sin\left(i\,b^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfc(b*x)*sin(-c+I*b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(-erfc(b*x)*sin(I*b^2*x^2 - c), x)
```

maple [F] time = 0.19, size = 0, normalized size = 0.00

$$\int -\text{erfc}\,(bx)\sin\left(ib^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-erfc(b*x)*sin(-c+I*b^2*x^2),x)
```

```
[Out] int(-erfc(b*x)*sin(-c+I*b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$-\frac{i\sqrt{\pi}\ \cos(c)\,\text{erfc}\,(bx)^2}{8\,b}-\frac{\sqrt{\pi}\ \text{erfc}\,(bx)^2\sin(c)}{8\,b}-\frac{1}{2}i\ \cos(c)\int\text{erfc}\,(bx)\,e^{\left(b^2x^2\right)}\,dx+\frac{1}{2}\int\text{erfc}\,(bx)\,e^{\left(b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfc(b*x)*sin(-c+I*b^2*x^2),x, algorithm="maxima")
```

```
[Out] -1/8*I*sqrt(pi)*cos(c)*erfc(b*x)^2/b - 1/8*sqrt(pi)*erfc(b*x)^2*sin(c)/b -
1/2*I*cos(c)*integrate(erfc(b*x)*e^(b^2*x^2), x) + 1/2*integrate(erfc(b*x)*
e^(b^2*x^2), x)*sin(c)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int\sin\left(c-b^2\,x^2\,1\mathrm{i}\right)\,\text{erfc}\,(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sin(c - b^2*x^2*1i)*erfc(b*x),x)
[Out] int(sin(c - b^2*x^2*1i)*erfc(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$-\int \sin\left(ib^2x^2 - c\right)\operatorname{erfc}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfc(b*x)*sin(-c+I*b**2*x**2),x)
[Out] -Integral(sin(I*b**2*x**2 - c)*erfc(b*x), x)
```

3.201 $\int \cos\left(c+ib^2x^2\right)\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=85

$$-\frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\sqrt{\pi}\,e^{ic}\text{erfc}(bx)^2}{8b}+\frac{\sqrt{\pi}\,e^{-ic}\text{erfi}(bx)}{4b}$$

```
[Out] -1/2*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/exp(I*c)/Pi^(1/2)-1/8
*exp(I*c)*erfc(b*x)^2*Pi^(1/2)/b+1/4*erfi(b*x)*Pi^(1/2)/b/exp(I*c)
```

Rubi [A] time = 0.07, antiderivative size = 85, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6408, 6377, 2204, 6376, 6374, 30}

$$-\frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\sqrt{\pi}\,e^{ic}\text{Erfc}(bx)^2}{8b}+\frac{\sqrt{\pi}\,e^{-ic}\text{Erfi}(bx)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Cos[c + I*b^2*x^2]*Erfc[b*x],x]
```

```
[Out] -(E^(I*c)*Sqrt[Pi]*Erfc[b*x]^2)/(8*b) + (Sqrt[Pi]*Erfi[b*x])/(4*b*E^(I*c))
- (b*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(2*E^(I*c)*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6408

```
Int[Cos[(c_.) + (d_.)*(x_)^2]*Erfc[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int[
E^(-(I*c) - I*d*x^2)*Erfc[b*x], x], x] + Dist[1/2, Int[E^(I*c + I*d*x^2)*Er
fc[b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \cos\left(c+ib^2x^2\right)\operatorname{erfc}(bx)\,dx &= \frac{1}{2}\int e^{ic-b^2x^2}\operatorname{erfc}(bx)\,dx+\frac{1}{2}\int e^{-ic+b^2x^2}\operatorname{erfc}(bx)\,dx\\ &= \frac{1}{2}\int e^{-ic+b^2x^2}\,dx-\frac{1}{2}\int e^{-ic+b^2x^2}\operatorname{erf}(bx)\,dx-\frac{\left(e^{ic}\sqrt{\pi}\right)\operatorname{Subst}\left(\int x\,dx,x,\operatorname{erfc}(bx)\right)}{4b}\\ &= -\frac{e^{ic}\sqrt{\pi}\operatorname{erfc}(bx)^2}{8b}+\frac{e^{-ic}\sqrt{\pi}\operatorname{erfi}(bx)}{4b}-\frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [F] time = 1.74, size = 0, normalized size = 0.00

$$\int \cos\left(c+ib^2x^2\right)\operatorname{erfc}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Cos[c + I*b^2*x^2]*Erfc[b*x],x]
[Out] Integrate[Cos[c + I*b^2*x^2]*Erfc[b*x], x]
```

fricas [F] time = 0.64, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-\frac{1}{2}\left((\operatorname{erf}(bx)-1)e^{\left(-2\,b^2x^2+2\,i\,c\right)}+\operatorname{erf}(bx)-1\right)e^{\left(b^2x^2-i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b^2*x^2)*erfc(b*x),x, algorithm="fricas")
```

```
[Out] integral(-1/2*((erf(b*x) - 1)*e^(-2*b^2*x^2 + 2*I*c) + erf(b*x) - 1)*e^(b^2
*x^2 - I*c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cos\left(i\,b^2x^2+c\right)\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b^2*x^2)*erfc(b*x),x, algorithm="giac")
```

```
[Out] integrate(cos(I*b^2*x^2 + c)*erfc(b*x), x)
```

maple [F] time = 0.38, size = 0, normalized size = 0.00

$$\int \cos\left(ib^2x^2+c\right)\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(c+I*b^2*x^2)*erfc(b*x),x)
```

```
[Out] int(cos(c+I*b^2*x^2)*erfc(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$-\frac{\sqrt{\pi}\,\cos(c)\operatorname{erfc}(bx)^2}{8\,b}-\frac{i\sqrt{\pi}\,\operatorname{erfc}(bx)^2\sin(c)}{8\,b}+\frac{1}{2}\cos(c)\int \operatorname{erfc}(bx)\,e^{\left(b^2x^2\right)}\,dx-\frac{1}{2}i\int \operatorname{erfc}(bx)\,e^{\left(b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b^2*x^2)*erfc(b*x),x, algorithm="maxima")
```

```
[Out] -1/8*sqrt(pi)*cos(c)*erfc(b*x)^2/b - 1/8*I*sqrt(pi)*erfc(b*x)^2*sin(c)/b +
1/2*cos(c)*integrate(erfc(b*x)*e^(b^2*x^2), x) - 1/2*I*integrate(erfc(b*x)*
e^(b^2*x^2), x)*sin(c)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \cos\left(b^2\,x^2\,1\mathrm{i}+c\right)\,\operatorname{erfc}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(c + b^2*x^2*1i)*erfc(b*x),x)
```

```
[Out] int(cos(c + b^2*x^2*1i)*erfc(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cos\left(ib^2x^2+c\right)\operatorname{erfc}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b**2*x**2)*erfc(b*x),x)
```

```
[Out] Integral(cos(I*b**2*x**2 + c)*erfc(b*x), x)
```

3.202 $\int \cos\left(c - ib^2x^2\right) \mathbf{erfc}(bx)\, dx$

Optimal. Leaf size=85

$$-\frac{be^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}} - \frac{\sqrt{\pi}\,e^{-ic}\mathrm{erfc}(bx)^2}{8b} + \frac{\sqrt{\pi}\,e^{ic}\mathrm{erfi}(bx)}{4b}$$

```
[Out] -1/2*b*exp(I*c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)-1/8
*erfc(b*x)^2*Pi^(1/2)/b/exp(I*c)+1/4*exp(I*c)*erfi(b*x)*Pi^(1/2)/b
```

Rubi [A] time = 0.07, antiderivative size = 85, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6408, 6374, 30, 6377, 2204, 6376}

$$-\frac{be^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}} - \frac{\sqrt{\pi}\,e^{-ic}\mathrm{Erfc}(bx)^2}{8b} + \frac{\sqrt{\pi}\,e^{ic}\mathrm{Erfi}(bx)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Cos[c - I*b^2*x^2]*Erfc[b*x],x]
```

```
[Out] -(Sqrt[Pi]*Erfc[b*x]^2)/(8*b*E^(I*c)) + (E^(I*c)*Sqrt[Pi]*Erfi[b*x])/(4*b)
- (b*E^(I*c)*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(2*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6408

```
Int[Cos[(c_.) + (d_.)*(x_)^2]*Erfc[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int[
E^(-(I*c) - I*d*x^2)*Erfc[b*x], x], x] + Dist[1/2, Int[E^(I*c + I*d*x^2)*Er
fc[b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \cos\left(c-ib^2x^2\right)\text{erfc}(bx)\,dx &= \frac{1}{2}\int e^{-ic-b^2x^2}\text{erfc}(bx)\,dx+\frac{1}{2}\int e^{ic+b^2x^2}\text{erfc}(bx)\,dx\\ &= \frac{1}{2}\int e^{ic+b^2x^2}\,dx-\frac{1}{2}\int e^{ic+b^2x^2}\text{erf}(bx)\,dx-\frac{\left(e^{-ic}\sqrt{\pi}\right)\text{Subst}(\int x\,dx,x,\text{erfc}(bx))}{4b}\\ &= -\frac{e^{-ic}\sqrt{\pi}\,\text{erfc}(bx)^2}{8b}+\frac{e^{ic}\sqrt{\pi}\,\text{erfi}(bx)}{4b}-\frac{be^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [F] time = 1.66, size = 0, normalized size = 0.00

$$\int \cos\left(c-ib^2x^2\right)\text{erfc}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Cos[c - I*b^2*x^2]*Erfc[b*x],x]
[Out] Integrate[Cos[c - I*b^2*x^2]*Erfc[b*x], x]
```

fricas [F] time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{1}{2}\left((\text{erf}\,(bx)-1)e^{\left(-2\,b^2x^2-2i\,c\right)}+\text{erf}\,(bx)-1\right)e^{\left(b^2x^2+i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b^2*x^2)*erfc(b*x),x, algorithm="fricas")
```

```
[Out] integral(-1/2*((erf(b*x) - 1)*e^(-2*b^2*x^2 - 2*I*c) + erf(b*x) - 1)*e^(b^2
*x^2 + I*c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cos\left(i\,b^2x^2-c\right)\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b^2*x^2)*erfc(b*x),x, algorithm="giac")
```

```
[Out] integrate(cos(I*b^2*x^2 - c)*erfc(b*x), x)
```

maple [F] time = 0.32, size = 0, normalized size = 0.00

$$\int \cos\left(ib^2x^2-c\right)\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(-c+I*b^2*x^2)*erfc(b*x),x)
```

```
[Out] int(cos(-c+I*b^2*x^2)*erfc(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$-\frac{\sqrt{\pi}\,\cos(c)\operatorname{erfc}(bx)^2}{8\,b}+\frac{i\,\sqrt{\pi}\,\operatorname{erfc}(bx)^2\sin(c)}{8\,b}+\frac{1}{2}\,\cos(c)\int \operatorname{erfc}(bx)\,e^{\left(b^2x^2\right)}\,dx+\frac{1}{2}i\int \operatorname{erfc}(bx)\,e^{\left(b^2x^2\right)}\,dx\,\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b^2*x^2)*erfc(b*x),x, algorithm="maxima")
```

```
[Out] -1/8*sqrt(pi)*cos(c)*erfc(b*x)^2/b + 1/8*I*sqrt(pi)*erfc(b*x)^2*sin(c)/b +
1/2*cos(c)*integrate(erfc(b*x)*e^(b^2*x^2), x) + 1/2*I*integrate(erfc(b*x)*
e^(b^2*x^2), x)*sin(c)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \cos\left(c-b^2\,x^2\,1\mathrm{i}\right)\,\operatorname{erfc}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(c - b^2*x^2*1i)*erfc(b*x),x)
```

```
[Out] int(cos(c - b^2*x^2*1i)*erfc(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cos \left(ib^2x^2-c\right) \operatorname{erfc}(bx) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b**2*x**2)*erfc(b*x),x)
```

```
[Out] Integral(cos(I*b**2*x**2 - c)*erfc(b*x), x)
```

3.203 $\int \textbf{erfc}(bx)\sinh\left(c+b^2x^2\right)\,dx$

Optimal. Leaf size=75

$$-\frac{be^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{-c}\text{erfc}(bx)^2}{8b}+\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)}{4b}$$

```
[Out] -1/2*b*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)+1/8*e
rfc(b*x)^2*Pi^(1/2)/b/exp(c)+1/4*exp(c)*erfi(b*x)*Pi^(1/2)/b
```

Rubi [A] time = 0.07, antiderivative size = 75, 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 = {6411, 6377, 2204, 6376, 6374, 30}

$$-\frac{be^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{-c}\text{Erfc}(bx)^2}{8b}+\frac{\sqrt{\pi}\,e^c\text{Erfi}(bx)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]*Sinh[c + b^2*x^2],x]
```

```
[Out] (Sqrt[Pi]*Erfc[b*x]^2)/(8*b*E^c) + (E^c*Sqrt[Pi]*Erfi[b*x])/(4*b) - (b*E^c*
x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(2*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6411

```
Int[Erfc[(b_.)*(x_)]*Sinh[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[1/2, Int
[E^(c + d*x^2)*Erfc[b*x], x], x] - Dist[1/2, Int[E^(-c - d*x^2)*Erfc[b*x],
x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erfc}(bx)\sinh\left(c+b^2x^2\right)\,dx &= -\left(\frac{1}{2}\int e^{-c-b^2x^2}\operatorname{erfc}(bx)\,dx\right)+\frac{1}{2}\int e^{c+b^2x^2}\operatorname{erfc}(bx)\,dx\\ &= \frac{1}{2}\int e^{c+b^2x^2}\,dx-\frac{1}{2}\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx+\frac{\left(e^{-c}\sqrt{\pi}\right)\operatorname{Subst}\left(\int x\,dx,x,\operatorname{erfc}(bx)\right)}{4b}\\ &= \frac{e^{-c}\sqrt{\pi}\operatorname{erfc}(bx)^2}{8b}+\frac{e^{c}\sqrt{\pi}\operatorname{erfi}(bx)}{4b}-\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.20, size = 83, normalized size = 1.11

$$\frac{\pi\left(\operatorname{erf}(bx)^2(\cosh(c)-\sinh(c))-2\operatorname{erf}(bx)(\cosh(c)-\sinh(c))+2\operatorname{erfi}(bx)(\sinh(c)+\cosh(c))\right)-4b^2x^2(\sinh(c)+}{8\sqrt{\pi}\,b}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Erfc[b*x]*Sinh[c + b^2*x^2],x]
```

```
[Out] (-4*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2]*(Cosh[c] + Sinh[c]
) + Pi*(-2*Erf[b*x]*(Cosh[c] - Sinh[c]) + Erf[b*x]^2*(Cosh[c] - Sinh[c]) +
2*Erfi[b*x]*(Cosh[c] + Sinh[c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.42, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-(\operatorname{erf}(bx)-1)\sinh\left(b^2x^2+c\right),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)*sinh(b^2*x^2+c),x, algorithm="fricas")
```

```
[Out] integral(-(erf(b*x) - 1)*sinh(b^2*x^2 + c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx)\sinh\left(b^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)*sinh(b^2*x^2+c),x, algorithm="giac")
```

```
[Out] integrate(erfc(b*x)*sinh(b^2*x^2 + c), x)
```

maple [F] time = 0.16, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx)\sinh\left(b^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfc(b*x)*sinh(b^2*x^2+c),x)
```

```
[Out] int(erfc(b*x)*sinh(b^2*x^2+c),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfc}(bx)\sinh\left(b^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)*sinh(b^2*x^2+c),x, algorithm="maxima")
```

```
[Out] integrate(erfc(b*x)*sinh(b^2*x^2 + c), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \sinh\left(b^2\,x^2+c\right)\,\operatorname{erfc}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(c + b^2*x^2)*erfc(b*x),x)
```

```
[Out] int(sinh(c + b^2*x^2)*erfc(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \sinh \left(b^2x^2+c\right) \operatorname{erfc}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfc(b*x)*sinh(b**2*x**2+c),x)
[Out] Integral(sinh(b**2*x**2 + c)*erfc(b*x), x)
```

3.204 $\int \mathbf{erfc}(bx) \sinh\left(c - b^2x^2\right) dx$

Optimal. Leaf size=77

$$\frac{be^{-c}x^2 \,_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}} - \frac{\sqrt{\pi}\, e^c \text{erfc}(bx)^2}{8b} - \frac{\sqrt{\pi}\, e^{-c} \text{erfi}(bx)}{4b}$$

```
[Out] 1/2*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/exp(c)/Pi^(1/2)-1/8*ex
p(c)*erfc(b*x)^2*Pi^(1/2)/b-1/4*erfi(b*x)*Pi^(1/2)/b/exp(c)
```

Rubi [A] time = 0.07, antiderivative size = 77, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6411, 6374, 30, 6377, 2204, 6376}

$$\frac{be^{-c}x^2 \,_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}} - \frac{\sqrt{\pi}\, e^c \text{Erfc}(bx)^2}{8b} - \frac{\sqrt{\pi}\, e^{-c} \text{Erfi}(bx)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfc[b*x]*Sinh[c - b^2*x^2],x]
```

```
[Out] -(E^c*Sqrt[Pi]*Erfc[b*x]^2)/(8*b) - (Sqrt[Pi]*Erfi[b*x])/(4*b*E^c) + (b*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(2*E^c*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6411

```
Int[Erfc[(b_.)*(x_)]*Sinh[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[1/2, Int
[E^(c + d*x^2)*Erfc[b*x], x], x] - Dist[1/2, Int[E^(-c - d*x^2)*Erfc[b*x],
x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\int \operatorname{erfc}(bx)\sinh\left(c-b^2x^2\right)\,dx = \frac{1}{2}\int e^{c-b^2x^2}\operatorname{erfc}(bx)\,dx - \frac{1}{2}\int e^{-c+b^2x^2}\operatorname{erfc}(bx)\,dx$$
$$= -\left(\frac{1}{2}\int e^{-c+b^2x^2}\,dx\right) + \frac{1}{2}\int e^{-c+b^2x^2}\operatorname{erf}(bx)\,dx - \frac{\left(e^c\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx, x, \operatorname{erfc}(b$$
$$= -\frac{e^c\sqrt{\pi}\operatorname{erfc}(bx)^2}{8b} - \frac{e^{-c}\sqrt{\pi}\operatorname{erfi}(bx)}{4b} + \frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}$$

Mathematica [A] time = 0.18, size = 84, normalized size = 1.09

$$-\frac{(\cosh(c)-\sinh(c))\left(\pi\left(\operatorname{erf}(bx)^2(\sinh(2c)+\cosh(2c))-2\operatorname{erf}(bx)(\sinh(2c)+\cosh(2c))+2\operatorname{erfi}(bx)\right)-4b^2x^2\,{}_2}{8\sqrt{\pi}\,b}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Erfc[b*x]*Sinh[c - b^2*x^2],x]
```

```
[Out] -1/8*((Cosh[c] - Sinh[c])*(-4*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b
^2*x^2] + Pi*(2*Erfi[b*x] - 2*Erf[b*x]*(Cosh[2*c] + Sinh[2*c]) + Erf[b*x]^2
*(Cosh[2*c] + Sinh[2*c]))))/(b*Sqrt[Pi])
```

fricas [F] time = 0.53, size = 0, normalized size = 0.00

$$\operatorname{integral}\left((\operatorname{erf}(bx)-1)\sinh\left(b^2x^2-c\right), x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfc(b*x)*sinh(b^2*x^2-c),x, algorithm="fricas")
[Out] integral((erf(b*x) - 1)*sinh(b^2*x^2 - c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int -\operatorname{erfc}(bx)\sinh\left(b^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfc(b*x)*sinh(b^2*x^2-c),x, algorithm="giac")
[Out] integrate(-erfc(b*x)*sinh(b^2*x^2 - c), x)
```

maple [F] time = 0.14, size = 0, normalized size = 0.00

$$\int -\operatorname{erfc}(bx)\sinh\left(b^2x^2-c\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-erfc(b*x)*sinh(b^2*x^2-c),x)
[Out] int(-erfc(b*x)*sinh(b^2*x^2-c),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$-\int \operatorname{erfc}(bx)\sinh\left(b^2x^2-c\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfc(b*x)*sinh(b^2*x^2-c),x, algorithm="maxima")
[Out] -integrate(erfc(b*x)*sinh(b^2*x^2 - c), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \sinh\left(c-b^2\,x^2\right)\,\operatorname{erfc}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(c - b^2*x^2)*erfc(b*x),x)
[Out] int(sinh(c - b^2*x^2)*erfc(b*x), x)
```

sympy **[F]** time = 0.00, size = 0, normalized size = 0.00

$$-\int \sinh\left(b^2x^2-c\right)\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfc(b*x)*sinh(b**2*x**2-c),x)
```

```
[Out] -Integral(sinh(b**2*x**2 - c)*erfc(b*x), x)
```

3.205 $\int \cosh\left(c+b^2x^2\right)\mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=75

$$-\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\sqrt{\pi}\,e^{-c}\text{erfc}(bx)^2}{8b}+\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)}{4b}$$

```
[Out] -1/2*b*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/Pi^(1/2)-1/8*e
rfc(b*x)^2*Pi^(1/2)/b/exp(c)+1/4*exp(c)*erfi(b*x)*Pi^(1/2)/b
```

Rubi [A] time = 0.07, antiderivative size = 75, 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 = {6414, 6377, 2204, 6376, 6374, 30}

$$-\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\sqrt{\pi}\,e^{-c}\text{Erfc}(bx)^2}{8b}+\frac{\sqrt{\pi}\,e^c\text{Erfi}(bx)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[c + b^2*x^2]*Erfc[b*x],x]
```

```
[Out] -(Sqrt[Pi]*Erfc[b*x]^2)/(8*b*E^c) + (E^c*Sqrt[Pi]*Erfi[b*x])/(4*b) - (b*E^c
*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(2*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6414

```
Int[Cosh[(c_.) + (d_.)*(x_)^2]*Erfc[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int
[E^(c + d*x^2)*Erfc[b*x], x], x] + Dist[1/2, Int[E^(-c - d*x^2)*Erfc[b*x],
x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\begin{aligned}\int \cosh\left(c+b^2x^2\right)\operatorname{erfc}(bx)\,dx &= \frac{1}{2}\int e^{-c-b^2x^2}\operatorname{erfc}(bx)\,dx+\frac{1}{2}\int e^{c+b^2x^2}\operatorname{erfc}(bx)\,dx\\ &= \frac{1}{2}\int e^{c+b^2x^2}\,dx-\frac{1}{2}\int e^{c+b^2x^2}\operatorname{erf}(bx)\,dx-\frac{\left(e^{-c}\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erfc}(bx))}{4b}\\ &= -\frac{e^{-c}\sqrt{\pi}\operatorname{erfc}(bx)^2}{8b}+\frac{e^{c}\sqrt{\pi}\operatorname{erfi}(bx)}{4b}-\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.13, size = 114, normalized size = 1.52

$$\frac{-4b^2x^2\sinh(c)\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)+4b^2x^2\cosh(c)\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)+\pi\left(-2\operatorname{erf}(bx)(\cosh(c)\operatorname{erfi}(bx)+\sinh\right.}{8\sqrt{\pi}\,b}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Cosh[c + b^2*x^2]*Erfc[b*x],x]
```

```
[Out] (4*b^2*x^2*Cosh[c]*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)] - 4*b^2*
x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2]*Sinh[c] + Pi*(Erf[b*x]^2*(
-Cosh[c] + Sinh[c]) + 2*Erfi[b*x]*(Cosh[c] + Sinh[c]) - 2*Erf[b*x]*(-Cosh[c
] + Cosh[c]*Erfi[b*x] + Sinh[c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.48, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-\cosh\left(b^2x^2+c\right)\operatorname{erf}(bx)+\cosh\left(b^2x^2+c\right),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2+c)*erfc(b*x),x, algorithm="fricas")
[Out] integral(-cosh(b^2*x^2 + c)*erf(b*x) + cosh(b^2*x^2 + c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erfc}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2+c)*erfc(b*x),x, algorithm="giac")
[Out] integrate(cosh(b^2*x^2 + c)*erfc(b*x), x)
```

maple [F] time = 0.30, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erfc}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(b^2*x^2+c)*erfc(b*x),x)
[Out] int(cosh(b^2*x^2+c)*erfc(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erfc}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2+c)*erfc(b*x),x, algorithm="maxima")
[Out] integrate(cosh(b^2*x^2 + c)*erfc(b*x), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \cosh\left(b^2\,x^2+c\right)\,\operatorname{erfc}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(c + b^2*x^2)*erfc(b*x),x)
[Out] int(cosh(c + b^2*x^2)*erfc(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2 + c\right) \operatorname{erfc}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b**2*x**2+c)*erfc(b*x),x)
```

```
[Out] Integral(cosh(b**2*x**2 + c)*erfc(b*x), x)
```

3.206 $\int \cosh\left(c-b^2x^2\right) \mathbf{erfc}(bx)\,dx$

Optimal. Leaf size=77

$$-\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\sqrt{\pi}\,e^c\text{erfc}(bx)^2}{8b}+\frac{\sqrt{\pi}\,e^{-c}\text{erfi}(bx)}{4b}$$

```
[Out] -1/2*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],b^2*x^2)/exp(c)/Pi^(1/2)-1/8*e
xp(c)*erfc(b*x)^2*Pi^(1/2)/b+1/4*erfi(b*x)*Pi^(1/2)/b/exp(c)
```

Rubi [A] time = 0.07, antiderivative size = 77, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6414, 6374, 30, 6377, 2204, 6376}

$$-\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}-\frac{\sqrt{\pi}\,e^c\text{Erfc}(bx)^2}{8b}+\frac{\sqrt{\pi}\,e^{-c}\text{Erfi}(bx)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[c - b^2*x^2]*Erfc[b*x],x]
```

```
[Out] -(E^c*Sqrt[Pi]*Erfc[b*x]^2)/(8*b) + (Sqrt[Pi]*Erfi[b*x])/(4*b*E^c) - (b*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/(2*E^c*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6374

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)]^(n_.), x_Symbol] :> -Dist[(E^
c*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfc[b*x]], x] /; FreeQ[{b, c, d,
n}, x] && EqQ[d, -b^2]
```

Rule 6376

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erf[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2*
HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[{b, c,
d}, x] && EqQ[d, b^2]
```

Rule 6377

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfc[(b_.)*(x_)], x_Symbol] :> Int[E^(c + d*x^
2), x] - Int[E^(c + d*x^2)*Erf[b*x], x] /; FreeQ[{b, c, d}, x] && EqQ[d, b^
2]
```

Rule 6414

```
Int[Cosh[(c_.) + (d_.)*(x_)^2]*Erfc[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int
[E^(c + d*x^2)*Erfc[b*x], x], x] + Dist[1/2, Int[E^(-c - d*x^2)*Erfc[b*x],
x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\begin{aligned}\int \cosh\left(c-b^2x^2\right)\mathrm{erfc}(bx)\,dx &= \frac{1}{2}\int e^{c-b^2x^2}\mathrm{erfc}(bx)\,dx+\frac{1}{2}\int e^{-c+b^2x^2}\mathrm{erfc}(bx)\,dx\\ &= \frac{1}{2}\int e^{-c+b^2x^2}\,dx-\frac{1}{2}\int e^{-c+b^2x^2}\mathrm{erf}(bx)\,dx-\frac{\left(e^c\sqrt{\pi}\right)\mathrm{Subst}(\int x\,dx,x,\mathrm{erfc}(bx))}{4b}\\ &= -\frac{e^c\sqrt{\pi}\,\mathrm{erfc}(bx)^2}{8b}+\frac{e^{-c}\sqrt{\pi}\,\mathrm{erfi}(bx)}{4b}-\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.13, size = 117, normalized size = 1.52

$$\frac{4b^2x^2\sinh(c)\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)+4b^2x^2\cosh(c)\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)-\pi\left(2\mathrm{erf}(bx)(\cosh(c)\mathrm{erfi}(bx)-\sinh(c)\right.}{8\sqrt{\pi}\,b}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Cosh[c - b^2*x^2]*Erfc[b*x],x]
```

```
[Out] (4*b^2*x^2*Cosh[c]*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)] + 4*b^2*
x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2]*Sinh[c] - Pi*(2*Erf[b*x]*(
-Cosh[c] + Cosh[c]*Erfi[b*x] - Sinh[c]) + 2*Erfi[b*x]*(-Cosh[c] + Sinh[c])
+ Erf[b*x]^2*(Cosh[c] + Sinh[c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.50, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(-\cosh\left(b^2x^2-c\right)\mathrm{erf}\left(bx\right)+\cosh\left(b^2x^2-c\right),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2-c)*erfc(b*x),x, algorithm="fricas")
[Out] integral(-cosh(b^2*x^2 - c)*erf(b*x) + cosh(b^2*x^2 - c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2-c)*erfc(b*x),x, algorithm="giac")
[Out] integrate(cosh(b^2*x^2 - c)*erfc(b*x), x)
```

maple [F] time = 0.28, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(b^2*x^2-c)*erfc(b*x),x)
[Out] int(cosh(b^2*x^2-c)*erfc(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erfc}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2-c)*erfc(b*x),x, algorithm="maxima")
[Out] integrate(cosh(b^2*x^2 - c)*erfc(b*x), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \cosh\left(c-b^2\,x^2\right)\,\operatorname{erfc}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(c - b^2*x^2)*erfc(b*x),x)
[Out] int(cosh(c - b^2*x^2)*erfc(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh \left(b^2x^2 - c\right) \operatorname{erfc}(bx) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b**2*x**2-c)*erfc(b*x),x)
```

```
[Out] Integral(cosh(b**2*x**2 - c)*erfc(b*x), x)
```

3.207 $\int x^5 \mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=93

$$\frac{5\mathrm{erfi}(bx)}{16b^6}-\frac{x^5e^{b^2x^2}}{6\sqrt{\pi}\,b}-\frac{5xe^{b^2x^2}}{8\sqrt{\pi}\,b^5}+\frac{5x^3e^{b^2x^2}}{12\sqrt{\pi}\,b^3}+\frac{1}{6}x^6\mathrm{erfi}(bx)$$

```
[Out] 5/16*erfi(b*x)/b^6+1/6*x^6*erfi(b*x)-5/8*exp(b^2*x^2)*x/b^5/Pi^(1/2)+5/12*e
xp(b^2*x^2)*x^3/b^3/Pi^(1/2)-1/6*exp(b^2*x^2)*x^5/b/Pi^(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 93, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2212, 2204}

$$\frac{5\mathrm{Erfi}(bx)}{16b^6}-\frac{x^5e^{b^2x^2}}{6\sqrt{\pi}\,b}+\frac{5x^3e^{b^2x^2}}{12\sqrt{\pi}\,b^3}-\frac{5xe^{b^2x^2}}{8\sqrt{\pi}\,b^5}+\frac{1}{6}x^6\mathrm{Erfi}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^5*Erfi[b*x],x]
```

```
[Out] (-5*E^(b^2*x^2)*x)/(8*b^5*Sqrt[Pi]) + (5*E^(b^2*x^2)*x^3)/(12*b^3*Sqrt[Pi])
 - (E^(b^2*x^2)*x^5)/(6*b*Sqrt[Pi]) + (5*Erfi[b*x])/(16*b^6) + (x^6*Erfi[b*
x])/6
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int x^5\operatorname{erfi}(bx)\,dx &= \frac{1}{6}x^6\operatorname{erfi}(bx) - \frac{b\int e^{b^2x^2}x^6\,dx}{3\sqrt{\pi}}\\
&= -\frac{e^{b^2x^2}x^5}{6b\sqrt{\pi}} + \frac{1}{6}x^6\operatorname{erfi}(bx) + \frac{5\int e^{b^2x^2}x^4\,dx}{6b\sqrt{\pi}}\\
&= \frac{5e^{b^2x^2}x^3}{12b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^5}{6b\sqrt{\pi}} + \frac{1}{6}x^6\operatorname{erfi}(bx) - \frac{5\int e^{b^2x^2}x^2\,dx}{4b^3\sqrt{\pi}}\\
&= -\frac{5e^{b^2x^2}x}{8b^5\sqrt{\pi}} + \frac{5e^{b^2x^2}x^3}{12b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^5}{6b\sqrt{\pi}} + \frac{1}{6}x^6\operatorname{erfi}(bx) + \frac{5\int e^{b^2x^2}\,dx}{8b^5\sqrt{\pi}}\\
&= -\frac{5e^{b^2x^2}x}{8b^5\sqrt{\pi}} + \frac{5e^{b^2x^2}x^3}{12b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^5}{6b\sqrt{\pi}} + \frac{5\operatorname{erfi}(bx)}{16b^6} + \frac{1}{6}x^6\operatorname{erfi}(bx)
\end{aligned}
$$

Mathematica [A] time = 0.04, size = 64, normalized size = 0.69

$$\frac{\sqrt{\pi}\left(8b^6x^6+15\right)\operatorname{erfi}(bx)-2bxe^{b^2x^2}\left(4b^4x^4-10b^2x^2+15\right)}{48\sqrt{\pi}\,b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*Erfi[b*x],x]
```

```
[Out] (-2*b*E^(b^2*x^2)*x*(15 - 10*b^2*x^2 + 4*b^4*x^4) + Sqrt[Pi]*(15 + 8*b^6*x^
6)*Erfi[b*x])/(48*b^6*Sqrt[Pi])
```

fricas [A] time = 0.42, size = 62, normalized size = 0.67

$$-\frac{2\sqrt{\pi}\left(4\,b^5x^5-10\,b^3x^3+15\,bx\right)e^{\left(b^2x^2\right)}-\left(15\,\pi+8\,\pi b^6x^6\right)\operatorname{erfi}\left(bx\right)}{48\,\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfi(b*x),x, algorithm="fricas")
```

```
[Out] -1/48*(2*sqrt(pi)*(4*b^5*x^5 - 10*b^3*x^3 + 15*b*x)*e^(b^2*x^2) - (15*pi +
8*pi*b^6*x^6)*erfi(b*x))/(pi*b^6)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5 \operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^5*erfi(b*x), x)
```

maple [A] time = 0.01, size = 77, normalized size = 0.83

$$\frac{\frac{b^6x^6\operatorname{erfi}(bx)}{6}-\frac{\frac{e^{b^2x^2}b^5x^5}{2}-\frac{5\,e^{b^2x^2}b^3x^3}{4}+\frac{15\,e^{b^2x^2}bx}{8}-\frac{15\sqrt{\pi}\,\operatorname{erfi}(bx)}{16}}{3\sqrt{\pi}}}{b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfi(b*x),x)
```

```
[Out] 1/b^6*(1/6*b^6*x^6*erfi(b*x)-1/3/Pi^(1/2)*(1/2*exp(b^2*x^2)*b^5*x^5-5/4*exp
(b^2*x^2)*b^3*x^3+15/8*exp(b^2*x^2)*b*x-15/16*Pi^(1/2)*erfi(b*x)))
```

maxima [C] time = 0.32, size = 63, normalized size = 0.68

$$\frac{1}{6}\,x^6\operatorname{erfi}(bx)-\frac{b\left(\frac{2\left(4\,b^4x^5-10\,b^2x^3+15\,x\right)e^{\left(b^2x^2\right)}}{b^6}+\frac{15i\,\sqrt{\pi}\,\operatorname{erf}(i\,bx)}{b^7}\right)}{48\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfi(b*x),x, algorithm="maxima")
```

```
[Out] 1/6*x^6*erfi(b*x) - 1/48*b*(2*(4*b^4*x^5 - 10*b^2*x^3 + 15*x)*e^(b^2*x^2)/b
^6 + 15*I*sqrt(pi)*erf(I*b*x)/b^7)/sqrt(pi)
```

mupad [B] time = 0.12, size = 108, normalized size = 1.16

$$\frac{x^6\operatorname{erfi}(b\,x)}{6}-\frac{5\,b\,x^7}{16\left(-b^2\,x^2\right)^{7/2}}-\frac{x^5\,e^{b^2\,x^2}}{6\,b\,\sqrt{\pi}}+\frac{5\,x^3\,e^{b^2\,x^2}}{12\,b^3\,\sqrt{\pi}}-\frac{5\,x\,e^{b^2\,x^2}}{8\,b^5\,\sqrt{\pi}}+\frac{5\,b\,x^7\operatorname{erfc}\left(\sqrt{-b^2\,x^2}\right)}{16\left(-b^2\,x^2\right)^{7/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfi(b*x),x)
```

```
[Out] (x^6*erfi(b*x))/6 - (5*b*x^7)/(16*(-b^2*x^2)^(7/2)) - (x^5*exp(b^2*x^2))/(6
*b*pi^(1/2)) + (5*x^3*exp(b^2*x^2))/(12*b^3*pi^(1/2)) - (5*x*exp(b^2*x^2))/
(8*b^5*pi^(1/2)) + (5*b*x^7*erfc((-b^2*x^2)^(1/2)))/(16*(-b^2*x^2)^(7/2))
```

sympy [A] time = 2.65, size = 88, normalized size = 0.95

$$\begin{cases} \frac{x^6\operatorname{erfi}(bx)}{6} - \frac{x^5e^{b^2x^2}}{6\sqrt{\pi}\,b} + \frac{5x^3e^{b^2x^2}}{12\sqrt{\pi}\,b^3} - \frac{5xe^{b^2x^2}}{8\sqrt{\pi}\,b^5} + \frac{5\operatorname{erfi}(bx)}{16b^6} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*erfi(b*x),x)
```

```
[Out] Piecewise((x**6*erfi(b*x)/6 - x**5*exp(b**2*x**2)/(6*sqrt(pi)*b) + 5*x**3*e
xp(b**2*x**2)/(12*sqrt(pi)*b**3) - 5*x*exp(b**2*x**2)/(8*sqrt(pi)*b**5) + 5
*erfi(b*x)/(16*b**6), Ne(b, 0)), (0, True))
```

3.208 $\int x^3 \mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=69

$$-\frac{3\text{erfi}(bx)}{16b^4}-\frac{x^3e^{b^2x^2}}{4\sqrt{\pi}\,b}+\frac{3xe^{b^2x^2}}{8\sqrt{\pi}\,b^3}+\frac{1}{4}x^4\text{erfi}(bx)$$

```
[Out] -3/16*erfi(b*x)/b^4+1/4*x^4*erfi(b*x)+3/8*exp(b^2*x^2)*x/b^3/Pi^(1/2)-1/4*e
xp(b^2*x^2)*x^3/b/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2212, 2204}

$$-\frac{3\text{Erfi}(bx)}{16b^4}-\frac{x^3e^{b^2x^2}}{4\sqrt{\pi}\,b}+\frac{3xe^{b^2x^2}}{8\sqrt{\pi}\,b^3}+\frac{1}{4}x^4\text{Erfi}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^3*Erfi[b*x],x]
```

```
[Out] (3*E^(b^2*x^2)*x)/(8*b^3*Sqrt[Pi]) - (E^(b^2*x^2)*x^3)/(4*b*Sqrt[Pi]) - (3*
Erfi[b*x])/(16*b^4) + (x^4*Erfi[b*x])/4
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int x^3\mathrm{erfi}(bx)\,dx &= \frac{1}{4}x^4\mathrm{erfi}(bx) - \frac{b\int e^{b^2x^2}x^4\,dx}{2\sqrt{\pi}}\\
&= -\frac{e^{b^2x^2}x^3}{4b\sqrt{\pi}} + \frac{1}{4}x^4\mathrm{erfi}(bx) + \frac{3\int e^{b^2x^2}x^2\,dx}{4b\sqrt{\pi}}\\
&= \frac{3e^{b^2x^2}x}{8b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^3}{4b\sqrt{\pi}} + \frac{1}{4}x^4\mathrm{erfi}(bx) - \frac{3\int e^{b^2x^2}\,dx}{8b^3\sqrt{\pi}}\\
&= \frac{3e^{b^2x^2}x}{8b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^3}{4b\sqrt{\pi}} - \frac{3\mathrm{erfi}(bx)}{16b^4} + \frac{1}{4}x^4\mathrm{erfi}(bx)
\end{aligned}
$$

Mathematica [A] time = 0.04, size = 51, normalized size = 0.74

$$
\frac{\left(4b^4x^4-3\right)\mathrm{erfi}(bx) - \frac{2bxe^{b^2x^2}\left(2b^2x^2-3\right)}{\sqrt{\pi}}}{16b^4}
$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*Erfi[b*x],x]
```

```
[Out] ((-2*b*E^(b^2*x^2)*x*(-3 + 2*b^2*x^2))/Sqrt[Pi] + (-3 + 4*b^4*x^4)*Erfi[b*x
])/(16*b^4)
```

fricas [A] time = 0.47, size = 53, normalized size = 0.77

$$
-\frac{2\sqrt{\pi}\left(2\,b^3x^3-3\,bx\right)e^{\left(b^2x^2\right)} + \left(3\,\pi-4\,\pi b^4x^4\right)\mathrm{erfi}\left(bx\right)}{16\,\pi b^4}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfi(b*x),x, algorithm="fricas")
```

```
[Out] -1/16*(2*sqrt(pi)*(2*b^3*x^3 - 3*b*x)*e^(b^2*x^2) + (3*pi - 4*pi*b^4*x^4)*e
rfi(b*x))/(pi*b^4)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$
\int x^3\,\mathrm{erfi}\left(bx\right)\,dx
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^3*erfi(b*x), x)
```

maple [A] time = 0.00, size = 61, normalized size = 0.88

$$\frac{\frac{b^4x^4\operatorname{erfi}(bx)}{4}-\frac{\frac{e^{b^2x^2}b^3x^3}{2}-\frac{3\,e^{b^2x^2}bx}{4}+\frac{3\sqrt{\pi}\,\operatorname{erfi}(bx)}{8}}{2\sqrt{\pi}}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfi(b*x),x)
```

```
[Out] 1/b^4*(1/4*b^4*x^4*erfi(b*x)-1/2/Pi^(1/2)*(1/2*exp(b^2*x^2)*b^3*x^3-3/4*exp
(b^2*x^2)*b*x+3/8*Pi^(1/2)*erfi(b*x)))
```

maxima [C] time = 0.31, size = 55, normalized size = 0.80

$$\frac{1}{4}x^4\operatorname{erfi}(bx)-\frac{b\left(\frac{2\left(2b^2x^3-3x\right)e^{\left(b^2x^2\right)}}{b^4}-\frac{3i\sqrt{\pi}\,\operatorname{erf}(i\,bx)}{b^5}\right)}{16\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfi(b*x),x, algorithm="maxima")
```

```
[Out] 1/4*x^4*erfi(b*x) - 1/16*b*(2*(2*b^2*x^3 - 3*x)*e^(b^2*x^2)/b^4 - 3*I*sqrt(
pi)*erf(I*b*x)/b^5)/sqrt(pi)
```

mupad [B] time = 0.09, size = 89, normalized size = 1.29

$$\frac{x^4\operatorname{erfi}(b\,x)}{4}-\frac{3\,b\,x^5}{16\left(-b^2\,x^2\right)^{5/2}}-\frac{x^3\,e^{b^2\,x^2}}{4\,b\,\sqrt{\pi}}+\frac{3\,x\,e^{b^2\,x^2}}{8\,b^3\,\sqrt{\pi}}+\frac{3\,b\,x^5\,\operatorname{erfc}\left(\sqrt{-b^2\,x^2}\right)}{16\left(-b^2\,x^2\right)^{5/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfi(b*x),x)
```

```
[Out] (x^4*erfi(b*x))/4 - (3*b*x^5)/(16*(-b^2*x^2)^(5/2)) - (x^3*exp(b^2*x^2))/(4
*b*pi^(1/2)) + (3*x*exp(b^2*x^2))/(8*b^3*pi^(1/2)) + (3*b*x^5*erfc((-b^2*x^
2)^(1/2)))/(16*(-b^2*x^2)^(5/2))
```

sympy [A] time = 0.80, size = 65, normalized size = 0.94

$$\begin{cases}\frac{x^4\operatorname{erfi}(bx)}{4}-\frac{x^3e^{b^2x^2}}{4\sqrt{\pi}\,b}+\frac{3xe^{b^2x^2}}{8\sqrt{\pi}\,b^3}-\frac{3\operatorname{erfi}(bx)}{16b^4} & \text{for } b\neq 0\\ 0 & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*erfi(b*x),x)
```

```
[Out] Piecewise((x**4*erfi(b*x)/4 - x**3*exp(b**2*x**2)/(4*sqrt(pi)*b) + 3*x*exp(
b**2*x**2)/(8*sqrt(pi)*b**3) - 3*erfi(b*x)/(16*b**4), Ne(b, 0)), (0, True))
```

3.209 $\int x \textbf{erfi}(bx)\,dx$

Optimal. Leaf size=45

$$\frac{\text{erfi}(bx)}{4b^2} - \frac{xe^{b^2x^2}}{2\sqrt{\pi}\,b} + \frac{1}{2}x^2\text{erfi}(bx)$$

```
[Out] 1/4*erfi(b*x)/b^2+1/2*x^2*erfi(b*x)-1/2*exp(b^2*x^2)*x/b/Pi^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 45, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6363, 2212, 2204}

$$\frac{\text{Erfi}(bx)}{4b^2} - \frac{xe^{b^2x^2}}{2\sqrt{\pi}\,b} + \frac{1}{2}x^2\text{Erfi}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x*Erfi[b*x],x]
```

```
[Out] -(E^(b^2*x^2)*x)/(2*b*Sqrt[Pi]) + Erfi[b*x]/(4*b^2) + (x^2*Erfi[b*x])/2
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x\text{erfi}(bx)\,dx = \frac{1}{2}x^2\text{erfi}(bx) - \frac{b\int e^{b^2x^2}x^2\,dx}{\sqrt{\pi}}$$
$$= -\frac{e^{b^2x^2}x}{2b\sqrt{\pi}} + \frac{1}{2}x^2\text{erfi}(bx) + \frac{\int e^{b^2x^2}\,dx}{2b\sqrt{\pi}}$$
$$= -\frac{e^{b^2x^2}x}{2b\sqrt{\pi}} + \frac{\text{erfi}(bx)}{4b^2} + \frac{1}{2}x^2\text{erfi}(bx)$$

Mathematica [A] time = 0.04, size = 39, normalized size = 0.87

$$\frac{1}{4}\left(\left(\frac{1}{b^2}+2x^2\right)\text{erfi}(bx) - \frac{2xe^{b^2x^2}}{\sqrt{\pi}\,b}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Erfi[b*x],x]
[Out] ((-2*E^(b^2*x^2)*x)/(b*Sqrt[Pi]) + (b^(-2) + 2*x^2)*Erfi[b*x])/4
```

fricas [A] time = 1.18, size = 41, normalized size = 0.91

$$-\frac{2\sqrt{\pi}\,bxe^{\left(b^2x^2\right)} - \left(\pi + 2\,\pi b^2x^2\right)\text{erfi}\left(bx\right)}{4\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x),x, algorithm="fricas")
[Out] -1/4*(2*sqrt(pi)*b*x*e^(b^2*x^2) - (pi + 2*pi*b^2*x^2)*erfi(b*x))/(pi*b^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{erfi}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x),x, algorithm="giac")
[Out] integrate(x*erfi(b*x), x)
```

maple [A] time = 0.00, size = 45, normalized size = 1.00

$$\frac{\frac{b^2x^2\,\mathrm{erfi}(bx)}{2}-\frac{\frac{\mathrm{e}^{b^2x^2}bx}{2}-\frac{\sqrt{\pi}\,\mathrm{erfi}(bx)}{4}}{\sqrt{\pi}}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfi(b*x),x)
```

```
[Out] 1/b^2*(1/2*b^2*x^2*erfi(b*x)-1/Pi^(1/2)*(1/2*exp(b^2*x^2)*b*x-1/4*Pi^(1/2)*
erfi(b*x)))
```

maxima [C] time = 0.33, size = 44, normalized size = 0.98

$$\frac{1}{2}\,x^2\,\mathrm{erfi}\,(bx)-\frac{b\left(\frac{2\,xe^{\left(b^2x^2\right)}}{b^2}+\frac{i\,\sqrt{\pi}\,\mathrm{erf}(i\,bx)}{b^3}\right)}{4\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*erfi(b*x) - 1/4*b*(2*x*e^(b^2*x^2)/b^2 + I*sqrt(pi)*erf(I*b*x)/b^3)
/sqrt(pi)
```

mupad [B] time = 0.19, size = 43, normalized size = 0.96

$$\frac{x^2\,\mathrm{erfi}\,(b\,x)}{2}+\frac{b\,\mathrm{erfi}\left(x\,\sqrt{b^2}\right)}{4\,\left(b^2\right)^{3/2}}-\frac{x\,\mathrm{e}^{b^2\,x^2}}{2\,b\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfi(b*x),x)
```

```
[Out] (x^2*erfi(b*x))/2 + (b*erfi(x*(b^2)^(1/2)))/(4*(b^2)^(3/2)) - (x*exp(b^2*x^
2))/(2*b*pi^(1/2))
```

sympy [A] time = 0.19, size = 39, normalized size = 0.87

$$\begin{cases}\frac{x^2\,\mathrm{erfi}\,(bx)}{2}-\frac{xe^{b^2x^2}}{2\sqrt{\pi}\,b}+\frac{\mathrm{erfi}\,(bx)}{4b^2} & \text{for } b\neq 0\\ 0 & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x),x)
```

```
[Out] Piecewise((x**2*erfi(b*x)/2 - x*exp(b**2*x**2)/(2*sqrt(pi)*b) + erfi(b*x)/(
4*b**2), Ne(b, 0)), (0, True))
```

3.210 $\int \frac{\textbf{erfi}(bx)}{x}\,dx$

Optimal. Leaf size=31

$$\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

```
[Out] 2*b*x*HypergeometricPFQ([1/2, 1/2],[3/2, 3/2],b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.01, antiderivative size = 31, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.125, Rules used = {6360}

$$\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/x,x]
```

```
[Out] (2*b*x*HypergeometricPFQ[{1/2, 1/2}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi]
```

Rule 6360

```
Int[Erfi[(b_.)*(x_)]/(x_), x_Symbol] :> Simp[(2*b*x*HypergeometricPFQ[{1/2,
 1/2}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi], x] /; FreeQ[b, x]
```

Rubi steps

$$\int \frac{\text{erfi}(bx)}{x}\,dx = \frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

Mathematica [A] time = 0.02, size = 31, normalized size = 1.00

$$\frac{2bx\,{}_2F_2\left(\frac{1}{2},\frac{1}{2};\frac{3}{2},\frac{3}{2};b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/x,x]
```

```
[Out] (2*b*x*HypergeometricPFQ[{1/2, 1/2}, {3/2, 3/2}, b^2*x^2])/Sqrt[Pi]
```

fricas [F] time = 0.41, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x,x, algorithm="fricas")
[Out] integral(erfi(b*x)/x, x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x,x, algorithm="giac")
[Out] integrate(erfi(b*x)/x, x)
```

maple [A] time = 0.02, size = 22, normalized size = 0.71

$$\frac{2bx\,\text{hypergeom}\left(\left[\frac{1}{2}, \frac{1}{2}\right], \left[\frac{3}{2}, \frac{3}{2}\right], b^2x^2\right)}{\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x,x)
[Out] 2/Pi^(1/2)*b*x*hypergeom([1/2,1/2],[3/2,3/2],b^2*x^2)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x,x, algorithm="maxima")
[Out] integrate(erfi(b*x)/x, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.03

$$\int \frac{\text{erfi}\,(b\,x)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x,x)
```

```
[Out] int(erfi(b*x)/x, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x,x)
```

```
[Out] Exception raised: AttributeError
```

3.211 $\int \frac{\mathbf{erfi}(bx)}{x^3}\, dx$

Optimal. Leaf size=40

$$b^2\text{erfi}(bx) - \frac{be^{b^2x^2}}{\sqrt{\pi}\,x} - \frac{\text{erfi}(bx)}{2x^2}$$

```
[Out] b^2*erfi(b*x)-1/2*erfi(b*x)/x^2-b*exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.04, antiderivative size = 40, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2214, 2204}

$$b^2\text{Erfi}(bx) - \frac{be^{b^2x^2}}{\sqrt{\pi}\,x} - \frac{\text{Erfi}(bx)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/x^3,x]
```

```
[Out] -((b*E^(b^2*x^2))/(Sqrt[Pi]*x)) + b^2*Erfi[b*x] - Erfi[b*x]/(2*x^2)
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\text{erfi}(bx)}{x^3}\,dx &= -\frac{\text{erfi}(bx)}{2x^2} + \frac{b\int \frac{e^{b^2x^2}}{x^2}\,dx}{\sqrt{\pi}} \\
&= -\frac{be^{b^2x^2}}{\sqrt{\pi}\,x} - \frac{\text{erfi}(bx)}{2x^2} + \frac{(2b^3)\int e^{b^2x^2}\,dx}{\sqrt{\pi}} \\
&= -\frac{be^{b^2x^2}}{\sqrt{\pi}\,x} + b^2\text{erfi}(bx) - \frac{\text{erfi}(bx)}{2x^2}
\end{aligned}
$$

Mathematica [**A**] time = 0.03, size = 37, normalized size = 0.92

$$
\left(b^2 - \frac{1}{2x^2}\right)\text{erfi}(bx) - \frac{be^{b^2x^2}}{\sqrt{\pi}\,x}
$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/x^3,x]
[Out] -((b*E^(b^2*x^2))/(Sqrt[Pi]*x)) + (b^2 - 1/(2*x^2))*Erfi[b*x]
```

fricas [**A**] time = 0.50, size = 40, normalized size = 1.00

$$
-\frac{2\sqrt{\pi}\,bxe^{\left(b^2x^2\right)} + \left(\pi - 2\,\pi b^2x^2\right)\text{erfi}\,(bx)}{2\,\pi x^2}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^3,x, algorithm="fricas")
[Out] -1/2*(2*sqrt(pi)*b*x*e^(b^2*x^2) + (pi - 2*pi*b^2*x^2)*erfi(b*x))/(pi*x^2)
```

giac [**F**] time = 0.00, size = 0, normalized size = 0.00

$$
\int \frac{\text{erfi}\,(bx)}{x^3}\,dx
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^3,x, algorithm="giac")
[Out] integrate(erfi(b*x)/x^3, x)
```

maple [A] time = 0.01, size = 47, normalized size = 1.18

$$b^2\left(-\frac{\mathrm{erfi}\,(bx)}{2b^2x^2}+\frac{-\frac{e^{b^2x^2}}{bx}+\sqrt{\pi}\ \mathrm{erfi}\,(bx)}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^3,x)
```

```
[Out] b^2*(-1/2/b^2/x^2*erfi(b*x)+1/Pi^(1/2)*(-exp(b^2*x^2)/b/x+Pi^(1/2)*erfi(b*x
)))
```

maxima [A] time = 0.37, size = 39, normalized size = 0.98

$$-\frac{\sqrt{-b^2x^2}\,b\Gamma\left(-\frac{1}{2},-b^2x^2\right)}{2\sqrt{\pi}\,x}-\frac{\mathrm{erfi}\,(bx)}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^3,x, algorithm="maxima")
```

```
[Out] -1/2*sqrt(-b^2*x^2)*b*gamma(-1/2, -b^2*x^2)/(sqrt(pi)*x) - 1/2*erfi(b*x)/x^
2
```

mupad [B] time = 0.11, size = 69, normalized size = 1.72

$$\frac{b\,\mathrm{erfc}\left(\sqrt{-b^2\,x^2}\right)\,\sqrt{-b^2\,x^2}}{x}-\frac{b\,\sqrt{-b^2\,x^2}}{x}-\frac{b\,e^{b^2\,x^2}}{x\,\sqrt{\pi}}-\frac{\mathrm{erfi}\,(b\,x)}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^3,x)
```

```
[Out] (b*erfc((-b^2*x^2)^(1/2))*(-b^2*x^2)^(1/2))/x - (b*(-b^2*x^2)^(1/2))/x - (b
*exp(b^2*x^2))/(x*pi^(1/2)) - erfi(b*x)/(2*x^2)
```

sympy [A] time = 0.43, size = 34, normalized size = 0.85

$$b^2\,\mathrm{erfi}\,(bx)-\frac{be^{b^2x^2}}{\sqrt{\pi}\,x}-\frac{\mathrm{erfi}\,(bx)}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x**3,x)
```

```
[Out] b**2*erfi(b*x) - b*exp(b**2*x**2)/(sqrt(pi)*x) - erfi(b*x)/(2*x**2)
```

3.212 $\int \frac{\mathbf{erfi}(bx)}{x^5} \, dx$

Optimal. Leaf size=69

$$\frac{1}{3}b^4\text{erfi}(bx) - \frac{be^{b^2x^2}}{6\sqrt{\pi}\,x^3} - \frac{b^3e^{b^2x^2}}{3\sqrt{\pi}\,x} - \frac{\text{erfi}(bx)}{4x^4}$$

```
[Out] 1/3*b^4*erfi(b*x)-1/4*erfi(b*x)/x^4-1/6*b*exp(b^2*x^2)/x^3/Pi^(1/2)-1/3*b^3
*exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2214, 2204}

$$\frac{1}{3}b^4\text{Erfi}(bx) - \frac{b^3e^{b^2x^2}}{3\sqrt{\pi}\,x} - \frac{be^{b^2x^2}}{6\sqrt{\pi}\,x^3} - \frac{\text{Erfi}(bx)}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/x^5,x]
```

```
[Out] -(b*E^(b^2*x^2))/(6*Sqrt[Pi]*x^3) - (b^3*E^(b^2*x^2))/(3*Sqrt[Pi]*x) + (b^4
*Erfi[b*x])/3 - Erfi[b*x]/(4*x^4)
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\text{erfi}(bx)}{x^5}\,dx &= -\frac{\text{erfi}(bx)}{4x^4}+\frac{b\int \frac{e^{b^2x^2}}{x^4}\,dx}{2\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{\text{erfi}(bx)}{4x^4}+\frac{b^3\int \frac{e^{b^2x^2}}{x^2}\,dx}{3\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{b^3e^{b^2x^2}}{3\sqrt{\pi}\,x}-\frac{\text{erfi}(bx)}{4x^4}+\frac{\left(2b^5\right)\int e^{b^2x^2}\,dx}{3\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{b^3e^{b^2x^2}}{3\sqrt{\pi}\,x}+\frac{1}{3}b^4\text{erfi}(bx)-\frac{\text{erfi}(bx)}{4x^4}
\end{aligned}$$

Mathematica [A] time = 0.04, size = 51, normalized size = 0.74

$$\frac{\left(4b^4x^4-3\right)\text{erfi}(bx)-\frac{2bxe^{b^2x^2}\left(2b^2x^2+1\right)}{\sqrt{\pi}}}{12x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/x^5,x]
```

```
[Out] ((-2*b*E^(b^2*x^2)*x*(1 + 2*b^2*x^2))/Sqrt[Pi] + (-3 + 4*b^4*x^4)*Erfi[b*x]
)/(12*x^4)
```

fricas [A] time = 0.55, size = 52, normalized size = 0.75

$$-\frac{2\sqrt{\pi}\left(2\,b^3x^3+bx\right)e^{\left(b^2x^2\right)}+\left(3\,\pi-4\,\pi b^4x^4\right)\text{erfi}\,(bx)}{12\,\pi x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^5,x, algorithm="fricas")
```

```
[Out] -1/12*(2*sqrt(pi)*(2*b^3*x^3 + b*x)*e^(b^2*x^2) + (3*pi - 4*pi*b^4*x^4)*erf
i(b*x))/(pi*x^4)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^5,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)/x^5, x)
```

maple [A] time = 0.00, size = 65, normalized size = 0.94

$$b^{4}\left(-\frac{\operatorname{erfi}\left(bx\right)}{4b^{4}x^{4}}+\frac{-\frac{e^{b^{2}x^{2}}}{3b^{3}x^{3}}-\frac{2\,e^{b^{2}x^{2}}}{3bx}+\frac{2\sqrt{\pi}\ \operatorname{erfi}(bx)}{3}}{2\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^5,x)
```

```
[Out] b^4*(-1/4/b^4/x^4*erfi(b*x)+1/2/Pi^(1/2)*(-1/3*exp(b^2*x^2)/b^3/x^3-2/3*exp
(b^2*x^2)/b/x+2/3*Pi^(1/2)*erfi(b*x)))
```

maxima [A] time = 0.38, size = 39, normalized size = 0.57

$$-\frac{\left(-b^{2}x^{2}\right)^{\frac{3}{2}}b\Gamma\left(-\frac{3}{2},-b^{2}x^{2}\right)}{4\sqrt{\pi}\,x^{3}}-\frac{\operatorname{erfi}\left(bx\right)}{4\,x^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^5,x, algorithm="maxima")
```

```
[Out] -1/4*(-b^2*x^2)^(3/2)*b*gamma(-3/2, -b^2*x^2)/(sqrt(pi)*x^3) - 1/4*erfi(b*x
)/x^4
```

mupad [B] time = 0.08, size = 89, normalized size = 1.29

$$\frac{b\left(-b^{2}\,x^{2}\right)^{3/2}}{3\,x^{3}}-\frac{\operatorname{erfi}\left(b\,x\right)}{4\,x^{4}}-\frac{b^{3}\,e^{b^{2}\,x^{2}}}{3\,x\,\sqrt{\pi}}-\frac{b\,e^{b^{2}\,x^{2}}}{6\,x^{3}\,\sqrt{\pi}}-\frac{b\,\operatorname{erfc}\left(\sqrt{-b^{2}\,x^{2}}\right)\left(-b^{2}\,x^{2}\right)^{3/2}}{3\,x^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^5,x)
```

```
[Out] (b*(-b^2*x^2)^(3/2))/(3*x^3) - erfi(b*x)/(4*x^4) - (b^3*exp(b^2*x^2))/(3*x*
pi^(1/2)) - (b*exp(b^2*x^2))/(6*x^3*pi^(1/2)) - (b*erfc((-b^2*x^2)^(1/2))*(
-b^2*x^2)^(3/2))/(3*x^3)
```

sympy [A] time = 1.10, size = 60, normalized size = 0.87

$$\frac{b^4 \operatorname{erfi}(bx)}{3} - \frac{b^3 e^{b^2x^2}}{3\sqrt{\pi}\,x} - \frac{be^{b^2x^2}}{6\sqrt{\pi}\,x^3} - \frac{\operatorname{erfi}(bx)}{4x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x**5,x)
```

```
[Out] b**4*erfi(b*x)/3 - b**3*exp(b**2*x**2)/(3*sqrt(pi)*x) - b*exp(b**2*x**2)/(6
*sqrt(pi)*x**3) - erfi(b*x)/(4*x**4)
```

3.213 $\int \frac{\text{erfi}(bx)}{x^7} dx$

Optimal. Leaf size=93

$$\frac{4}{45}b^6\text{erfi}(bx) - \frac{be^{b^2x^2}}{15\sqrt{\pi}\,x^5} - \frac{4b^5e^{b^2x^2}}{45\sqrt{\pi}\,x} - \frac{2b^3e^{b^2x^2}}{45\sqrt{\pi}\,x^3} - \frac{\text{erfi}(bx)}{6x^6}$$

```
[Out] 4/45*b^6*erfi(b*x)-1/6*erfi(b*x)/x^6-1/15*b*exp(b^2*x^2)/x^5/Pi^(1/2)-2/45*
b^3*exp(b^2*x^2)/x^3/Pi^(1/2)-4/45*b^5*exp(b^2*x^2)/x/Pi^(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 93, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2214, 2204}

$$\frac{4}{45}b^6\text{Erfi}(bx) - \frac{4b^5e^{b^2x^2}}{45\sqrt{\pi}\,x} - \frac{2b^3e^{b^2x^2}}{45\sqrt{\pi}\,x^3} - \frac{be^{b^2x^2}}{15\sqrt{\pi}\,x^5} - \frac{\text{Erfi}(bx)}{6x^6}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/x^7,x]
```

```
[Out] -(b*E^(b^2*x^2))/(15*Sqrt[Pi]*x^5) - (2*b^3*E^(b^2*x^2))/(45*Sqrt[Pi]*x^3)
- (4*b^5*E^(b^2*x^2))/(45*Sqrt[Pi]*x) + (4*b^6*Erfi[b*x])/45 - Erfi[b*x]/(6
*x^6)
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\mathrm{erfi}(bx)}{x^7}\,dx &= -\frac{\mathrm{erfi}(bx)}{6x^6}+\frac{b\int \frac{e^{b^2x^2}}{x^6}\,dx}{3\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{15\sqrt{\pi}\,x^5}-\frac{\mathrm{erfi}(bx)}{6x^6}+\frac{\left(2b^3\right)\int \frac{e^{b^2x^2}}{x^4}\,dx}{15\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{15\sqrt{\pi}\,x^5}-\frac{2b^3e^{b^2x^2}}{45\sqrt{\pi}\,x^3}-\frac{\mathrm{erfi}(bx)}{6x^6}+\frac{\left(4b^5\right)\int \frac{e^{b^2x^2}}{x^2}\,dx}{45\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{15\sqrt{\pi}\,x^5}-\frac{2b^3e^{b^2x^2}}{45\sqrt{\pi}\,x^3}-\frac{4b^5e^{b^2x^2}}{45\sqrt{\pi}\,x}-\frac{\mathrm{erfi}(bx)}{6x^6}+\frac{\left(8b^7\right)\int e^{b^2x^2}\,dx}{45\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{15\sqrt{\pi}\,x^5}-\frac{2b^3e^{b^2x^2}}{45\sqrt{\pi}\,x^3}-\frac{4b^5e^{b^2x^2}}{45\sqrt{\pi}\,x}+\frac{4}{45}b^6\mathrm{erfi}(bx)-\frac{\mathrm{erfi}(bx)}{6x^6}
\end{aligned}
$$

Mathematica [A] time = 0.03, size = 64, normalized size = 0.69

$$\frac{\sqrt{\pi}\left(8b^6x^6-15\right)\mathrm{erfi}(bx)-2bxe^{b^2x^2}\left(4b^4x^4+2b^2x^2+3\right)}{90\sqrt{\pi}\,x^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/x^7,x]
```

```
[Out] (-2*b*E^(b^2*x^2)*x*(3 + 2*b^2*x^2 + 4*b^4*x^4) + Sqrt[Pi]*(-15 + 8*b^6*x^6
)*Erfi[b*x])/(90*Sqrt[Pi]*x^6)
```

fricas [A] time = 0.40, size = 61, normalized size = 0.66

$$-\frac{2\sqrt{\pi}\left(4\,b^5x^5+2\,b^3x^3+3\,bx\right)e^{\left(b^2x^2\right)}+\left(15\,\pi-8\,\pi b^6x^6\right)\mathrm{erfi}\left(bx\right)}{90\,\pi x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^7,x, algorithm="fricas")
```

```
[Out] -1/90*(2*sqrt(pi)*(4*b^5*x^5 + 2*b^3*x^3 + 3*b*x)*e^(b^2*x^2) + (15*pi - 8*
pi*b^6*x^6)*erfi(b*x))/(pi*x^6)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^7,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)/x^7, x)
```

maple [A] time = 0.01, size = 81, normalized size = 0.87

$$b^6\left(-\frac{\operatorname{erfi}(bx)}{6b^6x^6}+\frac{-\frac{e^{b^2x^2}}{5b^5x^5}-\frac{2\,e^{b^2x^2}}{15b^3x^3}-\frac{4\,e^{b^2x^2}}{15bx}+\frac{4\sqrt{\pi}\ \operatorname{erfi}(bx)}{15}}{3\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^7,x)
```

```
[Out] b^6*(-1/6/b^6/x^6*erfi(b*x)+1/3/Pi^(1/2)*(-1/5*exp(b^2*x^2)/b^5/x^5-2/15*ex
p(b^2*x^2)/b^3/x^3-4/15*exp(b^2*x^2)/b/x+4/15*Pi^(1/2)*erfi(b*x)))
```

maxima [A] time = 0.36, size = 39, normalized size = 0.42

$$-\frac{\left(-b^2x^2\right)^{\frac{5}{2}}b\Gamma\left(-\frac{5}{2},-b^2x^2\right)}{6\sqrt{\pi}\,x^5}-\frac{\operatorname{erfi}(bx)}{6\,x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^7,x, algorithm="maxima")
```

```
[Out] -1/6*(-b^2*x^2)^(5/2)*b*gamma(-5/2, -b^2*x^2)/(sqrt(pi)*x^5) - 1/6*erfi(b*x
)/x^6
```

mupad [B] time = 0.12, size = 108, normalized size = 1.16

$$-\frac{\operatorname{erfi}(b\,x)}{6\,x^6}-\frac{3\,b\,e^{b^2\,x^2}+2\,b^3\,x^2\,e^{b^2\,x^2}+4\,b^5\,x^4\,e^{b^2\,x^2}+4\,b\,\sqrt{\pi}\,\left(-b^2\,x^2\right)^{5/2}-4\,b\,\sqrt{\pi}\,\operatorname{erfc}\left(\sqrt{-b^2}\,\sqrt{x^2}\right)\,\left(-b^2\,x^2\right)^{5/2}}{45\,x^5\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^7,x)
```

```
[Out] - erfi(b*x)/(6*x^6) - (3*b*exp(b^2*x^2) + 2*b^3*x^2*exp(b^2*x^2) + 4*b^5*x^
4*exp(b^2*x^2) + 4*b*pi^(1/2)*(-b^2*x^2)^(5/2) - 4*b*pi^(1/2)*erfc((-b^2)^(
1/2)*(x^2)^(1/2))*(-b^2*x^2)^(5/2))/(45*x^5*pi^(1/2))
```

sympy [A] time = 2.82, size = 87, normalized size = 0.94

$$\frac{4b^6\operatorname{erfi}(bx)}{45}-\frac{4b^5e^{b^2x^2}}{45\sqrt{\pi}\,x}-\frac{2b^3e^{b^2x^2}}{45\sqrt{\pi}\,x^3}-\frac{be^{b^2x^2}}{15\sqrt{\pi}\,x^5}-\frac{\operatorname{erfi}(bx)}{6x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x**7,x)
```

```
[Out] 4*b**6*erfi(b*x)/45 - 4*b**5*exp(b**2*x**2)/(45*sqrt(pi)*x) - 2*b**3*exp(b*
*2*x**2)/(45*sqrt(pi)*x**3) - b*exp(b**2*x**2)/(15*sqrt(pi)*x**5) - erfi(b*
x)/(6*x**6)
```

3.214 $\int x^6 \mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=105

$$-\frac{x^6e^{b^2x^2}}{7\sqrt{\pi}\,b}+\frac{6e^{b^2x^2}}{7\sqrt{\pi}\,b^7}-\frac{6x^2e^{b^2x^2}}{7\sqrt{\pi}\,b^5}+\frac{3x^4e^{b^2x^2}}{7\sqrt{\pi}\,b^3}+\frac{1}{7}x^7\text{erfi}(bx)$$

```
[Out] 1/7*x^7*erfi(b*x)+6/7*exp(b^2*x^2)/b^7/Pi^(1/2)-6/7*exp(b^2*x^2)*x^2/b^5/Pi
^(1/2)+3/7*exp(b^2*x^2)*x^4/b^3/Pi^(1/2)-1/7*exp(b^2*x^2)*x^6/b/Pi^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 105, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2212, 2209}

$$-\frac{x^6e^{b^2x^2}}{7\sqrt{\pi}\,b}+\frac{3x^4e^{b^2x^2}}{7\sqrt{\pi}\,b^3}-\frac{6x^2e^{b^2x^2}}{7\sqrt{\pi}\,b^5}+\frac{6e^{b^2x^2}}{7\sqrt{\pi}\,b^7}+\frac{1}{7}x^7\text{Erfi}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^6*Erfi[b*x],x]
```

```
[Out] (6*E^(b^2*x^2))/(7*b^7*Sqrt[Pi]) - (6*E^(b^2*x^2)*x^2)/(7*b^5*Sqrt[Pi]) + (
3*E^(b^2*x^2)*x^4)/(7*b^3*Sqrt[Pi]) - (E^(b^2*x^2)*x^6)/(7*b*Sqrt[Pi]) + (x
^7*Erfi[b*x])/7
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
```

```
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int x^6\text{erfi}(bx)\,dx &= \frac{1}{7}x^7\text{erfi}(bx) - \frac{(2b)\int e^{b^2x^2}x^7\,dx}{7\sqrt{\pi}} \\
&= -\frac{e^{b^2x^2}x^6}{7b\sqrt{\pi}} + \frac{1}{7}x^7\text{erfi}(bx) + \frac{6\int e^{b^2x^2}x^5\,dx}{7b\sqrt{\pi}} \\
&= \frac{3e^{b^2x^2}x^4}{7b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^6}{7b\sqrt{\pi}} + \frac{1}{7}x^7\text{erfi}(bx) - \frac{12\int e^{b^2x^2}x^3\,dx}{7b^3\sqrt{\pi}} \\
&= -\frac{6e^{b^2x^2}x^2}{7b^5\sqrt{\pi}} + \frac{3e^{b^2x^2}x^4}{7b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^6}{7b\sqrt{\pi}} + \frac{1}{7}x^7\text{erfi}(bx) + \frac{12\int e^{b^2x^2}x\,dx}{7b^5\sqrt{\pi}} \\
&= \frac{6e^{b^2x^2}}{7b^7\sqrt{\pi}} - \frac{6e^{b^2x^2}x^2}{7b^5\sqrt{\pi}} + \frac{3e^{b^2x^2}x^4}{7b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^6}{7b\sqrt{\pi}} + \frac{1}{7}x^7\text{erfi}(bx)
\end{aligned}$$

Mathematica [A] time = 0.05, size = 57, normalized size = 0.54

$$\frac{1}{7}\left(\frac{e^{b^2x^2}\left(-b^6x^6+3b^4x^4-6b^2x^2+6\right)}{\sqrt{\pi}\,b^7}+x^7\text{erfi}(bx)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^6*Erfi[b*x],x]
```

```
[Out] ((E^(b^2*x^2)*(6 - 6*b^2*x^2 + 3*b^4*x^4 - b^6*x^6))/(b^7*Sqrt[Pi]) + x^7*E
rfi[b*x])/7
```

fricas [A] time = 0.44, size = 59, normalized size = 0.56

$$\frac{\pi b^7x^7\,\text{erfi}\,(bx)-\sqrt{\pi}\left(b^6x^6-3\,b^4x^4+6\,b^2x^2-6\right)e^{\left(b^2x^2\right)}}{7\,\pi b^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erfi(b*x),x, algorithm="fricas")
```

```
[Out] 1/7*(pi*b^7*x^7*erfi(b*x) - sqrt(pi)*(b^6*x^6 - 3*b^4*x^4 + 6*b^2*x^2 - 6)*
e^(b^2*x^2))/(pi*b^7)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^6 \operatorname{erfi}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^6*erfi(b*x), x)
```

maple [A] time = 0.00, size = 82, normalized size = 0.78

$$\frac{\frac{b^7x^7\operatorname{erfi}(bx)}{7} - \frac{2\left(\frac{b^6x^6e^{b^2x^2}}{2} - \frac{3e^{b^2x^2}b^4x^4}{2} + 3b^2x^2e^{b^2x^2} - 3e^{b^2x^2}\right)}{7\sqrt{\pi}}}{b^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*erfi(b*x),x)
```

```
[Out] 1/b^7*(1/7*b^7*x^7*erfi(b*x)-2/7/Pi^(1/2)*(1/2*b^6*x^6*exp(b^2*x^2)-3/2*exp
(b^2*x^2)*b^4*x^4+3*b^2*x^2*exp(b^2*x^2)-3*exp(b^2*x^2)))
```

maxima [A] time = 0.32, size = 51, normalized size = 0.49

$$\frac{1}{7}x^7\operatorname{erfi}(bx) - \frac{\left(b^6x^6 - 3b^4x^4 + 6b^2x^2 - 6\right)e^{\left(b^2x^2\right)}}{7\sqrt{\pi}b^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erfi(b*x),x, algorithm="maxima")
```

```
[Out] 1/7*x^7*erfi(b*x) - 1/7*(b^6*x^6 - 3*b^4*x^4 + 6*b^2*x^2 - 6)*e^(b^2*x^2)/(
sqrt(pi)*b^7)
```

mupad [B] time = 0.13, size = 51, normalized size = 0.49

$$\frac{x^7\operatorname{erfi}(b\,x)}{7} - \frac{e^{b^2\,x^2}\,\left(b^6\,x^6 - 3\,b^4\,x^4 + 6\,b^2\,x^2 - 6\right)}{7\,b^7\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*erfi(b*x),x)
```

```
[Out] (x^7*erfi(b*x))/7 - (exp(b^2*x^2)*(6*b^2*x^2 - 3*b^4*x^4 + b^6*x^6 - 6))/(7
*b^7*pi^(1/2))
```

sympy [A] time = 4.46, size = 99, normalized size = 0.94

$$\begin{cases} \frac{x^7 \operatorname{erfi}(bx)}{7} - \frac{x^6 e^{b^2x^2}}{7\sqrt{\pi}\, b} + \frac{3x^4 e^{b^2x^2}}{7\sqrt{\pi}\, b^3} - \frac{6x^2 e^{b^2x^2}}{7\sqrt{\pi}\, b^5} + \frac{6e^{b^2x^2}}{7\sqrt{\pi}\, b^7} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**6*erfi(b*x),x)
```

```
[Out] Piecewise((x**7*erfi(b*x)/7 - x**6*exp(b**2*x**2)/(7*sqrt(pi)*b) + 3*x**4*e
xp(b**2*x**2)/(7*sqrt(pi)*b**3) - 6*x**2*exp(b**2*x**2)/(7*sqrt(pi)*b**5) +
 6*exp(b**2*x**2)/(7*sqrt(pi)*b**7), Ne(b, 0)), (0, True))
```

3.215 $\int x^4 \mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=81

$$-\frac{x^4 e^{b^2x^2}}{5\sqrt{\pi}\,b}-\frac{2e^{b^2x^2}}{5\sqrt{\pi}\,b^5}+\frac{2x^2e^{b^2x^2}}{5\sqrt{\pi}\,b^3}+\frac{1}{5}x^5\mathrm{erfi}(bx)$$

```
[Out] 1/5*x^5*erfi(b*x)-2/5*exp(b^2*x^2)/b^5/Pi^(1/2)+2/5*exp(b^2*x^2)*x^2/b^3/Pi
^(1/2)-1/5*exp(b^2*x^2)*x^4/b/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 81, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2212, 2209}

$$-\frac{x^4 e^{b^2x^2}}{5\sqrt{\pi}\,b}+\frac{2x^2e^{b^2x^2}}{5\sqrt{\pi}\,b^3}-\frac{2e^{b^2x^2}}{5\sqrt{\pi}\,b^5}+\frac{1}{5}x^5\mathrm{Erfi}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^4*Erfi[b*x],x]
```

```
[Out] (-2*E^(b^2*x^2))/(5*b^5*Sqrt[Pi]) + (2*E^(b^2*x^2)*x^2)/(5*b^3*Sqrt[Pi]) -
(E^(b^2*x^2)*x^4)/(5*b*Sqrt[Pi]) + (x^5*Erfi[b*x])/5
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int x^4\text{erfi}(bx)\,dx &= \frac{1}{5}x^5\text{erfi}(bx) - \frac{(2b)\int e^{b^2x^2}x^5\,dx}{5\sqrt{\pi}}\\ &= -\frac{e^{b^2x^2}x^4}{5b\sqrt{\pi}} + \frac{1}{5}x^5\text{erfi}(bx) + \frac{4\int e^{b^2x^2}x^3\,dx}{5b\sqrt{\pi}}\\ &= \frac{2e^{b^2x^2}x^2}{5b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^4}{5b\sqrt{\pi}} + \frac{1}{5}x^5\text{erfi}(bx) - \frac{4\int e^{b^2x^2}x\,dx}{5b^3\sqrt{\pi}}\\ &= -\frac{2e^{b^2x^2}}{5b^5\sqrt{\pi}} + \frac{2e^{b^2x^2}x^2}{5b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^4}{5b\sqrt{\pi}} + \frac{1}{5}x^5\text{erfi}(bx)\end{aligned}$$

Mathematica [A] time = 0.03, size = 49, normalized size = 0.60

$$\frac{1}{5}\left(x^5\text{erfi}(bx) - \frac{e^{b^2x^2}\left(b^4x^4 - 2b^2x^2 + 2\right)}{\sqrt{\pi}\,b^5}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*Erfi[b*x],x]
```

```
[Out] (-((E^(b^2*x^2)*(2 - 2*b^2*x^2 + b^4*x^4))/(b^5*Sqrt[Pi])) + x^5*Erfi[b*x])
/5
```

fricas [A] time = 0.53, size = 51, normalized size = 0.63

$$\frac{\pi b^5x^5\,\text{erfi}\,(bx) - \sqrt{\pi}\left(b^4x^4 - 2\,b^2x^2 + 2\right)e^{\left(b^2x^2\right)}}{5\,\pi b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfi(b*x),x, algorithm="fricas")
```

```
[Out] 1/5*(pi*b^5*x^5*erfi(b*x) - sqrt(pi)*(b^4*x^4 - 2*b^2*x^2 + 2)*e^(b^2*x^2))
/(pi*b^5)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\,\text{erfi}\,(bx)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^4*erfi(b*x), x)
```

maple [A] time = 0.01, size = 64, normalized size = 0.79

$$\frac{\frac{b^5x^5\,\mathrm{erfi}(bx)}{5}-\frac{2\left(\frac{\mathrm{e}^{b^2x^2}b^4x^4}{2}-b^2x^2\mathrm{e}^{b^2x^2}+\mathrm{e}^{b^2x^2}\right)}{5\sqrt{\pi}}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfi(b*x),x)
```

```
[Out] 1/b^5*(1/5*b^5*x^5*erfi(b*x)-2/5/Pi^(1/2)*(1/2*exp(b^2*x^2)*b^4*x^4-b^2*x^2
*exp(b^2*x^2)+exp(b^2*x^2)))
```

maxima [A] time = 0.32, size = 43, normalized size = 0.53

$$\frac{1}{5}\,x^5\,\mathrm{erfi}\left(bx\right)-\frac{\left(b^4x^4-2\,b^2x^2+2\right)e^{\left(b^2x^2\right)}}{5\,\sqrt{\pi}\,b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfi(b*x),x, algorithm="maxima")
```

```
[Out] 1/5*x^5*erfi(b*x) - 1/5*(b^4*x^4 - 2*b^2*x^2 + 2)*e^(b^2*x^2)/(sqrt(pi)*b^5
)
```

mupad [B] time = 0.11, size = 43, normalized size = 0.53

$$\frac{x^5\,\mathrm{erfi}\left(b\,x\right)}{5}-\frac{\mathrm{e}^{b^2\,x^2}\,\left(b^4\,x^4-2\,b^2\,x^2+2\right)}{5\,b^5\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfi(b*x),x)
```

```
[Out] (x^5*erfi(b*x))/5 - (exp(b^2*x^2)*(b^4*x^4 - 2*b^2*x^2 + 2))/(5*b^5*pi^(1/2
))
```

sympy [A] time = 1.45, size = 75, normalized size = 0.93

$$\begin{cases}\frac{x^5\,\mathrm{erfi}\left(bx\right)}{5}-\frac{x^4e^{b^2x^2}}{5\sqrt{\pi}\,b}+\frac{2x^2e^{b^2x^2}}{5\sqrt{\pi}\,b^3}-\frac{2e^{b^2x^2}}{5\sqrt{\pi}\,b^5} & \text{for } b\neq 0\\ 0 & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*erfi(b*x),x)
```

```
[Out] Piecewise((x**5*erfi(b*x)/5 - x**4*exp(b**2*x**2)/(5*sqrt(pi)*b) + 2*x**2*e
xp(b**2*x**2)/(5*sqrt(pi)*b**3) - 2*exp(b**2*x**2)/(5*sqrt(pi)*b**5), Ne(b,
 0)), (0, True))
```

3.216 $\int x^2\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=57

$$-\frac{x^2e^{b^2x^2}}{3\sqrt{\pi}\,b}+\frac{e^{b^2x^2}}{3\sqrt{\pi}\,b^3}+\frac{1}{3}x^3\text{erfi}(bx)$$

```
[Out] 1/3*x^3*erfi(b*x)+1/3*exp(b^2*x^2)/b^3/Pi^(1/2)-1/3*exp(b^2*x^2)*x^2/b/Pi^(
1/2)
```

Rubi [A] time = 0.04, antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2212, 2209}

$$-\frac{x^2e^{b^2x^2}}{3\sqrt{\pi}\,b}+\frac{e^{b^2x^2}}{3\sqrt{\pi}\,b^3}+\frac{1}{3}x^3\text{Erfi}(bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Erfi[b*x],x]
```

```
[Out] E^(b^2*x^2)/(3*b^3*Sqrt[Pi]) - (E^(b^2*x^2)*x^2)/(3*b*Sqrt[Pi]) + (x^3*Erfi
[b*x])/3
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int x^2\text{erfi}(bx)\,dx &= \frac{1}{3}x^3\text{erfi}(bx) - \frac{(2b)\int e^{b^2x^2}x^3\,dx}{3\sqrt{\pi}} \\
&= -\frac{e^{b^2x^2}x^2}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erfi}(bx) + \frac{2\int e^{b^2x^2}x\,dx}{3b\sqrt{\pi}} \\
&= \frac{e^{b^2x^2}}{3b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^2}{3b\sqrt{\pi}} + \frac{1}{3}x^3\text{erfi}(bx)
\end{aligned}
$$

Mathematica [A] time = 0.04, size = 41, normalized size = 0.72

$$\frac{1}{3}\left(\frac{e^{b^2x^2}\left(1-b^2x^2\right)}{\sqrt{\pi}\,b^3} + x^3\text{erfi}(bx)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*Erfi[b*x],x]
[Out] ((E^(b^2*x^2)*(1 - b^2*x^2))/(b^3*Sqrt[Pi]) + x^3*Erfi[b*x])/3
```

fricas [A] time = 0.39, size = 43, normalized size = 0.75

$$\frac{\pi b^3x^3\,\text{erfi}\,(bx) - \sqrt{\pi}\left(b^2x^2-1\right)e^{\left(b^2x^2\right)}}{3\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(b*x),x, algorithm="fricas")
[Out] 1/3*(pi*b^3*x^3*erfi(b*x) - sqrt(pi)*(b^2*x^2 - 1)*e^(b^2*x^2))/(pi*b^3)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfi}\,(bx)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(b*x),x, algorithm="giac")
[Out] integrate(x^2*erfi(b*x), x)
```

maple [A] time = 0.00, size = 50, normalized size = 0.88

$$\frac{\frac{b^3x^3\operatorname{erfi}(bx)}{3}-\frac{2\left(\frac{b^2x^2\mathrm{e}^{b^2x^2}}{2}-\frac{\mathrm{e}^{b^2x^2}}{2}\right)}{3\sqrt{\pi}}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfi(b*x),x)
```

```
[Out] 1/b^3*(1/3*b^3*x^3*erfi(b*x)-2/3/Pi^(1/2)*(1/2*b^2*x^2*exp(b^2*x^2)-1/2*exp
(b^2*x^2)))
```

maxima [A] time = 0.32, size = 35, normalized size = 0.61

$$\frac{1}{3}\,x^3\operatorname{erfi}\left(bx\right)-\frac{\left(b^2x^2-1\right)e^{\left(b^2x^2\right)}}{3\,\sqrt{\pi}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(b*x),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*erfi(b*x) - 1/3*(b^2*x^2 - 1)*e^(b^2*x^2)/(sqrt(pi)*b^3)
```

mupad [B] time = 0.15, size = 35, normalized size = 0.61

$$\frac{x^3\operatorname{erfi}\left(b\,x\right)}{3}-\frac{\mathrm{e}^{b^2\,x^2}\,\left(b^2\,x^2-1\right)}{3\,b^3\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfi(b*x),x)
```

```
[Out] (x^3*erfi(b*x))/3 - (exp(b^2*x^2)*(b^2*x^2 - 1))/(3*b^3*pi^(1/2))
```

sympy [A] time = 0.39, size = 49, normalized size = 0.86

$$\begin{cases} \frac{x^3\operatorname{erfi}\left(bx\right)}{3}-\frac{x^2e^{b^2x^2}}{3\sqrt{\pi}\,b}+\frac{e^{b^2x^2}}{3\sqrt{\pi}\,b^3} & \text{for}\ b\neq 0\\ 0 & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erfi(b*x),x)
```

```
[Out] Piecewise((x**3*erfi(b*x)/3 - x**2*exp(b**2*x**2)/(3*sqrt(pi)*b) + exp(b**2
*x**2)/(3*sqrt(pi)*b**3), Ne(b, 0)), (0, True))
```

3.217 $\int \text{erfi}(bx)\,dx$

Optimal. Leaf size=26

$$x\text{erfi}(bx) - \frac{e^{b^2x^2}}{\sqrt{\pi}\,b}$$

```
[Out] x*erfi(b*x)-exp(b^2*x^2)/b/Pi^(1/2)
```

Rubi [A] time = 0.00, antiderivative size = 26, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6351}

$$x\text{Erfi}(bx) - \frac{e^{b^2x^2}}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x],x]
[Out] -(E^(b^2*x^2)/(b*Sqrt[Pi])) + x*Erfi[b*x]
```

Rule 6351

```
Int[Erfi[(a_.) + (b_.)*(x_)], x_Symbol] :> Simp[((a + b*x)*Erfi[a + b*x])/b
, x] - Simp[E^(a + b*x)^2/(b*Sqrt[Pi]), x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\int \text{erfi}(bx)\,dx = -\frac{e^{b^2x^2}}{b\sqrt{\pi}} + x\text{erfi}(bx)$$

Mathematica [A] time = 0.01, size = 26, normalized size = 1.00

$$x\text{erfi}(bx) - \frac{e^{b^2x^2}}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x],x]
[Out] -(E^(b^2*x^2)/(b*Sqrt[Pi])) + x*Erfi[b*x]
```

fricas [A] time = 0.39, size = 29, normalized size = 1.12

$$\frac{\pi bx \operatorname{erfi}(bx) - \sqrt{\pi}\, e^{\left(b^2x^2\right)}}{\pi b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x),x, algorithm="fricas")
[Out] (pi*b*x*erfi(b*x) - sqrt(pi)*e^(b^2*x^2))/(pi*b)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x),x, algorithm="giac")
[Out] integrate(erfi(b*x), x)
```

maple [A] time = 0.00, size = 26, normalized size = 1.00

$$\frac{bx \operatorname{erfi}(bx) - \frac{e^{b^2x^2}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x),x)
[Out] 1/b*(b*x*erfi(b*x)-1/Pi^(1/2)*exp(b^2*x^2))
```

maxima [A] time = 0.32, size = 25, normalized size = 0.96

$$\frac{bx \operatorname{erfi}(bx) - \frac{e^{\left(b^2x^2\right)}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x),x, algorithm="maxima")
[Out] (b*x*erfi(b*x) - e^(b^2*x^2)/sqrt(pi))/b
```

mupad [B] time = 0.05, size = 23, normalized size = 0.88

$$x \operatorname{erfi}(b\, x) - \frac{e^{b^2\, x^2}}{b\, \sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x),x)
```

```
[Out] x*erfi(b*x) - exp(b^2*x^2)/(b*pi^(1/2))
```

sympy [A] time = 0.13, size = 22, normalized size = 0.85

$$\begin{cases} x \operatorname{erfi}(bx) - \frac{e^{b^2x^2}}{\sqrt{\pi}\, b} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x),x)
```

```
[Out] Piecewise((x*erfi(b*x) - exp(b**2*x**2)/(sqrt(pi)*b), Ne(b, 0)), (0, True))
```

3.218 $\int \frac{\text{erfi}(bx)}{x^2} \, dx$

Optimal. Leaf size=25

$$\frac{b\text{Ei}\left(b^2x^2\right)}{\sqrt{\pi}} - \frac{\text{erfi}(bx)}{x}$$

```
[Out] -erfi(b*x)/x+b*Ei(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 25, 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 = {6363, 2210}

$$\frac{b\text{Ei}\left(b^2x^2\right)}{\sqrt{\pi}} - \frac{\text{Erfi}(bx)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/x^2,x]
```

```
[Out] -(Erfi[b*x]/x) + (b*ExpIntegralEi[b^2*x^2])/Sqrt[Pi]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\text{erfi}(bx)}{x^2} \, dx &= -\frac{\text{erfi}(bx)}{x} + \frac{(2b)\int \frac{e^{b^2x^2}}{x} \, dx}{\sqrt{\pi}} \\
&= -\frac{\text{erfi}(bx)}{x} + \frac{b\text{Ei}\left(b^2x^2\right)}{\sqrt{\pi}}
\end{aligned}$$

Mathematica [A] time = 0.02, size = 25, normalized size = 1.00

$$\frac{b\text{Ei}\left(b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{erfi}(bx)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/x^2,x]
[Out] -(Erfi[b*x]/x) + (b*ExpIntegralEi[b^2*x^2])/Sqrt[Pi]
```

fricas [A] time = 0.45, size = 29, normalized size = 1.16

$$\frac{\sqrt{\pi}\,bx\text{Ei}\left(b^2x^2\right)-\pi\,\text{erfi}\,(bx)}{\pi x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^2,x, algorithm="fricas")
[Out] (sqrt(pi)*b*x*Ei(b^2*x^2) - pi*erfi(b*x))/(pi*x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\text{erfi}\,(bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^2,x, algorithm="giac")
[Out] integrate(erfi(b*x)/x^2, x)
```

maple [A] time = 0.00, size = 31, normalized size = 1.24

$$b\left(-\frac{\text{erfi}\,(bx)}{bx}-\frac{\text{Ei}\left(1,-b^2x^2\right)}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^2,x)
[Out] b*(-erfi(b*x)/b/x-1/Pi^(1/2)*Ei(1,-b^2*x^2))
```

maxima [A] time = 0.35, size = 23, normalized size = 0.92

$$\frac{b\text{Ei}\left(b^2x^2\right)}{\sqrt{\pi}}-\frac{\text{erfi}\,(bx)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^2,x, algorithm="maxima")
[Out] b*Ei(b^2*x^2)/sqrt(pi) - erfi(b*x)/x
```

mupad [B] time = 0.18, size = 23, normalized size = 0.92

$$\frac{b\,\mathrm{ei}\left(b^2\,x^2\right)}{\sqrt{\pi}}-\frac{\mathrm{erfi}\left(b\,x\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^2,x)
[Out] (b*ei(b^2*x^2))/pi^(1/2) - erfi(b*x)/x
```

sympy [C] time = 0.98, size = 32, normalized size = 1.28

$$-\frac{b\,\mathrm{E}_1\left(b^2x^2e^{i\pi}\right)}{\sqrt{\pi}}-\frac{i\,\mathrm{erfc}\left(ibx\right)}{x}+\frac{i}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x**2,x)
[Out] -b*expint(1, b**2*x**2*exp_polar(I*pi))/sqrt(pi) - I*erfc(I*b*x)/x + I/x
```

3.219 $\int \frac{\mathbf{erfi}(bx)}{x^4} dx$

Optimal. Leaf size=54

$$-\frac{be^{b^2x^2}}{3\sqrt{\pi}\,x^2}+\frac{b^3\mathrm{Ei}\left(b^2x^2\right)}{3\sqrt{\pi}}-\frac{\mathrm{erfi}(bx)}{3x^3}$$

```
[Out] -1/3*erfi(b*x)/x^3-1/3*b*exp(b^2*x^2)/x^2/Pi^(1/2)+1/3*b^3*Ei(b^2*x^2)/Pi^(
1/2)
```

Rubi [A] time = 0.05, antiderivative size = 54, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2214, 2210}

$$\frac{b^3\mathrm{Ei}\left(b^2x^2\right)}{3\sqrt{\pi}}-\frac{be^{b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{\mathrm{Erfi}(bx)}{3x^3}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/x^4,x]
```

```
[Out] -(b*E^(b^2*x^2))/(3*Sqrt[Pi]*x^2) - Erfi[b*x]/(3*x^3) + (b^3*ExpIntegralEi[
b^2*x^2])/(3*Sqrt[Pi])
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\text{erfi}(bx)}{x^4}\,dx = -\frac{\text{erfi}(bx)}{3x^3} + \frac{(2b)\int \frac{e^{b^2x^2}}{x^3}\,dx}{3\sqrt{\pi}}$$
$$= -\frac{be^{b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{\text{erfi}(bx)}{3x^3} + \frac{\left(2b^3\right)\int \frac{e^{b^2x^2}}{x}\,dx}{3\sqrt{\pi}}$$
$$= -\frac{be^{b^2x^2}}{3\sqrt{\pi}\,x^2} - \frac{\text{erfi}(bx)}{3x^3} + \frac{b^3\text{Ei}\left(b^2x^2\right)}{3\sqrt{\pi}}$$

Mathematica [A] time = 0.02, size = 50, normalized size = 0.93

$$-\frac{\frac{bxe^{b^2x^2}}{\sqrt{\pi}} - \frac{b^3x^3\text{Ei}\left(b^2x^2\right)}{\sqrt{\pi}} + \text{erfi}(bx)}{3x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/x^4,x]
```

```
[Out] -1/3*((b*E^(b^2*x^2)*x)/Sqrt[Pi] + Erfi[b*x] - (b^3*x^3*ExpIntegralEi[b^2*x
^2])/Sqrt[Pi])/x^3
```

fricas [A] time = 0.44, size = 48, normalized size = 0.89

$$-\frac{\pi\,\text{erfi}\,(bx) - \sqrt{\pi}\left(b^3x^3\text{Ei}\left(b^2x^2\right) - bxe^{\left(b^2x^2\right)}\right)}{3\,\pi x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^4,x, algorithm="fricas")
```

```
[Out] -1/3*(pi*erfi(b*x) - sqrt(pi)*(b^3*x^3*Ei(b^2*x^2) - b*x*e^(b^2*x^2)))/(pi*
x^3)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^4,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)/x^4, x)
```

maple [A] time = 0.01, size = 52, normalized size = 0.96

$$b^{3}\left(-\frac{\operatorname{erfi}(bx)}{3b^{3}x^{3}}+\frac{-\frac{e^{b^{2}x^{2}}}{3b^{2}x^{2}}-\frac{\operatorname{Ei}\left(1,-b^{2}x^{2}\right)}{3}}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^4,x)
```

```
[Out] b^3*(-1/3*erfi(b*x)/b^3/x^3+2/3/Pi^(1/2)*(-1/2*exp(b^2*x^2)/b^2/x^2-1/2*Ei(
1,-b^2*x^2)))
```

maxima [A] time = 0.38, size = 28, normalized size = 0.52

$$\frac{b^{3}\Gamma\left(-1,-b^{2}x^{2}\right)}{3\sqrt{\pi}}-\frac{\operatorname{erfi}(bx)}{3x^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^4,x, algorithm="maxima")
```

```
[Out] 1/3*b^3*gamma(-1, -b^2*x^2)/sqrt(pi) - 1/3*erfi(b*x)/x^3
```

mupad [B] time = 0.22, size = 43, normalized size = 0.80

$$\frac{b^{3}\operatorname{ei}\left(b^{2}x^{2}\right)}{3\sqrt{\pi}}-\frac{\operatorname{erfi}(b\,x)}{3\,x^{3}}-\frac{b\,e^{b^{2}x^{2}}}{3\,x^{2}\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^4,x)
```

```
[Out] (b^3*ei(b^2*x^2))/(3*pi^(1/2)) - erfi(b*x)/(3*x^3) - (b*exp(b^2*x^2))/(3*x^
2*pi^(1/2))
```

sympy [C] time = 1.67, size = 63, normalized size = 1.17

$$-\frac{b^{3}\operatorname{E}_{1}\left(b^{2}x^{2}e^{i\pi}\right)}{3\sqrt{\pi}}-\frac{be^{b^{2}x^{2}}}{3\sqrt{\pi}\,x^{2}}-\frac{i\operatorname{erfc}(ibx)}{3x^{3}}+\frac{i}{3x^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x**4,x)

[Out] -b**3*expint(1, b**2*x**2*exp_polar(I*pi))/(3*sqrt(pi)) - b*exp(b**2*x**2)/
(3*sqrt(pi)*x**2) - I*erfc(I*b*x)/(3*x**3) + I/(3*x**3)
```

3.220 $\int \frac{\text{erfi}(bx)}{x^6} dx$

Optimal. Leaf size=78

$$-\frac{be^{b^2x^2}}{10\sqrt{\pi}\,x^4}+\frac{b^5\text{Ei}\left(b^2x^2\right)}{10\sqrt{\pi}}-\frac{b^3e^{b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{\text{erfi}(bx)}{5x^5}$$

```
[Out] -1/5*erfi(b*x)/x^5-1/10*b*exp(b^2*x^2)/x^4/Pi^(1/2)-1/10*b^3*exp(b^2*x^2)/x
^2/Pi^(1/2)+1/10*b^5*Ei(b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.07, antiderivative size = 78, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6363, 2214, 2210}

$$\frac{b^5\text{Ei}\left(b^2x^2\right)}{10\sqrt{\pi}}-\frac{b^3e^{b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{be^{b^2x^2}}{10\sqrt{\pi}\,x^4}-\frac{\text{Erfi}(bx)}{5x^5}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/x^6,x]
```

```
[Out] -(b*E^(b^2*x^2))/(10*Sqrt[Pi]*x^4) - (b^3*E^(b^2*x^2))/(10*Sqrt[Pi]*x^2) -
Erfi[b*x]/(5*x^5) + (b^5*ExpIntegralEi[b^2*x^2])/(10*Sqrt[Pi])
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
```

```
m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\text{erfi}(bx)}{x^6}\,dx &= -\frac{\text{erfi}(bx)}{5x^5}+\frac{(2b)\int \frac{e^{b^2x^2}}{x^5}\,dx}{5\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{10\sqrt{\pi}\,x^4}-\frac{\text{erfi}(bx)}{5x^5}+\frac{b^3\int \frac{e^{b^2x^2}}{x^3}\,dx}{5\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{10\sqrt{\pi}\,x^4}-\frac{b^3e^{b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{\text{erfi}(bx)}{5x^5}+\frac{b^5\int \frac{e^{b^2x^2}}{x}\,dx}{5\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}}{10\sqrt{\pi}\,x^4}-\frac{b^3e^{b^2x^2}}{10\sqrt{\pi}\,x^2}-\frac{\text{erfi}(bx)}{5x^5}+\frac{b^5\text{Ei}\left(b^2x^2\right)}{10\sqrt{\pi}}
\end{aligned}$$

Mathematica [A] time = 0.03, size = 61, normalized size = 0.78

$$\frac{-bxe^{b^2x^2}\left(b^2x^2+1\right)+b^5x^5\text{Ei}\left(b^2x^2\right)-2\sqrt{\pi}\,\text{erfi}(bx)}{10\sqrt{\pi}\,x^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/x^6,x]
```

```
[Out] (-(b*E^(b^2*x^2)*x*(1 + b^2*x^2)) - 2*Sqrt[Pi]*Erfi[b*x] + b^5*x^5*ExpInteg
ralEi[b^2*x^2])/(10*Sqrt[Pi]*x^5)
```

fricas [A] time = 1.26, size = 58, normalized size = 0.74

$$-\frac{2\,\pi\,\text{erfi}\,(bx)-\sqrt{\pi}\left(b^5x^5\text{Ei}\left(b^2x^2\right)-\left(b^3x^3+bx\right)e^{\left(b^2x^2\right)}\right)}{10\,\pi x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^6,x, algorithm="fricas")
```

```
[Out] -1/10*(2*pi*erfi(b*x) - sqrt(pi)*(b^5*x^5*Ei(b^2*x^2) - (b^3*x^3 + b*x)*e^(
b^2*x^2)))/(pi*x^5)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^6,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)/x^6, x)
```

maple [A] time = 0.00, size = 68, normalized size = 0.87

$$b^{5}\left(-\frac{\operatorname{erfi}(bx)}{5b^{5}x^{5}}+\frac{-\frac{e^{b^{2}x^{2}}}{10b^{4}x^{4}}-\frac{e^{b^{2}x^{2}}}{10b^{2}x^{2}}-\frac{\operatorname{Ei}\left(1,-b^{2}x^{2}\right)}{10}}{\sqrt{\pi}}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^6,x)
```

```
[Out] b^5*(-1/5*erfi(b*x)/b^5/x^5+2/5/Pi^(1/2)*(-1/4*exp(b^2*x^2)/b^4/x^4-1/4*exp
(b^2*x^2)/b^2/x^2-1/4*Ei(1,-b^2*x^2)))
```

maxima [A] time = 0.36, size = 28, normalized size = 0.36

$$-\frac{b^{5}\Gamma\left(-2,-b^{2}x^{2}\right)}{5\sqrt{\pi}}-\frac{\operatorname{erfi}(bx)}{5x^{5}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x^6,x, algorithm="maxima")
```

```
[Out] -1/5*b^5*gamma(-2, -b^2*x^2)/sqrt(pi) - 1/5*erfi(b*x)/x^5
```

mupad [B] time = 0.22, size = 62, normalized size = 0.79

$$\frac{b^{5}\operatorname{ei}\left(b^{2}x^{2}\right)}{10\sqrt{\pi}}-\frac{\operatorname{erfi}(bx)}{5x^{5}}-\frac{\frac{b\,e^{b^{2}x^{2}}}{2}+\frac{b^{3}x^{2}e^{b^{2}x^{2}}}{2}}{5x^{4}\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/x^6,x)
```

```
[Out] (b^5*ei(b^2*x^2))/(10*pi^(1/2)) - erfi(b*x)/(5*x^5) - ((b*exp(b^2*x^2))/2 +
 (b^3*x^2*exp(b^2*x^2))/2)/(5*x^4*pi^(1/2))
```

sympy [C] time = 2.91, size = 85, normalized size = 1.09

$$-\frac{b^{5}E_{1}\left(b^{2}x^{2}e^{i\pi}\right)}{10\sqrt{\pi}}-\frac{b^{3}e^{b^{2}x^{2}}}{10\sqrt{\pi}x^{2}}-\frac{be^{b^{2}x^{2}}}{10\sqrt{\pi}x^{4}}-\frac{i\operatorname{erfc}(ibx)}{5x^{5}}+\frac{i}{5x^{5}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/x**6,x)
```

```
[Out] -b**5*expint(1, b**2*x**2*exp_polar(I*pi))/(10*sqrt(pi)) - b**3*exp(b**2*x*
*2)/(10*sqrt(pi)*x**2) - b*exp(b**2*x**2)/(10*sqrt(pi)*x**4) - I*erfc(I*b*x
)/(5*x**5) + I/(5*x**5)
```

3.221 $\int (c+dx)^3 \mathbf{erfi}(a+bx)\,dx$

Optimal. Leaf size=279

$$-\frac{d^2 e^{(a+bx)^2}(a+bx)^2(bc-ad)}{\sqrt{\pi}\,b^4}+\frac{d^2 e^{(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^4}-\frac{(bc-ad)^4\text{erfi}(a+bx)}{4b^4 d}+\frac{3d(bc-ad)^2\text{erfi}(a+bx)}{4b^4}-\frac{e^{(a+bx)^2}(bc}{\sqrt{\pi}\,b}$$

```
[Out] -3/16*d^3*erfi(b*x+a)/b^4+3/4*d*(-a*d+b*c)^2*erfi(b*x+a)/b^4-1/4*(-a*d+b*c)
^4*erfi(b*x+a)/b^4/d+1/4*(d*x+c)^4*erfi(b*x+a)/d+d^2*(-a*d+b*c)*exp((b*x+a)
^2)/b^4/Pi^(1/2)-(-a*d+b*c)^3*exp((b*x+a)^2)/b^4/Pi^(1/2)+3/8*d^3*exp((b*x+
a)^2)*(b*x+a)/b^4/Pi^(1/2)-3/2*d*(-a*d+b*c)^2*exp((b*x+a)^2)*(b*x+a)/b^4/Pi
^(1/2)-d^2*(-a*d+b*c)*exp((b*x+a)^2)*(b*x+a)^2/b^4/Pi^(1/2)-1/4*d^3*exp((b*
x+a)^2)*(b*x+a)^3/b^4/Pi^(1/2)
```

Rubi [A] time = 0.25, antiderivative size = 279, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 5, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.357, Rules used = {6363, 2226, 2204, 2209, 2212}

$$-\frac{d^2 e^{(a+bx)^2}(a+bx)^2(bc-ad)}{\sqrt{\pi}\,b^4}+\frac{d^2 e^{(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^4}-\frac{(bc-ad)^4\text{Erfi}(a+bx)}{4b^4 d}+\frac{3d(bc-ad)^2\text{Erfi}(a+bx)}{4b^4}-\frac{e^{(a+bx)^2}(bc}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[(c + d*x)^3*Erfi[a + b*x],x]
```

```
[Out] (d^2*(b*c - a*d)*E^(a + b*x)^2)/(b^4*Sqrt[Pi]) - ((b*c - a*d)^3*E^(a + b*x)
^2)/(b^4*Sqrt[Pi]) + (3*d^3*E^(a + b*x)^2*(a + b*x))/(8*b^4*Sqrt[Pi]) - (3*
d*(b*c - a*d)^2*E^(a + b*x)^2*(a + b*x))/(2*b^4*Sqrt[Pi]) - (d^2*(b*c - a*d
)*E^(a + b*x)^2*(a + b*x)^2)/(b^4*Sqrt[Pi]) - (d^3*E^(a + b*x)^2*(a + b*x)^
3)/(4*b^4*Sqrt[Pi]) - (3*d^3*Erfi[a + b*x])/(16*b^4) + (3*d*(b*c - a*d)^2*E
rfi[a + b*x])/(4*b^4) - ((b*c - a*d)^4*Erfi[a + b*x])/(4*b^4*d) + ((c + d*x
)^4*Erfi[a + b*x])/(4*d)
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 2226

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*(u_), x_Symbol] :> Int[E
xpandLinearProduct[F^(a + b*(c + d*x)^n), u, c, d, x], x] /; FreeQ[{F, a, b
, c, d, n}, x] && PolynomialQ[u, x]
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (c+dx)^3\text{erfi}(a+bx)\,dx = \frac{(c+dx)^4\text{erfi}(a+bx)}{4d} - \frac{b\int e^{(a+bx)^2}(c+dx)^4\,dx}{2d\sqrt{\pi}}$$

$$= \frac{(c+dx)^4\text{erfi}(a+bx)}{4d} - \frac{b\int\left(\frac{(bc-ad)^4e^{(a+bx)^2}}{b^4} + \frac{4d(bc-ad)^3e^{(a+bx)^2}(a+bx)}{b^4} + \frac{6d^2(bc-ad)^2e^{(a+bx)^2}(a\cdots}{b^4}\right.}{2d\sqrt{\pi}}$$

$$= \frac{(c+dx)^4\text{erfi}(a+bx)}{4d} - \frac{d^3\int e^{(a+bx)^2}(a+bx)^4\,dx}{2b^3\sqrt{\pi}} - \frac{\left(2d^2(bc-ad)\right)\int e^{(a+bx)^2}(a+bx)^3\cdots}{b^3\sqrt{\pi}}$$

$$= -\frac{(bc-ad)^3e^{(a+bx)^2}}{b^4\sqrt{\pi}} - \frac{3d(bc-ad)^2e^{(a+bx)^2}(a+bx)}{2b^4\sqrt{\pi}} - \frac{d^2(bc-ad)e^{(a+bx)^2}(a+bx)^2}{b^4\sqrt{\pi}} - \frac{d\cdots}{}$$

$$= \frac{d^2(bc-ad)e^{(a+bx)^2}}{b^4\sqrt{\pi}} - \frac{(bc-ad)^3e^{(a+bx)^2}}{b^4\sqrt{\pi}} + \frac{3d^3e^{(a+bx)^2}(a+bx)}{8b^4\sqrt{\pi}} - \frac{3d(bc-ad)^2e^{(a+bx)^2}(\cdots}{2b^4\sqrt{\pi}}$$

$$= \frac{d^2(bc-ad)e^{(a+bx)^2}}{b^4\sqrt{\pi}} - \frac{(bc-ad)^3e^{(a+bx)^2}}{b^4\sqrt{\pi}} + \frac{3d^3e^{(a+bx)^2}(a+bx)}{8b^4\sqrt{\pi}} - \frac{3d(bc-ad)^2e^{(a+bx)^2}(\cdots}{2b^4\sqrt{\pi}}$$

Mathematica [A] time = 0.33, size = 237, normalized size = 0.85

$$\sqrt{\pi}\operatorname{erfi}(a+bx)\left(-4a^4d^3+16a^3bcd^2+12a^2d\left(d^2-2b^2c^2\right)+8a\left(2b^3c^3-3bcd^2\right)+4b^4x\left(4c^3+6c^2dx+4cd^2x^2+\right.\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(c + d*x)^3*Erfi[a + b*x],x]
```

```
[Out] (-2*E^(a + b*x)^2*(a*(5 - 2*a^2)*d^3 + b*d^2*(8*(-1 + a^2)*c + (-3 + 2*a^2)
*d*x) - 2*a*b^2*d*(6*c^2 + 4*c*d*x + d^2*x^2) + 2*b^3*(4*c^3 + 6*c^2*d*x +
4*c*d^2*x^2 + d^3*x^3)) + Sqrt[Pi]*(12*b^2*c^2*d + 16*a^3*b*c*d^2 - 3*d^3 -
 4*a^4*d^3 + 12*a^2*d*(-2*b^2*c^2 + d^2) + 8*a*(2*b^3*c^3 - 3*b*c*d^2) + 4*
b^4*x*(4*c^3 + 6*c^2*d*x + 4*c*d^2*x^2 + d^3*x^3))*Erfi[a + b*x])/(16*b^4*S
qrt[Pi])
```

fricas [A] time = 0.48, size = 263, normalized size = 0.94

$$-\frac{2\sqrt{\pi}\left(2b^3d^3x^3+8b^3c^3-12ab^2c^2d+8\left(a^2-1\right)bcd^2-\left(2a^3-5a\right)d^3+2\left(4b^3cd^2-ab^2d^3\right)x^2+\left(12b^3c^2d-8a\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)^3*erfi(b*x+a),x, algorithm="fricas")
```

```
[Out] -1/16*(2*sqrt(pi)*(2*b^3*d^3*x^3 + 8*b^3*c^3 - 12*a*b^2*c^2*d + 8*(a^2 - 1)
*b*c*d^2 - (2*a^3 - 5*a)*d^3 + 2*(4*b^3*c*d^2 - a*b^2*d^3)*x^2 + (12*b^3*c^
2*d - 8*a*b^2*c*d^2 + (2*a^2 - 3)*b*d^3)*x)*e^(b^2*x^2 + 2*a*b*x + a^2) - (
4*pi*b^4*d^3*x^4 + 16*pi*b^4*c*d^2*x^3 + 24*pi*b^4*c^2*d*x^2 + 16*pi*b^4*c^
3*x + pi*(16*a*b^3*c^3 - 12*(2*a^2 - 1)*b^2*c^2*d + 8*(2*a^3 - 3*a)*b*c*d^2
 - (4*a^4 - 12*a^2 + 3)*d^3))*erfi(b*x + a))/(pi*b^4)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx+c)^3 \operatorname{erfi}(bx+a)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)^3*erfi(b*x+a),x, algorithm="giac")
```

```
[Out] integrate((d*x + c)^3*erfi(b*x + a), x)
```

maple [B] time = 0.01, size = 703, normalized size = 2.52

$$\frac{\frac{d^3\operatorname{erfi}(bx+a)(bx+a)^4}{4b^3}-\frac{d^3\operatorname{erfi}(bx+a)(bx+a)^3a}{b^3}+\frac{d^2\operatorname{erfi}(bx+a)(bx+a)^3c}{b^2}+\frac{3d^3\operatorname{erfi}(bx+a)(bx+a)^2a^2}{2b^3}-\frac{3d^2\operatorname{erfi}(bx+a)(bx+a)^2ac}{b^2}+\frac{3d\operatorname{erfi}(bx+a)}{2b}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x+c)^3*erfi(b*x+a),x)
```

```
[Out] 1/b*(1/4/b^3*d^3*erfi(b*x+a)*(b*x+a)^4-1/b^3*d^3*erfi(b*x+a)*(b*x+a)^3*a+1/
b^2*d^2*erfi(b*x+a)*(b*x+a)^3*c+3/2/b^3*d^3*erfi(b*x+a)*(b*x+a)^2*a^2-3/b^2
*d^2*erfi(b*x+a)*(b*x+a)^2*a*c+3/2/b*d*erfi(b*x+a)*(b*x+a)^2*c^2-1/b^3*d^3*
erfi(b*x+a)*(b*x+a)*a^3+3/b^2*d^2*erfi(b*x+a)*(b*x+a)*a^2*c-3/b*d*erfi(b*x+
a)*(b*x+a)*a*c^2+erfi(b*x+a)*(b*x+a)*c^3+1/4/b^3*d^3*erfi(b*x+a)*a^4-1/b^2*
d^2*erfi(b*x+a)*a^3*c+3/2/b*d*erfi(b*x+a)*a^2*c^2-erfi(b*x+a)*a*c^3+1/4*b/d
*erfi(b*x+a)*c^4-1/2/b^3/d/Pi^(1/2)*(d^4*(1/2*exp((b*x+a)^2)*(b*x+a)^3-3/4*
(b*x+a)*exp((b*x+a)^2)+3/8*Pi^(1/2)*erfi(b*x+a))+1/2*a^4*d^4*Pi^(1/2)*erfi(
b*x+a)+1/2*b^4*c^4*Pi^(1/2)*erfi(b*x+a)-2*a^3*d^4*exp((b*x+a)^2)+6*a^2*d^4*
(1/2*(b*x+a)*exp((b*x+a)^2)-1/4*Pi^(1/2)*erfi(b*x+a))-4*a*d^4*(1/2*(b*x+a)^
2*exp((b*x+a)^2)-1/2*exp((b*x+a)^2))+2*b^3*c^3*d*exp((b*x+a)^2)+6*b^2*c^2*d
^2*(1/2*(b*x+a)*exp((b*x+a)^2)-1/4*Pi^(1/2)*erfi(b*x+a))+4*b*c*d^3*(1/2*(b*
x+a)^2*exp((b*x+a)^2)-1/2*exp((b*x+a)^2))-2*a*b^3*c^3*d*Pi^(1/2)*erfi(b*x+a
)+3*a^2*b^2*c^2*d^2*Pi^(1/2)*erfi(b*x+a)-2*a^3*b*c*d^3*Pi^(1/2)*erfi(b*x+a)
-6*a*b^2*c^2*d^2*exp((b*x+a)^2)+6*a^2*b*c*d^3*exp((b*x+a)^2)-12*a*b*c*d^3*(
1/2*(b*x+a)*exp((b*x+a)^2)-1/4*Pi^(1/2)*erfi(b*x+a))))
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx+c)^3 \operatorname{erfi}(bx+a)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)^3*erfi(b*x+a),x, algorithm="maxima")
```

```
[Out] integrate((d*x + c)^3*erfi(b*x + a), x)
```

mupad [B] time = 0.64, size = 357, normalized size = 1.28

$$\operatorname{erfi}(a+b\,x)\left(c^3\,x+\frac{3\,c^2\,d\,x^2}{2}+c\,d^2\,x^3+\frac{d^3\,x^4}{4}\right)-\frac{\frac{e^{a^2+2\,a\,b\,x+b^2\,x^2}\left(-2\,a^3\,d^3+8\,a^2\,b\,c\,d^2-12\,a\,b^2\,c^2\,d+5\,a\,d^3+8\,b^3\,c^3-8\,b\,c\,d^2\right)}{4\,b^4}+\frac{d^3\,x^3\,e^{\cdots}}{\cdots}}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)*(c + d*x)^3,x)
```

```
[Out] erfi(a + b*x)*(c^3*x + (d^3*x^4)/4 + (3*c^2*d*x^2)/2 + c*d^2*x^3) - ((exp(a
^2 + b^2*x^2 + 2*a*b*x)*(5*a*d^3 - 2*a^3*d^3 + 8*b^3*c^3 - 8*b*c*d^2 - 12*a
*b^2*c^2*d + 8*a^2*b*c*d^2))/(4*b^4) + (d^3*x^3*exp(a^2 + b^2*x^2 + 2*a*b*x
))/(2*b) - (x^2*exp(a^2 + b^2*x^2 + 2*a*b*x)*(a*d^3 - 4*b*c*d^2))/(2*b^2) -
 (x*exp(a^2 + b^2*x^2 + 2*a*b*x)*(b^2*(12*c^2*d - 72*a^2*c^2*d) + b*(48*a^3
```

```
*c*d^2 - 8*a*c*d^2) - 3*d^3 + 20*a^2*d^3 - 12*a^4*d^3))/(b^3*(24*a^2 - 4)))
/(2*pi^(1/2)) - (erfi(a + b*x)*(3*d^3 - 12*a^2*d^3 + 4*a^4*d^3 - 16*a*b^3*c
^3 - 12*b^2*c^2*d + 24*a^2*b^2*c^2*d + 24*a*b*c*d^2 - 16*a^3*b*c*d^2))/(16*
b^4)
```

sympy [A] time = 8.01, size = 746, normalized size = 2.67

$$\begin{cases} -\frac{a^4d^3\,\mathrm{erfi}\,(a+bx)}{4b^4} + \frac{a^3cd^2\,\mathrm{erfi}\,(a+bx)}{b^3} + \frac{a^3d^3e^{a^2}e^{b^2x^2}e^{2abx}}{4\sqrt{\pi}\,b^4} - \frac{3a^2c^2d\,\mathrm{erfi}\,(a+bx)}{2b^2} - \frac{a^2cd^2e^{a^2}e^{b^2x^2}e^{2abx}}{\sqrt{\pi}\,b^3} - \frac{a^2d^3xe^{a^2}e^{b^2x^2}e^{2abx}}{4\sqrt{\pi}\,b^3} + \frac{3a^2d^3\,\mathrm{erfi}\,(a+ \\ \left(c^3x + \frac{3c^2dx^2}{2} + cd^2x^3 + \frac{d^3x^4}{4}\right)\mathrm{erfi}\,(a) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)**3*erfi(b*x+a),x)
```

```
[Out] Piecewise((-a**4*d**3*erfi(a + b*x)/(4*b**4) + a**3*c*d**2*erfi(a + b*x)/b*
*3 + a**3*d**3*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(4*sqrt(pi)*b**4) - 3*
a**2*c**2*d*erfi(a + b*x)/(2*b**2) - a**2*c*d**2*exp(a**2)*exp(b**2*x**2)*e
xp(2*a*b*x)/(sqrt(pi)*b**3) - a**2*d**3*x*exp(a**2)*exp(b**2*x**2)*exp(2*a*
b*x)/(4*sqrt(pi)*b**3) + 3*a**2*d**3*erfi(a + b*x)/(4*b**4) + a*c**3*erfi(a
 + b*x)/b + 3*a*c**2*d*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(2*sqrt(pi)*b*
*2) + a*c*d**2*x*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(sqrt(pi)*b**2) + a*
d**3*x**2*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(4*sqrt(pi)*b**2) - 3*a*c*d
**2*erfi(a + b*x)/(2*b**3) - 5*a*d**3*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)
/(8*sqrt(pi)*b**4) + c**3*x*erfi(a + b*x) + 3*c**2*d*x**2*erfi(a + b*x)/2 +
 c*d**2*x**3*erfi(a + b*x) + d**3*x**4*erfi(a + b*x)/4 - c**3*exp(a**2)*exp
(b**2*x**2)*exp(2*a*b*x)/(sqrt(pi)*b) - 3*c**2*d*x*exp(a**2)*exp(b**2*x**2)
*exp(2*a*b*x)/(2*sqrt(pi)*b) - c*d**2*x**2*exp(a**2)*exp(b**2*x**2)*exp(2*a
*b*x)/(sqrt(pi)*b) - d**3*x**3*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(4*sqr
t(pi)*b) + 3*c**2*d*erfi(a + b*x)/(4*b**2) + c*d**2*exp(a**2)*exp(b**2*x**2
)*exp(2*a*b*x)/(sqrt(pi)*b**3) + 3*d**3*x*exp(a**2)*exp(b**2*x**2)*exp(2*a*
b*x)/(8*sqrt(pi)*b**3) - 3*d**3*erfi(a + b*x)/(16*b**4), Ne(b, 0)), ((c**3*
x + 3*c**2*d*x**2/2 + c*d**2*x**3 + d**3*x**4/4)*erfi(a), True))
```

3.222 $\int (c+dx)^2 \mathbf{erfi}(a+bx)\,dx$

Optimal. Leaf size=186

$$-\frac{(bc-ad)^3\text{erfi}(a+bx)}{3b^3d}+\frac{d(bc-ad)\text{erfi}(a+bx)}{2b^3}-\frac{e^{(a+bx)^2}(bc-ad)^2}{\sqrt{\pi}\,b^3}-\frac{de^{(a+bx)^2}(a+bx)(bc-ad)}{\sqrt{\pi}\,b^3}-\frac{d^2e^{(a+bx)^2}(a+bx)^2}{3\sqrt{\pi}\,b^3}$$

```
[Out] 1/2*d*(-a*d+b*c)*erfi(b*x+a)/b^3-1/3*(-a*d+b*c)^3*erfi(b*x+a)/b^3/d+1/3*(d*
x+c)^3*erfi(b*x+a)/d+1/3*d^2*exp((b*x+a)^2)/b^3/Pi^(1/2)-(-a*d+b*c)^2*exp((
b*x+a)^2)/b^3/Pi^(1/2)-d*(-a*d+b*c)*exp((b*x+a)^2)*(b*x+a)/b^3/Pi^(1/2)-1/3
*d^2*exp((b*x+a)^2)*(b*x+a)^2/b^3/Pi^(1/2)
```

Rubi [A] time = 0.17, antiderivative size = 186, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.357, Rules used = {6363, 2226, 2204, 2209, 2212}

$$-\frac{(bc-ad)^3\text{Erfi}(a+bx)}{3b^3d}+\frac{d(bc-ad)\text{Erfi}(a+bx)}{2b^3}-\frac{e^{(a+bx)^2}(bc-ad)^2}{\sqrt{\pi}\,b^3}-\frac{de^{(a+bx)^2}(a+bx)(bc-ad)}{\sqrt{\pi}\,b^3}-\frac{d^2e^{(a+bx)^2}(a+bx}{3\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Int[(c + d*x)^2*Erfi[a + b*x],x]
```

```
[Out] (d^2*E^(a + b*x)^2)/(3*b^3*Sqrt[Pi]) - ((b*c - a*d)^2*E^(a + b*x)^2)/(b^3*S
qrt[Pi]) - (d*(b*c - a*d)*E^(a + b*x)^2*(a + b*x))/(b^3*Sqrt[Pi]) - (d^2*E^
(a + b*x)^2*(a + b*x)^2)/(3*b^3*Sqrt[Pi]) + (d*(b*c - a*d)*Erfi[a + b*x])/(
2*b^3) - ((b*c - a*d)^3*Erfi[a + b*x])/(3*b^3*d) + ((c + d*x)^3*Erfi[a + b*
x])/(3*d)
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
```

```
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 2226

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*(u_), x_Symbol] :> Int[E
xpandLinearProduct[F^(a + b*(c + d*x)^n), u, c, d, x], x] /; FreeQ[{F, a, b
, c, d, n}, x] && PolynomialQ[u, x]
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (c+dx)^2 \text{erfi}(a+bx)\,dx = \frac{(c+dx)^3\text{erfi}(a+bx)}{3d} - \frac{(2b)\int e^{(a+bx)^2}(c+dx)^3\,dx}{3d\sqrt{\pi}}$$

$$= \frac{(c+dx)^3\text{erfi}(a+bx)}{3d} - \frac{(2b)\int \left(\frac{(bc-ad)^3e^{(a+bx)^2}}{b^3} + \frac{3d(bc-ad)^2e^{(a+bx)^2}(a+bx)}{b^3} + \frac{3d^2(bc-ad)e^{(a+b}}{b^3}\right.}{3d\sqrt{\pi}}$$

$$= \frac{(c+dx)^3\text{erfi}(a+bx)}{3d} - \frac{\left(2d^2\right)\int e^{(a+bx)^2}(a+bx)^3\,dx}{3b^2\sqrt{\pi}} - \frac{(2d(bc-ad))\int e^{(a+bx)^2}(a+b}{b^2\sqrt{\pi}}$$

$$= -\frac{(bc-ad)^2e^{(a+bx)^2}}{b^3\sqrt{\pi}} - \frac{d(bc-ad)e^{(a+bx)^2}(a+bx)}{b^3\sqrt{\pi}} - \frac{d^2e^{(a+bx)^2}(a+bx)^2}{3b^3\sqrt{\pi}} - \frac{(bc-ad)^3e}{3b}$$

$$= \frac{d^2e^{(a+bx)^2}}{3b^3\sqrt{\pi}} - \frac{(bc-ad)^2e^{(a+bx)^2}}{b^3\sqrt{\pi}} - \frac{d(bc-ad)e^{(a+bx)^2}(a+bx)}{b^3\sqrt{\pi}} - \frac{d^2e^{(a+bx)^2}(a+bx)^2}{3b^3\sqrt{\pi}} +$$

Mathematica [A] time = 0.21, size = 142, normalized size = 0.76

$$\frac{\sqrt{\pi}\,\text{erfi}(a+bx)\left(2a^3d^2 - 6a^2bcd + a\left(6b^2c^2 - 3d^2\right) + 2b^3x\left(3c^2 + 3cdx + d^2x^2\right) + 3bcd\right) - 2e^{(a+bx)^2}\left(\left(a^2-1\right)d^2 -\right.}{6\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(c + d*x)^2*Erfi[a + b*x],x]
```

```
[Out] (-2*E^(a + b*x)^2*((-1 + a^2)*d^2 - a*b*d*(3*c + d*x) + b^2*(3*c^2 + 3*c*d*
x + d^2*x^2)) + Sqrt[Pi]*(3*b*c*d - 6*a^2*b*c*d + 2*a^3*d^2 + a*(6*b^2*c^2
- 3*d^2) + 2*b^3*x*(3*c^2 + 3*c*d*x + d^2*x^2))*Erfi[a + b*x])/(6*b^3*Sqrt[
Pi])
```

fricas [A] time = 0.46, size = 161, normalized size = 0.87

$$-\frac{2\sqrt{\pi}\left(b^2d^2x^2+3\,b^2c^2-3\,abcd+\left(a^2-1\right)d^2+\left(3\,b^2cd-abd^2\right)x\right)e^{\left(b^2x^2+2\,abx+a^2\right)}-\left(2\,\pi b^3d^2x^3+6\,\pi b^3cdx^2+6\,\pi b\right.}{6\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)^2*erfi(b*x+a),x, algorithm="fricas")
```

```
[Out] -1/6*(2*sqrt(pi)*(b^2*d^2*x^2 + 3*b^2*c^2 - 3*a*b*c*d + (a^2 - 1)*d^2 + (3*
b^2*c*d - a*b*d^2)*x)*e^(b^2*x^2 + 2*a*b*x + a^2) - (2*pi*b^3*d^2*x^3 + 6*p
i*b^3*c*d*x^2 + 6*pi*b^3*c^2*x + pi*(6*a*b^2*c^2 - 3*(2*a^2 - 1)*b*c*d + (2
*a^3 - 3*a)*d^2))*erfi(b*x + a))/(pi*b^3)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx+c)^2 \operatorname{erfi}(bx+a)\ dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)^2*erfi(b*x+a),x, algorithm="giac")
```

```
[Out] integrate((d*x + c)^2*erfi(b*x + a), x)
```

maple [B] time = 0.01, size = 414, normalized size = 2.23

$$\frac{\frac{d^2\operatorname{erfi}(bx+a)(bx+a)^3}{3b^2}-\frac{d^2\operatorname{erfi}(bx+a)(bx+a)^2a}{b^2}+\frac{d\operatorname{erfi}(bx+a)(bx+a)^2c}{b}+\frac{d^2\operatorname{erfi}(bx+a)(bx+a)a^2}{b^2}-\frac{2d\operatorname{erfi}(bx+a)(bx+a)ac}{b}+\operatorname{erfi}(bx+a)(bx}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x+c)^2*erfi(b*x+a),x)
```

```
[Out] 1/b*(1/3/b^2*d^2*erfi(b*x+a)*(b*x+a)^3-1/b^2*d^2*erfi(b*x+a)*(b*x+a)^2*a+1/
b*d*erfi(b*x+a)*(b*x+a)^2*c+1/b^2*d^2*erfi(b*x+a)*(b*x+a)*a^2-2/b*d*erfi(b*
x+a)*(b*x+a)*a*c+erfi(b*x+a)*(b*x+a)*c^2-1/3/b^2*d^2*erfi(b*x+a)*a^3+1/b*d*
erfi(b*x+a)*a^2*c-erfi(b*x+a)*a*c^2+1/3*b/d*erfi(b*x+a)*c^3-2/3/b^2/d/Pi^(1
/2)*(d^3*(1/2*(b*x+a)^2*exp((b*x+a)^2)-1/2*exp((b*x+a)^2))+1/2*b^3*c^3*Pi^(
```

```
1/2)*erfi(b*x+a)-1/2*a^3*d^3*Pi^(1/2)*erfi(b*x+a)+3/2*a^2*d^3*exp((b*x+a)^2
)-3*a*d^3*(1/2*(b*x+a)*exp((b*x+a)^2)-1/4*Pi^(1/2)*erfi(b*x+a))+3/2*b^2*c^2
*d*exp((b*x+a)^2)+3*b*c*d^2*(1/2*(b*x+a)*exp((b*x+a)^2)-1/4*Pi^(1/2)*erfi(b
*x+a))-3/2*a*b^2*c^2*d*Pi^(1/2)*erfi(b*x+a)+3/2*a^2*b*c*d^2*Pi^(1/2)*erfi(b
*x+a)-3*a*b*c*d^2*exp((b*x+a)^2)))
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx + c)^2 \operatorname{erfi}(bx + a)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)^2*erfi(b*x+a),x, algorithm="maxima")
```

```
[Out] integrate((d*x + c)^2*erfi(b*x + a), x)
```

mupad [B] time = 0.37, size = 190, normalized size = 1.02

$$\frac{\frac{e^{a^2+2\,a\,b\,x+b^2\,x^2}\,\left(-a^2\,d^2+3\,a\,b\,c\,d-3\,b^2\,c^2+d^2\right)}{b^3}+\frac{x\,e^{a^2+2\,a\,b\,x+b^2\,x^2}\,\left(a\,d^2-3\,b\,c\,d\right)}{b^2}-\frac{d^2\,x^2\,e^{a^2+2\,a\,b\,x+b^2\,x^2}}{b}}{3\,\sqrt{\pi}}+\operatorname{erfi}\left(a+b\,x\right)\,\left(c^2\,x+c\,d\,x^2+\frac{d}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)*(c + d*x)^2,x)
```

```
[Out] ((exp(a^2 + b^2*x^2 + 2*a*b*x)*(d^2 - a^2*d^2 - 3*b^2*c^2 + 3*a*b*c*d))/b^3
 + (x*exp(a^2 + b^2*x^2 + 2*a*b*x)*(a*d^2 - 3*b*c*d))/b^2 - (d^2*x^2*exp(a^
2 + b^2*x^2 + 2*a*b*x))/b)/(3*pi^(1/2)) + erfi(a + b*x)*(c^2*x + (d^2*x^3)/
3 + c*d*x^2) + (erfi(a + b*x)*(2*a^3*d^2 - 3*a*d^2 + 6*a*b^2*c^2 + 3*b*c*d
- 6*a^2*b*c*d))/(6*b^3)
```

sympy [A] time = 3.09, size = 398, normalized size = 2.14

$$\begin{cases} \frac{a^3d^2 \operatorname{erfi}(a+bx)}{3b^3} - \frac{a^2cd \operatorname{erfi}(a+bx)}{b^2} - \frac{a^2d^2e^{a^2}e^{b^2x^2}e^{2abx}}{3\sqrt{\pi}\,b^3} + \frac{ac^2 \operatorname{erfi}(a+bx)}{b} + \frac{acde^{a^2}e^{b^2x^2}e^{2abx}}{\sqrt{\pi}\,b^2} + \frac{ad^2xe^{a^2}e^{b^2x^2}e^{2abx}}{3\sqrt{\pi}\,b^2} - \frac{ad^2 \operatorname{erfi}(a+bx)}{2b^3} + c^2x \\ \left(c^2x + cdx^2 + \frac{d^2x^3}{3}\right)\operatorname{erfi}(a) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)**2*erfi(b*x+a),x)
```

```
[Out] Piecewise((a**3*d**2*erfi(a + b*x)/(3*b**3) - a**2*c*d*erfi(a + b*x)/b**2 -
 a**2*d**2*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(3*sqrt(pi)*b**3) + a*c**2
*erfi(a + b*x)/b + a*c*d*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(sqrt(pi)*b*
```

```
*2) + a*d**2*x*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(3*sqrt(pi)*b**2) - a*
d**2*erfi(a + b*x)/(2*b**3) + c**2*x*erfi(a + b*x) + c*d*x**2*erfi(a + b*x)
 + d**2*x**3*erfi(a + b*x)/3 - c**2*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(
sqrt(pi)*b) - c*d*x*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(sqrt(pi)*b) - d*
*2*x**2*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(3*sqrt(pi)*b) + c*d*erfi(a +
 b*x)/(2*b**2) + d**2*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(3*sqrt(pi)*b**
3), Ne(b, 0)), ((c**2*x + c*d*x**2 + d**2*x**3/3)*erfi(a), True))
```

3.223 $\int (c + dx)\mathbf{erfi}(a + bx)\,dx$

Optimal. Leaf size=115

$$-\frac{(bc-ad)^2\text{erfi}(a+bx)}{2b^2d}-\frac{e^{(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^2}+\frac{d\text{erfi}(a+bx)}{4b^2}-\frac{de^{(a+bx)^2}(a+bx)}{2\sqrt{\pi}\,b^2}+\frac{(c+dx)^2\text{erfi}(a+bx)}{2d}$$

```
[Out] 1/4*d*erfi(b*x+a)/b^2-1/2*(-a*d+b*c)^2*erfi(b*x+a)/b^2/d+1/2*(d*x+c)^2*erfi
(b*x+a)/d-(-a*d+b*c)*exp((b*x+a)^2)/b^2/Pi^(1/2)-1/2*d*exp((b*x+a)^2)*(b*x+
a)/b^2/Pi^(1/2)
```

Rubi [A] time = 0.11, antiderivative size = 115, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {6363, 2226, 2204, 2209, 2212}

$$-\frac{(bc-ad)^2\text{Erfi}(a+bx)}{2b^2d}-\frac{e^{(a+bx)^2}(bc-ad)}{\sqrt{\pi}\,b^2}+\frac{d\text{Erfi}(a+bx)}{4b^2}-\frac{de^{(a+bx)^2}(a+bx)}{2\sqrt{\pi}\,b^2}+\frac{(c+dx)^2\text{Erfi}(a+bx)}{2d}$$

Antiderivative was successfully verified.

```
[In] Int[(c + d*x)*Erfi[a + b*x],x]
```

```
[Out] -(((b*c - a*d)*E^(a + b*x)^2)/(b^2*Sqrt[Pi])) - (d*E^(a + b*x)^2*(a + b*x))
/(2*b^2*Sqrt[Pi]) + (d*Erfi[a + b*x])/(4*b^2) - ((b*c - a*d)^2*Erfi[a + b*x
])/(2*b^2*d) + ((c + d*x)^2*Erfi[a + b*x])/(2*d)
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
```

```
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 2226

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*(u_), x_Symbol] :> Int[E
xpandLinearProduct[F^(a + b*(c + d*x)^n), u, c, d, x], x] /; FreeQ[{F, a, b
, c, d, n}, x] && PolynomialQ[u, x]
```

Rule 6363

```
Int[Erfi[(a_.) + (b_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Simp[
((c + d*x)^(m + 1)*Erfi[a + b*x])/(d*(m + 1)), x] - Dist[(2*b)/(Sqrt[Pi]*d*
(m + 1)), Int[(c + d*x)^(m + 1)*E^(a + b*x)^2, x], x] /; FreeQ[{a, b, c, d,
 m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int (c+dx)\text{erfi}(a+bx)\,dx &= \frac{(c+dx)^2\text{erfi}(a+bx)}{2d} - \frac{b\int e^{(a+bx)^2}(c+dx)^2\,dx}{d\sqrt{\pi}} \\ &= \frac{(c+dx)^2\text{erfi}(a+bx)}{2d} - \frac{b\int\left(\frac{(bc-ad)^2e^{(a+bx)^2}}{b^2}+\frac{2d(bc-ad)e^{(a+bx)^2}(a+bx)}{b^2}+\frac{d^2e^{(a+bx)^2}(a+bx)^2}{b^2}\right)dx}{d\sqrt{\pi}} \\ &= \frac{(c+dx)^2\text{erfi}(a+bx)}{2d} - \frac{d\int e^{(a+bx)^2}(a+bx)^2\,dx}{b\sqrt{\pi}} - \frac{(2(bc-ad))\int e^{(a+bx)^2}(a+bx)\,dx}{b\sqrt{\pi}} - \\ &= -\frac{(bc-ad)e^{(a+bx)^2}}{b^2\sqrt{\pi}} - \frac{de^{(a+bx)^2}(a+bx)}{2b^2\sqrt{\pi}} - \frac{(bc-ad)^2\text{erfi}(a+bx)}{2b^2d} + \frac{(c+dx)^2\text{erfi}(a+bx}{2d} \\ &= -\frac{(bc-ad)e^{(a+bx)^2}}{b^2\sqrt{\pi}} - \frac{de^{(a+bx)^2}(a+bx)}{2b^2\sqrt{\pi}} + \frac{d\text{erfi}(a+bx)}{4b^2} - \frac{(bc-ad)^2\text{erfi}(a+bx)}{2b^2d} + \frac{(c+}{}\end{aligned}$$

Mathematica [A] time = 0.09, size = 78, normalized size = 0.68

$$\frac{\sqrt{\pi}\,\text{erfi}(a+bx)\left(-2a^2d+4abc+4b^2cx+2b^2dx^2+d\right)-2e^{(a+bx)^2}(-ad+2bc+bdx)}{4\sqrt{\pi}\,b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(c + d*x)*Erfi[a + b*x],x]
```

```
[Out] (-2*E^(a + b*x)^2*(2*b*c - a*d + b*d*x) + Sqrt[Pi]*(4*a*b*c + d - 2*a^2*d +
 4*b^2*c*x + 2*b^2*d*x^2)*Erfi[a + b*x])/(4*b^2*Sqrt[Pi])
```

fricas [A] time = 0.42, size = 89, normalized size = 0.77

$$-\frac{2\sqrt{\pi}\,(bdx+2\,bc-ad)e^{\left(b^2x^2+2\,abx+a^2\right)}-\left(2\,\pi b^2dx^2+4\,\pi b^2cx+\pi\left(4\,abc-\left(2\,a^2-1\right)d\right)\right)\operatorname{erfi}\left(bx+a\right)}{4\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)*erfi(b*x+a),x, algorithm="fricas")
```

```
[Out] -1/4*(2*sqrt(pi)*(b*d*x + 2*b*c - a*d)*e^(b^2*x^2 + 2*a*b*x + a^2) - (2*pi*
b^2*d*x^2 + 4*pi*b^2*c*x + pi*(4*a*b*c - (2*a^2 - 1)*d))*erfi(b*x + a))/(pi
*b^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx+c)\operatorname{erfi}\left(bx+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)*erfi(b*x+a),x, algorithm="giac")
```

```
[Out] integrate((d*x + c)*erfi(b*x + a), x)
```

maple [A] time = 0.00, size = 117, normalized size = 1.02

$$\frac{\frac{\operatorname{erfi}(bx+a)(bx+a)^2d}{2b}-\frac{\operatorname{erfi}(bx+a)ad(bx+a)}{b}+\operatorname{erfi}\left(bx+a\right)c\left(bx+a\right)-\frac{d\left(\frac{(bx+a)\mathrm{e}^{(bx+a)^2}}{2}-\frac{\sqrt{\pi}\ \operatorname{erfi}(bx+a)}{4}\right)-ad\ \mathrm{e}^{(bx+a)^2}+\mathrm{e}^{(bx+a)^2}bc}{\sqrt{\pi}\ b}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x+c)*erfi(b*x+a),x)
```

```
[Out] 1/b*(1/2/b*erfi(b*x+a)*(b*x+a)^2*d-1/b*erfi(b*x+a)*a*d*(b*x+a)+erfi(b*x+a)*
c*(b*x+a)-1/Pi^(1/2)/b*(d*(1/2*(b*x+a)*exp((b*x+a)^2)-1/4*Pi^(1/2)*erfi(b*x
+a))-a*d*exp((b*x+a)^2)+exp((b*x+a)^2)*b*c))
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx+c)\operatorname{erfi}\left(bx+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)*erfi(b*x+a),x, algorithm="maxima")
```

```
[Out] integrate((d*x + c)*erfi(b*x + a), x)
```

mupad [B] time = 0.33, size = 106, normalized size = 0.92

$$\frac{\frac{e^{a^2+2\,a\,b\,x+b^2\,x^2}\,\left(\frac{a\,d}{2}-b\,c\right)}{b^2}-\frac{d\,x\,e^{a^2+2\,a\,b\,x+b^2\,x^2}}{2\,b}}{\sqrt{\pi}}+\mathrm{erfi}\left(a+b\,x\right)\,\left(\frac{d\,x^2}{2}+c\,x\right)+\frac{\mathrm{erfi}\left(a+b\,x\right)\,\left(-2\,d\,a^2\,b+4\,c\,a\,b^2+d\,b\right)}{4\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)*(c + d*x),x)
```

```
[Out] ((exp(a^2 + b^2*x^2 + 2*a*b*x)*((a*d)/2 - b*c))/b^2 - (d*x*exp(a^2 + b^2*x^
2 + 2*a*b*x))/(2*b))/pi^(1/2) + erfi(a + b*x)*(c*x + (d*x^2)/2) + (erfi(a +
 b*x)*(b*d + 4*a*b^2*c - 2*a^2*b*d))/(4*b^3)
```

sympy [A] time = 1.07, size = 178, normalized size = 1.55

$$\begin{cases} -\frac{a^2 d \,\mathrm{erfi}\,(a+bx)}{2b^2} + \frac{ac \,\mathrm{erfi}\,(a+bx)}{b} + \frac{ade^{a^2}e^{b^2x^2}e^{2abx}}{2\sqrt{\pi}\,b^2} + cx\,\mathrm{erfi}\,(a+bx) + \frac{dx^2\,\mathrm{erfi}\,(a+bx)}{2} - \frac{ce^{a^2}e^{b^2x^2}e^{2abx}}{\sqrt{\pi}\,b} - \frac{dxe^{a^2}e^{b^2x^2}e^{2abx}}{2\sqrt{\pi}\,b} + \frac{d\,\mathrm{erfi}\,(a+}{4b^2} \\ \left(cx + \frac{dx^2}{2}\right)\mathrm{erfi}\,(a) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)*erfi(b*x+a),x)
```

```
[Out] Piecewise((-a**2*d*erfi(a + b*x)/(2*b**2) + a*c*erfi(a + b*x)/b + a*d*exp(a
**2)*exp(b**2*x**2)*exp(2*a*b*x)/(2*sqrt(pi)*b**2) + c*x*erfi(a + b*x) + d*
x**2*erfi(a + b*x)/2 - c*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(sqrt(pi)*b)
 - d*x*exp(a**2)*exp(b**2*x**2)*exp(2*a*b*x)/(2*sqrt(pi)*b) + d*erfi(a + b*
x)/(4*b**2), Ne(b, 0)), ((c*x + d*x**2/2)*erfi(a), True))
```

3.224 $\int \textbf{erfi}(a+bx)\,dx$

Optimal. Leaf size=35

$$\frac{(a+bx)\text{erfi}(a+bx)}{b}-\frac{e^{(a+bx)^2}}{\sqrt{\pi}\,b}$$

```
[Out] (b*x+a)*erfi(b*x+a)/b-exp((b*x+a)^2)/b/Pi^(1/2)
```

Rubi [A] time = 0.01, antiderivative size = 35, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6351}

$$\frac{(a+bx)\text{Erfi}(a+bx)}{b}-\frac{e^{(a+bx)^2}}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[a + b*x],x]
[Out] -(E^(a + b*x)^2/(b*Sqrt[Pi])) + ((a + b*x)*Erfi[a + b*x])/b
```

Rule 6351

```
Int[Erfi[(a_.) + (b_.)*(x_)], x_Symbol] :> Simp[((a + b*x)*Erfi[a + b*x])/b
, x] - Simp[E^(a + b*x)^2/(b*Sqrt[Pi]), x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\int \text{erfi}(a+bx)\,dx=-\frac{e^{(a+bx)^2}}{b\sqrt{\pi}}+\frac{(a+bx)\text{erfi}(a+bx)}{b}$$

Mathematica [A] time = 0.05, size = 33, normalized size = 0.94

$$\frac{(a+bx)\text{erfi}(a+bx)-\frac{e^{(a+bx)^2}}{\sqrt{\pi}}}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[a + b*x],x]
[Out] (-(E^(a + b*x)^2/Sqrt[Pi]) + (a + b*x)*Erfi[a + b*x])/b
```

fricas [A] time = 0.41, size = 45, normalized size = 1.29

$$\frac{(\pi bx + \pi a)\,\mathrm{erfi}\,(bx + a) - \sqrt{\pi}\,e^{\left(b^2x^2 + 2\,abx + a^2\right)}}{\pi b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a),x, algorithm="fricas")
```

```
[Out] ((pi*b*x + pi*a)*erfi(b*x + a) - sqrt(pi)*e^(b^2*x^2 + 2*a*b*x + a^2))/(pi*
b)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{erfi}\,(bx + a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x + a), x)
```

maple [A] time = 0.00, size = 31, normalized size = 0.89

$$\frac{(bx + a)\,\mathrm{erfi}\,(bx + a) - \frac{\mathrm{e}^{(bx+a)^2}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x+a),x)
```

```
[Out] 1/b*((b*x+a)*erfi(b*x+a)-1/Pi^(1/2)*exp((b*x+a)^2))
```

maxima [A] time = 0.31, size = 30, normalized size = 0.86

$$\frac{(bx + a)\,\mathrm{erfi}\,(bx + a) - \frac{e^{\left((bx+a)^2\right)}}{\sqrt{\pi}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a),x, algorithm="maxima")
```

```
[Out] ((b*x + a)*erfi(b*x + a) - e^((b*x + a)^2)/sqrt(pi))/b
```

mupad [B] time = 0.14, size = 46, normalized size = 1.31

$$x\,\mathrm{erfi}\left(a+b\,x\right)+\frac{a\,\mathrm{erfi}\left(a+b\,x\right)}{b}-\frac{\mathrm{e}^{a^2}\,\mathrm{e}^{b^2\,x^2}\,\mathrm{e}^{2\,a\,b\,x}}{b\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x),x)
```

```
[Out] x*erfi(a + b*x) + (a*erfi(a + b*x))/b - (exp(a^2)*exp(b^2*x^2)*exp(2*a*b*x)
)/(b*pi^(1/2))
```

sympy [A] time = 0.32, size = 51, normalized size = 1.46

$$\begin{cases} \frac{a\,\mathrm{erfi}\left(a+bx\right)}{b}+x\,\mathrm{erfi}\left(a+bx\right)-\frac{e^{a^2}e^{b^2x^2}e^{2abx}}{\sqrt{\pi}\,b} & \text{for } b\neq 0 \\ x\,\mathrm{erfi}\left(a\right) & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a),x)
```

```
[Out] Piecewise((a*erfi(a + b*x)/b + x*erfi(a + b*x) - exp(a**2)*exp(b**2*x**2)*e
xp(2*a*b*x)/(sqrt(pi)*b), Ne(b, 0)), (x*erfi(a), True))
```

3.225 $\int \frac{\text{erfi}(a+bx)}{c+dx} \, dx$

Optimal. Leaf size=17

$$\text{Int}\left(\frac{\text{erfi}(a+bx)}{c+dx},x\right)$$

```
[Out] Unintegrable(erfi(b*x+a)/(d*x+c),x)
```

Rubi [A] time = 0.01, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfi}(a+bx)}{c+dx} \, dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfi[a + b*x]/(c + d*x),x]
[Out] Defer[Int][Erfi[a + b*x]/(c + d*x), x]
```

Rubi steps

$$\int \frac{\text{erfi}(a+bx)}{c+dx} \, dx = \int \frac{\text{erfi}(a+bx)}{c+dx} \, dx$$

Mathematica [A] time = 1.26, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}(a+bx)}{c+dx} \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[a + b*x]/(c + d*x),x]
[Out] Integrate[Erfi[a + b*x]/(c + d*x), x]
```

fricas [A] time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\left(bx+a\right)}{dx+c},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c),x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x + a)/(d*x + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c),x, algorithm="giac")
[Out] integrate(erfi(b*x + a)/(d*x + c), x)
```

maple [A] time = 0.08, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x+a)/(d*x+c),x)
[Out] int(erfi(b*x+a)/(d*x+c),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c),x, algorithm="maxima")
[Out] integrate(erfi(b*x + a)/(d*x + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{\operatorname{erfi}(a+b\,x)}{c+d\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)/(c + d*x),x)
[Out] int(erfi(a + b*x)/(c + d*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(a+bx)}{c+dx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c),x)
```

```
[Out] Integral(erfi(a + b*x)/(c + d*x), x)
```

3.226 $\int \frac{\mathbf{erfi}(a+bx)}{(c+dx)^2}\,dx$

Optimal. Leaf size=50

$$\frac{2b\operatorname{Int}\left(\frac{e^{(a+bx)^2}}{c+dx},x\right)}{\sqrt{\pi}\,d}-\frac{\operatorname{erfi}(a+bx)}{d(c+dx)}$$

```
[Out] -erfi(b*x+a)/d/(d*x+c)+2*b*Unintegrable(exp((b*x+a)^2)/(d*x+c),x)/d/Pi^(1/2
)
```

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\operatorname{Erfi}(a+bx)}{(c+dx)^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfi[a + b*x]/(c + d*x)^2,x]
```

```
[Out] -(Erfi[a + b*x]/(d*(c + d*x))) + (2*b*Defer[Int][E^(a + b*x)^2/(c + d*x), x
])/(d*Sqrt[Pi])
```

Rubi steps

$$\int \frac{\operatorname{erfi}(a+bx)}{(c+dx)^2}\,dx=-\frac{\operatorname{erfi}(a+bx)}{d(c+dx)}+\frac{(2b)\int \frac{e^{(a+bx)^2}}{c+dx}\,dx}{d\sqrt{\pi}}$$

Mathematica [A] time = 0.36, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(a+bx)}{(c+dx)^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[a + b*x]/(c + d*x)^2,x]
```

```
[Out] Integrate[Erfi[a + b*x]/(c + d*x)^2, x]
```

fricas [A] time = 0.49, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erfi}(bx+a)}{d^2x^2+2\,cdx+c^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c)^2,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x + a)/(d^2*x^2 + 2*c*d*x + c^2), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c)^2,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x + a)/(d*x + c)^2, x)
```

maple [A] time = 0.10, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x+a)/(d*x+c)^2,x)
```

```
[Out] int(erfi(b*x+a)/(d*x+c)^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c)^2,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x + a)/(d*x + c)^2, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{\operatorname{erfi}(a+b\,x)}{(c+d\,x)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)/(c + d*x)^2,x)
```

```
[Out] int(erfi(a + b*x)/(c + d*x)^2, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(a+bx)}{(c+dx)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c)**2,x)
[Out] Integral(erfi(a + b*x)/(c + d*x)**2, x)
```

3.227 $\int \frac{\operatorname{erfi}(a+bx)}{(c+dx)^3}\,dx$

Optimal. Leaf size=102

$$-\frac{2b^2(bc-ad)\text{Int}\left(\frac{e^{(a+bx)^2}}{c+dx},x\right)}{\sqrt{\pi}\,d^3}+\frac{b^2\operatorname{erfi}(a+bx)}{d^3}-\frac{be^{(a+bx)^2}}{\sqrt{\pi}\,d^2(c+dx)}-\frac{\operatorname{erfi}(a+bx)}{2d(c+dx)^2}$$

```
[Out] b^2*erfi(b*x+a)/d^3-1/2*erfi(b*x+a)/d/(d*x+c)^2-b*exp((b*x+a)^2)/d^2/(d*x+c
)/Pi^(1/2)-2*b^2*(-a*d+b*c)*Unintegrable(exp((b*x+a)^2)/(d*x+c),x)/d^3/Pi^(
1/2)
```

Rubi [A] time = 0.07, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\operatorname{Erfi}(a+bx)}{(c+dx)^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfi[a + b*x]/(c + d*x)^3,x]
```

```
[Out] -((b*E^(a + b*x)^2)/(d^2*Sqrt[Pi]*(c + d*x))) + (b^2*Erfi[a + b*x])/d^3 - E
rfi[a + b*x]/(2*d*(c + d*x)^2) - (2*b^2*(b*c - a*d)*Defer[Int][E^(a + b*x)^
2/(c + d*x), x])/(d^3*Sqrt[Pi])
```

Rubi steps

$$\begin{aligned}
\int \frac{\operatorname{erfi}(a+bx)}{(c+dx)^3}\,dx &= -\frac{\operatorname{erfi}(a+bx)}{2d(c+dx)^2}+\frac{b\int \frac{e^{(a+bx)^2}}{(c+dx)^2}\,dx}{d\sqrt{\pi}}\\
&= -\frac{be^{(a+bx)^2}}{d^2\sqrt{\pi}\,(c+dx)}-\frac{\operatorname{erfi}(a+bx)}{2d(c+dx)^2}+\frac{\left(2b^3\right)\int e^{(a+bx)^2}\,dx}{d^3\sqrt{\pi}}-\frac{\left(2b^2(bc-ad)\right)\int \frac{e^{(a+bx)^2}}{c+dx}\,dx}{d^3\sqrt{\pi}}\\
&= -\frac{be^{(a+bx)^2}}{d^2\sqrt{\pi}\,(c+dx)}+\frac{b^2\operatorname{erfi}(a+bx)}{d^3}-\frac{\operatorname{erfi}(a+bx)}{2d(c+dx)^2}-\frac{\left(2b^2(bc-ad)\right)\int \frac{e^{(a+bx)^2}}{c+dx}\,dx}{d^3\sqrt{\pi}}
\end{aligned}$$

Mathematica [A] time = 0.64, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(a+bx)}{(c+dx)^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[a + b*x]/(c + d*x)^3,x]
[Out] Integrate[Erfi[a + b*x]/(c + d*x)^3, x]
```

fricas [A] time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx+a)}{d^3x^3+3\,cd^2x^2+3\,c^2dx+c^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c)^3,x, algorithm="fricas")
[Out] integral(erfi(b*x + a)/(d^3*x^3 + 3*c*d^2*x^2 + 3*c^2*d*x + c^3), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx+a)}{(dx+c)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c)^3,x, algorithm="giac")
[Out] integrate(erfi(b*x + a)/(d*x + c)^3, x)
```

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx+a)}{(dx+c)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x+a)/(d*x+c)^3,x)
[Out] int(erfi(b*x+a)/(d*x+c)^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx+a)}{(dx+c)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c)^3,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x + a)/(d*x + c)^3, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{erfi}\left(a+b\,x\right)}{{\left(c+d\,x\right)}^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)/(c + d*x)^3,x)
```

```
[Out] int(erfi(a + b*x)/(c + d*x)^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfi}\left(a+bx\right)}{\left(c+dx\right)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)/(d*x+c)**3,x)
```

```
[Out] Integral(erfi(a + b*x)/(c + d*x)**3, x)
```

3.228 $\int x^5 \mathbf{erfi}(bx)^2\,dx$

Optimal. Leaf size=175

$$\frac{5\text{erfi}(bx)^2}{16b^6}-\frac{x^5e^{b^2x^2}\text{erfi}(bx)}{3\sqrt{\pi}\,b}+\frac{x^4e^{2b^2x^2}}{6\pi b^2}+\frac{11e^{2b^2x^2}}{12\pi b^6}-\frac{5xe^{b^2x^2}\text{erfi}(bx)}{4\sqrt{\pi}\,b^5}-\frac{7x^2e^{2b^2x^2}}{12\pi b^4}+\frac{5x^3e^{b^2x^2}\text{erfi}(bx)}{6\sqrt{\pi}\,b^3}+\frac{1}{6}x^6\text{erfi}(bx)^2$$

```
[Out] 11/12*exp(2*b^2*x^2)/b^6/Pi-7/12*exp(2*b^2*x^2)*x^2/b^4/Pi+1/6*exp(2*b^2*x^
2)*x^4/b^2/Pi+5/16*erfi(b*x)^2/b^6+1/6*x^6*erfi(b*x)^2-5/4*exp(b^2*x^2)*x*e
rfi(b*x)/b^5/Pi^(1/2)+5/6*exp(b^2*x^2)*x^3*erfi(b*x)/b^3/Pi^(1/2)-1/3*exp(b
^2*x^2)*x^5*erfi(b*x)/b/Pi^(1/2)
```

Rubi [A] time = 0.26, antiderivative size = 175, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {6366, 6387, 6375, 30, 2209, 2212}

$$-\frac{x^5e^{b^2x^2}\text{Erfi}(bx)}{3\sqrt{\pi}\,b}+\frac{5x^3e^{b^2x^2}\text{Erfi}(bx)}{6\sqrt{\pi}\,b^3}-\frac{5xe^{b^2x^2}\text{Erfi}(bx)}{4\sqrt{\pi}\,b^5}+\frac{5\text{Erfi}(bx)^2}{16b^6}+\frac{x^4e^{2b^2x^2}}{6\pi b^2}-\frac{7x^2e^{2b^2x^2}}{12\pi b^4}+\frac{11e^{2b^2x^2}}{12\pi b^6}+\frac{1}{6}x^6\text{Erfi}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^5*Erfi[b*x]^2,x]
```

```
[Out] (11*E^(2*b^2*x^2))/(12*b^6*Pi) - (7*E^(2*b^2*x^2)*x^2)/(12*b^4*Pi) + (E^(2*
b^2*x^2)*x^4)/(6*b^2*Pi) - (5*E^(b^2*x^2)*x*Erfi[b*x])/(4*b^5*Sqrt[Pi]) + (
5*E^(b^2*x^2)*x^3*Erfi[b*x])/(6*b^3*Sqrt[Pi]) - (E^(b^2*x^2)*x^5*Erfi[b*x])
/(3*b*Sqrt[Pi]) + (5*Erfi[b*x]^2)/(16*b^6) + (x^6*Erfi[b*x]^2)/6
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
```

```
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int x^5\text{erfi}(bx)^2\,dx = \frac{1}{6}x^6\text{erfi}(bx)^2 - \frac{(2b)\int e^{b^2x^2}x^6\text{erfi}(bx)\,dx}{3\sqrt{\pi}}$$
$$= -\frac{e^{b^2x^2}x^5\text{erfi}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6\text{erfi}(bx)^2 + \frac{2\int e^{2b^2x^2}x^5\,dx}{3\pi} + \frac{5\int e^{b^2x^2}x^4\text{erfi}(bx)\,dx}{3b\sqrt{\pi}}$$
$$= \frac{e^{2b^2x^2}x^4}{6b^2\pi} + \frac{5e^{b^2x^2}x^3\text{erfi}(bx)}{6b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^5\text{erfi}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6\text{erfi}(bx)^2 - \frac{2\int e^{2b^2x^2}x^3\,dx}{3b^2\pi} - \frac{5\int e^{2b^2x^2}x^3}{3b^2\pi}$$
$$= -\frac{7e^{2b^2x^2}x^2}{12b^4\pi} + \frac{e^{2b^2x^2}x^4}{6b^2\pi} - \frac{5e^{b^2x^2}x\text{erfi}(bx)}{4b^5\sqrt{\pi}} + \frac{5e^{b^2x^2}x^3\text{erfi}(bx)}{6b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^5\text{erfi}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6\text{erfi}(bx)^2$$
$$= \frac{11e^{2b^2x^2}}{12b^6\pi} - \frac{7e^{2b^2x^2}x^2}{12b^4\pi} + \frac{e^{2b^2x^2}x^4}{6b^2\pi} - \frac{5e^{b^2x^2}x\text{erfi}(bx)}{4b^5\sqrt{\pi}} + \frac{5e^{b^2x^2}x^3\text{erfi}(bx)}{6b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^5\text{erfi}(bx)}{3b\sqrt{\pi}} + \frac{1}{6}x^6$$
$$= \frac{11e^{2b^2x^2}}{12b^6\pi} - \frac{7e^{2b^2x^2}x^2}{12b^4\pi} + \frac{e^{2b^2x^2}x^4}{6b^2\pi} - \frac{5e^{b^2x^2}x\text{erfi}(bx)}{4b^5\sqrt{\pi}} + \frac{5e^{b^2x^2}x^3\text{erfi}(bx)}{6b^3\sqrt{\pi}} - \frac{e^{b^2x^2}x^5\text{erfi}(bx)}{3b\sqrt{\pi}} + \frac{5\text{erf}}{16}$$

Mathematica [A] time = 0.05, size = 99, normalized size = 0.57

$$\frac{\pi\left(8b^6x^6+15\right)\operatorname{erfi}(bx)^2-4\sqrt{\pi}\,bxe^{b^2x^2}\left(4b^4x^4-10b^2x^2+15\right)\operatorname{erfi}(bx)+4e^{2b^2x^2}\left(2b^4x^4-7b^2x^2+11\right)}{48\pi b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*Erfi[b*x]^2,x]
```

```
[Out] (4*E^(2*b^2*x^2)*(11 - 7*b^2*x^2 + 2*b^4*x^4) - 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*
(15 - 10*b^2*x^2 + 4*b^4*x^4)*Erfi[b*x] + Pi*(15 + 8*b^6*x^6)*Erfi[b*x]^2)/
(48*b^6*Pi)
```

fricas [A] time = 0.42, size = 97, normalized size = 0.55

$$-\frac{4\sqrt{\pi}\left(4\,b^5x^5-10\,b^3x^3+15\,bx\right)\operatorname{erfi}(bx)\,e^{\left(b^2x^2\right)}-\left(15\,\pi+8\,\pi b^6x^6\right)\operatorname{erfi}(bx)^2-4\left(2\,b^4x^4-7\,b^2x^2+11\right)e^{\left(2\,b^2x^2\right)}}{48\,\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfi(b*x)^2,x, algorithm="fricas")
```

```
[Out] -1/48*(4*sqrt(pi)*(4*b^5*x^5 - 10*b^3*x^3 + 15*b*x)*erfi(b*x)*e^(b^2*x^2) -
 (15*pi + 8*pi*b^6*x^6)*erfi(b*x)^2 - 4*(2*b^4*x^4 - 7*b^2*x^2 + 11)*e^(2*b
^2*x^2))/(pi*b^6)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5\operatorname{erfi}(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfi(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^5*erfi(b*x)^2, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int x^5\operatorname{erfi}(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfi(b*x)^2,x)
```

```
[Out] int(x^5*erfi(b*x)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5 \operatorname{erfi}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfi(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x^5*erfi(b*x)^2, x)
```

mupad [B] time = 0.30, size = 139, normalized size = 0.79

$$\frac{x^6 \operatorname{erfi}(b\,x)^2}{6}+\frac{\frac{11\,e^{2\,b^2\,x^2}}{12}+\frac{5\,\pi\,\operatorname{erfi}(b\,x)^2}{16}-\frac{7\,b^2\,x^2\,e^{2\,b^2\,x^2}}{12}+\frac{b^4\,x^4\,e^{2\,b^2\,x^2}}{6}+\frac{5\,b^3\,x^3\,\sqrt{\pi}\,e^{b^2\,x^2}\,\operatorname{erfi}(b\,x)}{6}-\frac{b^5\,x^5\,\sqrt{\pi}\,e^{b^2\,x^2}\,\operatorname{erfi}(b\,x)}{3}-\frac{5\,b\,x\,\sqrt{}}{}}{b^6\,\pi}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfi(b*x)^2,x)
```

```
[Out] (x^6*erfi(b*x)^2)/6 + ((11*exp(2*b^2*x^2))/12 + (5*pi*erfi(b*x)^2)/16 - (7*
b^2*x^2*exp(2*b^2*x^2))/12 + (b^4*x^4*exp(2*b^2*x^2))/6 + (5*b^3*x^3*pi^(1/
2)*exp(b^2*x^2)*erfi(b*x))/6 - (b^5*x^5*pi^(1/2)*exp(b^2*x^2)*erfi(b*x))/3
- (5*b*x*pi^(1/2)*exp(b^2*x^2)*erfi(b*x))/4)/(b^6*pi)
```

sympy [A] time = 4.65, size = 168, normalized size = 0.96

$$\begin{cases} \frac{x^6 \operatorname{erfi}^2(bx)}{6} - \frac{x^5 e^{b^2x^2} \operatorname{erfi}(bx)}{3\sqrt{\pi}\,b} + \frac{x^4 e^{2b^2x^2}}{6\pi b^2} + \frac{5x^3 e^{b^2x^2} \operatorname{erfi}(bx)}{6\sqrt{\pi}\,b^3} - \frac{7x^2 e^{2b^2x^2}}{12\pi b^4} - \frac{5x e^{b^2x^2} \operatorname{erfi}(bx)}{4\sqrt{\pi}\,b^5} + \frac{11 e^{2b^2x^2}}{12\pi b^6} + \frac{5 \operatorname{erfi}^2(bx)}{16 b^6} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*erfi(b*x)**2,x)
```

```
[Out] Piecewise((x**6*erfi(b*x)**2/6 - x**5*exp(b**2*x**2)*erfi(b*x)/(3*sqrt(pi)*
b) + x**4*exp(2*b**2*x**2)/(6*pi*b**2) + 5*x**3*exp(b**2*x**2)*erfi(b*x)/(6
*sqrt(pi)*b**3) - 7*x**2*exp(2*b**2*x**2)/(12*pi*b**4) - 5*x*exp(b**2*x**2)
*erfi(b*x)/(4*sqrt(pi)*b**5) + 11*exp(2*b**2*x**2)/(12*pi*b**6) + 5*erfi(b*
x)**2/(16*b**6), Ne(b, 0)), (0, True))
```

3.229 $\int x^3 \textbf{erfi}(bx)^2\,dx$

Optimal. Leaf size=124

$$-\frac{3\text{erfi}(bx)^2}{16b^4}-\frac{x^3e^{b^2x^2}\text{erfi}(bx)}{2\sqrt{\pi}\,b}+\frac{x^2e^{2b^2x^2}}{4\pi b^2}-\frac{e^{2b^2x^2}}{2\pi b^4}+\frac{3xe^{b^2x^2}\text{erfi}(bx)}{4\sqrt{\pi}\,b^3}+\frac{1}{4}x^4\text{erfi}(bx)^2$$

```
[Out] -1/2*exp(2*b^2*x^2)/b^4/Pi+1/4*exp(2*b^2*x^2)*x^2/b^2/Pi-3/16*erfi(b*x)^2/b
^4+1/4*x^4*erfi(b*x)^2+3/4*exp(b^2*x^2)*x*erfi(b*x)/b^3/Pi^(1/2)-1/2*exp(b^
2*x^2)*x^3*erfi(b*x)/b/Pi^(1/2)
```

Rubi [A] time = 0.16, antiderivative size = 124, 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 = {6366, 6387, 6375, 30, 2209, 2212}

$$-\frac{x^3e^{b^2x^2}\text{Erfi}(bx)}{2\sqrt{\pi}\,b}+\frac{3xe^{b^2x^2}\text{Erfi}(bx)}{4\sqrt{\pi}\,b^3}-\frac{3\text{Erfi}(bx)^2}{16b^4}+\frac{x^2e^{2b^2x^2}}{4\pi b^2}-\frac{e^{2b^2x^2}}{2\pi b^4}+\frac{1}{4}x^4\text{Erfi}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^3*Erfi[b*x]^2,x]
```

```
[Out] -E^(2*b^2*x^2)/(2*b^4*Pi) + (E^(2*b^2*x^2)*x^2)/(4*b^2*Pi) + (3*E^(b^2*x^2)
*x*Erfi[b*x])/(4*b^3*Sqrt[Pi]) - (E^(b^2*x^2)*x^3*Erfi[b*x])/(2*b*Sqrt[Pi])
 - (3*Erfi[b*x]^2)/(16*b^4) + (x^4*Erfi[b*x]^2)/4
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
```

```
0])
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}
\int x^3\text{erfi}(bx)^2\,dx &= \frac{1}{4}x^4\text{erfi}(bx)^2-\frac{b\int e^{b^2x^2}x^4\text{erfi}(bx)\,dx}{\sqrt{\pi}}\\
&= -\frac{e^{b^2x^2}x^3\text{erfi}(bx)}{2b\sqrt{\pi}}+\frac{1}{4}x^4\text{erfi}(bx)^2+\frac{\int e^{2b^2x^2}x^3\,dx}{\pi}+\frac{3\int e^{b^2x^2}x^2\text{erfi}(bx)\,dx}{2b\sqrt{\pi}}\\
&= \frac{e^{2b^2x^2}x^2}{4b^2\pi}+\frac{3e^{b^2x^2}x\text{erfi}(bx)}{4b^3\sqrt{\pi}}-\frac{e^{b^2x^2}x^3\text{erfi}(bx)}{2b\sqrt{\pi}}+\frac{1}{4}x^4\text{erfi}(bx)^2-\frac{\int e^{2b^2x^2}x\,dx}{2b^2\pi}-\frac{3\int e^{2b^2x^2}x\,dx}{2b^2\pi}-\\
&= -\frac{e^{2b^2x^2}}{2b^4\pi}+\frac{e^{2b^2x^2}x^2}{4b^2\pi}+\frac{3e^{b^2x^2}x\text{erfi}(bx)}{4b^3\sqrt{\pi}}-\frac{e^{b^2x^2}x^3\text{erfi}(bx)}{2b\sqrt{\pi}}+\frac{1}{4}x^4\text{erfi}(bx)^2-\frac{3\,\text{Subst}(\int x\,dx,x,\text{er}}{8b^4}\\
&= -\frac{e^{2b^2x^2}}{2b^4\pi}+\frac{e^{2b^2x^2}x^2}{4b^2\pi}+\frac{3e^{b^2x^2}x\text{erfi}(bx)}{4b^3\sqrt{\pi}}-\frac{e^{b^2x^2}x^3\text{erfi}(bx)}{2b\sqrt{\pi}}-\frac{3\text{erfi}(bx)^2}{16b^4}+\frac{1}{4}x^4\text{erfi}(bx)^2
\end{aligned}$$

Mathematica [A] time = 0.03, size = 82, normalized size = 0.66

$$\frac{\pi\left(4b^4x^4-3\right)\text{erfi}(bx)^2-4\sqrt{\pi}\,bxe^{b^2x^2}\left(2b^2x^2-3\right)\text{erfi}(bx)+4e^{2b^2x^2}\left(b^2x^2-2\right)}{16\pi b^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*Erfi[b*x]^2,x]
```

```
[Out] (4*E^(2*b^2*x^2)*(-2 + b^2*x^2) - 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(-3 + 2*b^2*x^
2)*Erfi[b*x] + Pi*(-3 + 4*b^4*x^4)*Erfi[b*x]^2)/(16*b^4*Pi)
```

fricas [A] time = 0.44, size = 79, normalized size = 0.64

$$-\frac{4\sqrt{\pi}\left(2\,b^3x^3-3\,bx\right)\operatorname{erfi}(bx)\,e^{\left(b^2x^2\right)}+\left(3\,\pi-4\,\pi b^4x^4\right)\operatorname{erfi}(bx)^2-4\left(b^2x^2-2\right)e^{\left(2\,b^2x^2\right)}}{16\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfi(b*x)^2,x, algorithm="fricas")
```

```
[Out] -1/16*(4*sqrt(pi)*(2*b^3*x^3 - 3*b*x)*erfi(b*x)*e^(b^2*x^2) + (3*pi - 4*pi*
b^4*x^4)*erfi(b*x)^2 - 4*(b^2*x^2 - 2)*e^(2*b^2*x^2))/(pi*b^4)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\operatorname{erfi}(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfi(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^3*erfi(b*x)^2, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int x^3\operatorname{erfi}(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfi(b*x)^2,x)
```

```
[Out] int(x^3*erfi(b*x)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\operatorname{erfi}(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfi(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x^3*erfi(b*x)^2, x)
```

mupad [B] time = 0.22, size = 100, normalized size = 0.81

$$\frac{x^4\,\mathrm{erfi}\left(b\,x\right)^2}{4}-\frac{\frac{\mathrm{e}^{2\,b^2\,x^2}}{2}+\frac{3\,\pi\,\mathrm{erfi}(b\,x)^2}{16}-\frac{b^2\,x^2\,\mathrm{e}^{2\,b^2\,x^2}}{4}+\frac{b^3\,x^3\,\sqrt{\pi}\,\mathrm{e}^{b^2\,x^2}\,\mathrm{erfi}(b\,x)}{2}-\frac{3\,b\,x\,\sqrt{\pi}\,\mathrm{e}^{b^2\,x^2}\,\mathrm{erfi}(b\,x)}{4}}{b^4\,\pi}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfi(b*x)^2,x)
```

```
[Out] (x^4*erfi(b*x)^2)/4 - (exp(2*b^2*x^2)/2 + (3*pi*erfi(b*x)^2)/16 - (b^2*x^2*
exp(2*b^2*x^2))/4 + (b^3*x^3*pi^(1/2)*exp(b^2*x^2)*erfi(b*x))/2 - (3*b*x*pi
^(1/2)*exp(b^2*x^2)*erfi(b*x))/4)/(b^4*pi)
```

sympy [A] time = 1.58, size = 116, normalized size = 0.94

$$\begin{cases} \frac{x^4\,\mathrm{erfi}^2\,(bx)}{4}-\frac{x^3e^{b^2x^2}\,\mathrm{erfi}\,(bx)}{2\sqrt{\pi}\,b}+\frac{x^2e^{2b^2x^2}}{4\pi b^2}+\frac{3xe^{b^2x^2}\,\mathrm{erfi}\,(bx)}{4\sqrt{\pi}\,b^3}-\frac{e^{2b^2x^2}}{2\pi b^4}-\frac{3\,\mathrm{erfi}^2\,(bx)}{16b^4} & \text{for } b\neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*erfi(b*x)**2,x)
```

```
[Out] Piecewise((x**4*erfi(b*x)**2/4 - x**3*exp(b**2*x**2)*erfi(b*x)/(2*sqrt(pi)*
b) + x**2*exp(2*b**2*x**2)/(4*pi*b**2) + 3*x*exp(b**2*x**2)*erfi(b*x)/(4*sq
rt(pi)*b**3) - exp(2*b**2*x**2)/(2*pi*b**4) - 3*erfi(b*x)**2/(16*b**4), Ne(
b, 0)), (0, True))
```

3.230 $\int x\,\mathbf{erfi}(bx)^2\,dx$

Optimal. Leaf size=71

$$-\frac{xe^{b^2x^2}\operatorname{erfi}(bx)}{\sqrt{\pi}\,b}+\frac{\operatorname{erfi}(bx)^2}{4b^2}+\frac{e^{2b^2x^2}}{2\pi b^2}+\frac{1}{2}x^2\operatorname{erfi}(bx)^2$$

```
[Out] 1/2*exp(2*b^2*x^2)/b^2/Pi+1/4*erfi(b*x)^2/b^2+1/2*x^2*erfi(b*x)^2-exp(b^2*x
^2)*x*erfi(b*x)/b/Pi^(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 71, 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 = {6366, 6387, 6375, 30, 2209}

$$-\frac{xe^{b^2x^2}\operatorname{Erfi}(bx)}{\sqrt{\pi}\,b}+\frac{\operatorname{Erfi}(bx)^2}{4b^2}+\frac{e^{2b^2x^2}}{2\pi b^2}+\frac{1}{2}x^2\operatorname{Erfi}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x*Erfi[b*x]^2,x]
```

```
[Out] E^(2*b^2*x^2)/(2*b^2*Pi) - (E^(b^2*x^2)*x*Erfi[b*x])/(b*Sqrt[Pi]) + Erfi[b*
x]^2/(4*b^2) + (x^2*Erfi[b*x]^2)/2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
```

```
}, x] && EqQ[d, b^2]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int x\text{erfi}(bx)^2\,dx &= \frac{1}{2}x^2\text{erfi}(bx)^2 - \frac{(2b)\int e^{b^2x^2}x^2\text{erfi}(bx)\,dx}{\sqrt{\pi}}\\ &= -\frac{e^{b^2x^2}x\text{erfi}(bx)}{b\sqrt{\pi}} + \frac{1}{2}x^2\text{erfi}(bx)^2 + \frac{2\int e^{2b^2x^2}x\,dx}{\pi} + \frac{\int e^{b^2x^2}\text{erfi}(bx)\,dx}{b\sqrt{\pi}}\\ &= \frac{e^{2b^2x^2}}{2b^2\pi} - \frac{e^{b^2x^2}x\text{erfi}(bx)}{b\sqrt{\pi}} + \frac{1}{2}x^2\text{erfi}(bx)^2 + \frac{\text{Subst}(\int x\,dx, x, \text{erfi}(bx))}{2b^2}\\ &= \frac{e^{2b^2x^2}}{2b^2\pi} - \frac{e^{b^2x^2}x\text{erfi}(bx)}{b\sqrt{\pi}} + \frac{\text{erfi}(bx)^2}{4b^2} + \frac{1}{2}x^2\text{erfi}(bx)^2\end{aligned}$$

Mathematica [A] time = 0.02, size = 63, normalized size = 0.89

$$\frac{\left(2\pi b^2x^2+\pi\right)\text{erfi}(bx)^2 - 4\sqrt{\pi}\,bxe^{b^2x^2}\text{erfi}(bx) + 2e^{2b^2x^2}}{4\pi b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Erfi[b*x]^2,x]
```

```
[Out] (2*E^(2*b^2*x^2) - 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*Erfi[b*x] + (Pi + 2*b^2*Pi*x^
2)*Erfi[b*x]^2)/(4*b^2*Pi)
```

fricas [A] time = 0.44, size = 58, normalized size = 0.82

$$-\frac{4\sqrt{\pi}\,bx\,\text{erfi}\,(bx)\,e^{\left(b^2x^2\right)} - \left(\pi + 2\,\pi b^2x^2\right)\text{erfi}\,(bx)^2 - 2\,e^{\left(2\,b^2x^2\right)}}{4\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x)^2,x, algorithm="fricas")
```

```
[Out] -1/4*(4*sqrt(pi)*b*x*erfi(b*x)*e^(b^2*x^2) - (pi + 2*pi*b^2*x^2)*erfi(b*x)^
2 - 2*e^(2*b^2*x^2))/(pi*b^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{erfi}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x*erfi(b*x)^2, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int x \operatorname{erfi}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfi(b*x)^2,x)
```

```
[Out] int(x*erfi(b*x)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{erfi}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x*erfi(b*x)^2, x)
```

mupad [B] time = 0.18, size = 66, normalized size = 0.93

$$\frac{\frac{b^2\,x^2\,\mathrm{erfi}(b\,x)^2}{2}+\frac{\mathrm{erfi}(b\,x)^2}{4}}{b^2}+\frac{\frac{\mathrm{e}^{2\,b^2\,x^2}}{2}-b\,x\,\sqrt{\pi }\,\mathrm{e}^{b^2\,x^2}\,\mathrm{erfi}\left(b\,x\right)}{b^2\,\pi }$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfi(b*x)^2,x)
```

```
[Out] (erfi(b*x)^2/4 + (b^2*x^2*erfi(b*x)^2)/2)/b^2 + (exp(2*b^2*x^2)/2 - b*x*pi^
(1/2)*exp(b^2*x^2)*erfi(b*x))/(b^2*pi)
```

sympy [A] time = 0.40, size = 63, normalized size = 0.89

$$\begin{cases} \frac{x^2 \operatorname{erfi}^2(bx)}{2} - \frac{xe^{b^2x^2} \operatorname{erfi}(bx)}{\sqrt{\pi}\, b} + \frac{e^{2b^2x^2}}{2\pi b^2} + \frac{\operatorname{erfi}^2(bx)}{4b^2} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x)**2,x)
```

```
[Out] Piecewise((x**2*erfi(b*x)**2/2 - x*exp(b**2*x**2)*erfi(b*x)/(sqrt(pi)*b) +
exp(2*b**2*x**2)/(2*pi*b**2) + erfi(b*x)**2/(4*b**2), Ne(b, 0)), (0, True))
```

3.231 $\int \frac{\text{erfi}(bx)^2}{x} \, dx$

Optimal. Leaf size=13

$$\text{Int}\left(\frac{\text{erfi}(bx)^2}{x},x\right)$$

```
[Out] Unintegrable(erfi(b*x)^2/x,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfi}(bx)^2}{x} \, dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfi[b*x]^2/x,x]
```

```
[Out] Defer[Int][Erfi[b*x]^2/x, x]
```

Rubi steps

$$\int \frac{\text{erfi}(bx)^2}{x} \, dx = \int \frac{\text{erfi}(bx)^2}{x} \, dx$$

Mathematica [A] time = 0.03, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}(bx)^2}{x} \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[b*x]^2/x,x]
```

```
[Out] Integrate[Erfi[b*x]^2/x, x]
```

fricas [A] time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)^2}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x,x, algorithm="fricas")
[Out] integral(erfi(b*x)^2/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x,x, algorithm="giac")
[Out] integrate(erfi(b*x)^2/x, x)
```

maple [A] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x,x)
[Out] int(erfi(b*x)^2/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x,x, algorithm="maxima")
[Out] integrate(erfi(b*x)^2/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erfi}(b\,x)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x,x)
[Out] int(erfi(b*x)^2/x, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}^2(bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)**2/x,x)
```

```
[Out] Integral(erfi(b*x)**2/x, x)
```

3.232 $\int \frac{\text{erfi}(bx)^2}{x^3} dx$

Optimal. Leaf size=65

$$-\frac{2be^{b^2x^2}\text{erfi}(bx)}{\sqrt{\pi}x}+b^2\text{erfi}(bx)^2+\frac{2b^2\text{Ei}\left(2b^2x^2\right)}{\pi}-\frac{\text{erfi}(bx)^2}{2x^2}$$

```
[Out] 2*b^2*Ei(2*b^2*x^2)/Pi+b^2*erfi(b*x)^2-1/2*erfi(b*x)^2/x^2-2*b*exp(b^2*x^2)
*erfi(b*x)/x/Pi^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 65, 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 = {6366, 6393, 6375, 30, 2210}

$$-\frac{2be^{b^2x^2}\text{Erfi}(bx)}{\sqrt{\pi}x}+b^2\text{Erfi}(bx)^2+\frac{2b^2\text{Ei}\left(2b^2x^2\right)}{\pi}-\frac{\text{Erfi}(bx)^2}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]^2/x^3,x]
```

```
[Out] (-2*b*E^(b^2*x^2)*Erfi[b*x])/(Sqrt[Pi]*x) + b^2*Erfi[b*x]^2 - Erfi[b*x]^2/(
2*x^2) + (2*b^2*ExpIntegralEi[2*b^2*x^2])/Pi
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
```

```
}, x] && EqQ[d, b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\operatorname{erfi}(bx)^2}{x^3}\,dx &= -\frac{\operatorname{erfi}(bx)^2}{2x^2} + \frac{(2b)\int \frac{e^{b^2x^2}\operatorname{erfi}(bx)}{x^2}\,dx}{\sqrt{\pi}} \\
&= -\frac{2be^{b^2x^2}\operatorname{erfi}(bx)}{\sqrt{\pi}\,x} - \frac{\operatorname{erfi}(bx)^2}{2x^2} + \frac{\left(4b^2\right)\int \frac{e^{2b^2x^2}}{x}\,dx}{\pi} + \frac{\left(4b^3\right)\int e^{b^2x^2}\operatorname{erfi}(bx)\,dx}{\sqrt{\pi}} \\
&= -\frac{2be^{b^2x^2}\operatorname{erfi}(bx)}{\sqrt{\pi}\,x} - \frac{\operatorname{erfi}(bx)^2}{2x^2} + \frac{2b^2\operatorname{Ei}\left(2b^2x^2\right)}{\pi} + \left(2b^2\right)\operatorname{Subst}\left(\int x\,dx, x, \operatorname{erfi}(bx)\right) \\
&= -\frac{2be^{b^2x^2}\operatorname{erfi}(bx)}{\sqrt{\pi}\,x} + b^2\operatorname{erfi}(bx)^2 - \frac{\operatorname{erfi}(bx)^2}{2x^2} + \frac{2b^2\operatorname{Ei}\left(2b^2x^2\right)}{\pi}
\end{aligned}$$

Mathematica [A] time = 0.03, size = 60, normalized size = 0.92

$$-\frac{2be^{b^2x^2}\operatorname{erfi}(bx)}{\sqrt{\pi}\,x} + \left(b^2 - \frac{1}{2x^2}\right)\operatorname{erfi}(bx)^2 + \frac{2b^2\operatorname{Ei}\left(2b^2x^2\right)}{\pi}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]^2/x^3,x]
```

```
[Out] (-2*b*E^(b^2*x^2)*Erfi[b*x])/(Sqrt[Pi]*x) + (b^2 - 1/(2*x^2))*Erfi[b*x]^2 +
 (2*b^2*ExpIntegralEi[2*b^2*x^2])/Pi
```

fricas [A] time = 0.49, size = 64, normalized size = 0.98

$$\frac{4\,b^2x^2\operatorname{Ei}\left(2\,b^2x^2\right) - 4\,\sqrt{\pi}\,bx\operatorname{erfi}\left(bx\right)e^{\left(b^2x^2\right)} - \left(\pi - 2\,\pi b^2x^2\right)\operatorname{erfi}\left(bx\right)^2}{2\,\pi x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^3,x, algorithm="fricas")
```

```
[Out] 1/2*(4*b^2*x^2*Ei(2*b^2*x^2) - 4*sqrt(pi)*b*x*erfi(b*x)*e^(b^2*x^2) - (pi -
 2*pi*b^2*x^2)*erfi(b*x)^2)/(pi*x^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^3,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)^2/x^3, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^3,x)
```

```
[Out] int(erfi(b*x)^2/x^3,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^3,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)^2/x^3, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{\operatorname{erfi}(b\,x)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^3,x)
```

```
[Out] int(erfi(b*x)^2/x^3, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}^2(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)**2/x**3,x)
```

```
[Out] Integral(erfi(b*x)**2/x**3, x)
```

3.233 $\int \frac{\textbf{erfi}(bx)^2}{x^5}\,dx$

Optimal. Leaf size=123

$$\frac{1}{3}b^4\text{erfi}(bx)^2-\frac{be^{b^2x^2}\text{erfi}(bx)}{3\sqrt{\pi}\,x^3}-\frac{b^2e^{2b^2x^2}}{3\pi x^2}+\frac{4b^4\text{Ei}\left(2b^2x^2\right)}{3\pi}-\frac{2b^3e^{b^2x^2}\text{erfi}(bx)}{3\sqrt{\pi}\,x}-\frac{\text{erfi}(bx)^2}{4x^4}$$

```
[Out] -1/3*b^2*exp(2*b^2*x^2)/Pi/x^2+4/3*b^4*Ei(2*b^2*x^2)/Pi+1/3*b^4*erfi(b*x)^2
-1/4*erfi(b*x)^2/x^4-1/3*b*exp(b^2*x^2)*erfi(b*x)/x^3/Pi^(1/2)-2/3*b^3*exp(
b^2*x^2)*erfi(b*x)/x/Pi^(1/2)
```

Rubi [A] time = 0.17, antiderivative size = 123, 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 = {6366, 6393, 6375, 30, 2210, 2214}

$$-\frac{2b^3e^{b^2x^2}\text{Erfi}(bx)}{3\sqrt{\pi}\,x}-\frac{be^{b^2x^2}\text{Erfi}(bx)}{3\sqrt{\pi}\,x^3}+\frac{1}{3}b^4\text{Erfi}(bx)^2+\frac{4b^4\text{Ei}\left(2b^2x^2\right)}{3\pi}-\frac{b^2e^{2b^2x^2}}{3\pi x^2}-\frac{\text{Erfi}(bx)^2}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]^2/x^5,x]
```

```
[Out] -(b^2*E^(2*b^2*x^2))/(3*Pi*x^2) - (b*E^(b^2*x^2)*Erfi[b*x])/(3*Sqrt[Pi]*x^3
) - (2*b^3*E^(b^2*x^2)*Erfi[b*x])/(3*Sqrt[Pi]*x) + (b^4*Erfi[b*x]^2)/3 - Er
fi[b*x]^2/(4*x^4) + (4*b^4*ExpIntegralEi[2*b^2*x^2])/(3*Pi)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
```

```
] && LeQ[-n, m + 1]))
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\operatorname{erfi}(bx)^2}{x^5}\,dx &= -\frac{\operatorname{erfi}(bx)^2}{4x^4}+\frac{b\int \frac{e^{b^2x^2}\operatorname{erfi}(bx)}{x^4}\,dx}{\sqrt{\pi}}\\
&= -\frac{be^{b^2x^2}\operatorname{erfi}(bx)}{3\sqrt{\pi}\,x^3}-\frac{\operatorname{erfi}(bx)^2}{4x^4}+\frac{\left(2b^2\right)\int \frac{e^{2b^2x^2}}{x^3}\,dx}{3\pi}+\frac{\left(2b^3\right)\int \frac{e^{b^2x^2}\operatorname{erfi}(bx)}{x^2}\,dx}{3\sqrt{\pi}}\\
&= -\frac{b^2e^{2b^2x^2}}{3\pi x^2}-\frac{be^{b^2x^2}\operatorname{erfi}(bx)}{3\sqrt{\pi}\,x^3}-\frac{2b^3e^{b^2x^2}\operatorname{erfi}(bx)}{3\sqrt{\pi}\,x}-\frac{\operatorname{erfi}(bx)^2}{4x^4}+2\frac{\left(4b^4\right)\int \frac{e^{2b^2x^2}}{x}\,dx}{3\pi}+\frac{\left(4b^5\right)\int e^{b^2x^2}e}{3\sqrt{\pi}}\\
&= -\frac{b^2e^{2b^2x^2}}{3\pi x^2}-\frac{be^{b^2x^2}\operatorname{erfi}(bx)}{3\sqrt{\pi}\,x^3}-\frac{2b^3e^{b^2x^2}\operatorname{erfi}(bx)}{3\sqrt{\pi}\,x}-\frac{\operatorname{erfi}(bx)^2}{4x^4}+\frac{4b^4\operatorname{Ei}\left(2b^2x^2\right)}{3\pi}+\frac{1}{3}\left(2b^4\right)\operatorname{Subst}(\int\\
&= -\frac{b^2e^{2b^2x^2}}{3\pi x^2}-\frac{be^{b^2x^2}\operatorname{erfi}(bx)}{3\sqrt{\pi}\,x^3}-\frac{2b^3e^{b^2x^2}\operatorname{erfi}(bx)}{3\sqrt{\pi}\,x}+\frac{1}{3}b^4\operatorname{erfi}(bx)^2-\frac{\operatorname{erfi}(bx)^2}{4x^4}+\frac{4b^4\operatorname{Ei}\left(2b^2x^2\right)}{3\pi}
\end{aligned}$$

Mathematica [A] time = 0.04, size = 97, normalized size = 0.79

$$\frac{\pi\left(4b^4x^4-3\right)\operatorname{erfi}(bx)^2-4\sqrt{\pi}\,bxe^{b^2x^2}\left(2b^2x^2+1\right)\operatorname{erfi}(bx)-4b^2x^2\left(e^{2b^2x^2}-4b^2x^2\operatorname{Ei}\left(2b^2x^2\right)\right)}{12\pi x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]^2/x^5,x]
```

```
[Out] (-4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(1 + 2*b^2*x^2)*Erfi[b*x] + Pi*(-3 + 4*b^4*x^4
)*Erfi[b*x]^2 - 4*b^2*x^2*(E^(2*b^2*x^2) - 4*b^2*x^2*ExpIntegralEi[2*b^2*x^
2]))/(12*Pi*x^4)
```

fricas [A] time = 0.42, size = 93, normalized size = 0.76

$$\frac{16\,b^4x^4\operatorname{Ei}\left(2\,b^2x^2\right)-4\,b^2x^2e^{\left(2\,b^2x^2\right)}-4\,\sqrt{\pi}\left(2\,b^3x^3+bx\right)\operatorname{erfi}\left(bx\right)e^{\left(b^2x^2\right)}-\left(3\,\pi-4\,\pi b^4x^4\right)\operatorname{erfi}\left(bx\right)^2}{12\,\pi x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^5,x, algorithm="fricas")
```

```
[Out] 1/12*(16*b^4*x^4*Ei(2*b^2*x^2) - 4*b^2*x^2*e^(2*b^2*x^2) - 4*sqrt(pi)*(2*b^
3*x^3 + b*x)*erfi(b*x)*e^(b^2*x^2) - (3*pi - 4*pi*b^4*x^4)*erfi(b*x)^2)/(pi
*x^4)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(bx\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^5,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)^2/x^5, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(bx\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^5,x)
```

```
[Out] int(erfi(b*x)^2/x^5,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^5,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)^2/x^5, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{erfi}(b\,x)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^5,x)
```

```
[Out] int(erfi(b*x)^2/x^5, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}^2(bx)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)**2/x**5,x)
```

```
[Out] Integral(erfi(b*x)**2/x**5, x)
```

3.234 $\int \frac{\textbf{erfi}(bx)^2}{x^7}\,dx$

Optimal. Leaf size=174

$$\frac{4}{45}b^6\mathrm{erfi}(bx)^2-\frac{2be^{b^2x^2}\mathrm{erfi}(bx)}{15\sqrt{\pi}\,x^5}-\frac{b^2e^{2b^2x^2}}{15\pi x^4}+\frac{28b^6\mathrm{Ei}\left(2b^2x^2\right)}{45\pi}-\frac{8b^5e^{b^2x^2}\mathrm{erfi}(bx)}{45\sqrt{\pi}\,x}-\frac{2b^4e^{2b^2x^2}}{9\pi x^2}-\frac{4b^3e^{b^2x^2}\mathrm{erfi}(bx)}{45\sqrt{\pi}\,x^3}-\frac{\mathrm{erfi}(bx)}{6x^6}$$

```
[Out] -1/15*b^2*exp(2*b^2*x^2)/Pi/x^4-2/9*b^4*exp(2*b^2*x^2)/Pi/x^2+28/45*b^6*Ei(
2*b^2*x^2)/Pi+4/45*b^6*erfi(b*x)^2-1/6*erfi(b*x)^2/x^6-2/15*b*exp(b^2*x^2)*
erfi(b*x)/x^5/Pi^(1/2)-4/45*b^3*exp(b^2*x^2)*erfi(b*x)/x^3/Pi^(1/2)-8/45*b^
5*exp(b^2*x^2)*erfi(b*x)/x/Pi^(1/2)
```

Rubi [A] time = 0.28, antiderivative size = 174, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {6366, 6393, 6375, 30, 2210, 2214}

$$-\frac{8b^5e^{b^2x^2}\mathrm{Erfi}(bx)}{45\sqrt{\pi}\,x}-\frac{4b^3e^{b^2x^2}\mathrm{Erfi}(bx)}{45\sqrt{\pi}\,x^3}-\frac{2be^{b^2x^2}\mathrm{Erfi}(bx)}{15\sqrt{\pi}\,x^5}+\frac{4}{45}b^6\mathrm{Erfi}(bx)^2+\frac{28b^6\mathrm{Ei}\left(2b^2x^2\right)}{45\pi}-\frac{2b^4e^{2b^2x^2}}{9\pi x^2}-\frac{b^2e^{2b^2x^2}}{15\pi x^4}-\frac{\mathrm{Erfi}(}{6x}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]^2/x^7,x]
```

```
[Out] -(b^2*E^(2*b^2*x^2))/(15*Pi*x^4) - (2*b^4*E^(2*b^2*x^2))/(9*Pi*x^2) - (2*b*
E^(b^2*x^2)*Erfi[b*x])/(15*Sqrt[Pi]*x^5) - (4*b^3*E^(b^2*x^2)*Erfi[b*x])/(4
5*Sqrt[Pi]*x^3) - (8*b^5*E^(b^2*x^2)*Erfi[b*x])/(45*Sqrt[Pi]*x) + (4*b^6*Er
fi[b*x]^2)/45 - Erfi[b*x]^2/(6*x^6) + (28*b^6*ExpIntegralEi[2*b^2*x^2])/(45
*Pi)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
```

```
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
] && LeQ[-n, m + 1]))
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{\operatorname{erfi}(bx)^2}{x^7}\,dx = -\frac{\operatorname{erfi}(bx)^2}{6x^6} + \frac{(2b)\int \frac{e^{b^2x^2}\operatorname{erfi}(bx)}{x^6}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{2be^{b^2x^2}\operatorname{erfi}(bx)}{15\sqrt{\pi}\,x^5} - \frac{\operatorname{erfi}(bx)^2}{6x^6} + \frac{\left(4b^2\right)\int \frac{e^{2b^2x^2}}{x^5}\,dx}{15\pi} + \frac{\left(4b^3\right)\int \frac{e^{b^2x^2}\operatorname{erfi}(bx)}{x^4}\,dx}{15\sqrt{\pi}}$$

$$= -\frac{b^2e^{2b^2x^2}}{15\pi x^4} - \frac{2be^{b^2x^2}\operatorname{erfi}(bx)}{15\sqrt{\pi}\,x^5} - \frac{4b^3e^{b^2x^2}\operatorname{erfi}(bx)}{45\sqrt{\pi}\,x^3} - \frac{\operatorname{erfi}(bx)^2}{6x^6} + \frac{\left(8b^4\right)\int \frac{e^{2b^2x^2}}{x^3}\,dx}{45\pi} + \frac{\left(4b^4\right)\int \frac{e^{2b^2x^2}}{x^3}\,d}{15\pi}$$

$$= -\frac{b^2e^{2b^2x^2}}{15\pi x^4} - \frac{2b^4e^{2b^2x^2}}{9\pi x^2} - \frac{2be^{b^2x^2}\operatorname{erfi}(bx)}{15\sqrt{\pi}\,x^5} - \frac{4b^3e^{b^2x^2}\operatorname{erfi}(bx)}{45\sqrt{\pi}\,x^3} - \frac{8b^5e^{b^2x^2}\operatorname{erfi}(bx)}{45\sqrt{\pi}\,x} - \frac{\operatorname{erfi}(bx)^2}{6x^6} + 2\frac{(1}{}$$

$$= -\frac{b^2e^{2b^2x^2}}{15\pi x^4} - \frac{2b^4e^{2b^2x^2}}{9\pi x^2} - \frac{2be^{b^2x^2}\operatorname{erfi}(bx)}{15\sqrt{\pi}\,x^5} - \frac{4b^3e^{b^2x^2}\operatorname{erfi}(bx)}{45\sqrt{\pi}\,x^3} - \frac{8b^5e^{b^2x^2}\operatorname{erfi}(bx)}{45\sqrt{\pi}\,x} - \frac{\operatorname{erfi}(bx)^2}{6x^6} + \frac{28b}{}$$

$$= -\frac{b^2e^{2b^2x^2}}{15\pi x^4} - \frac{2b^4e^{2b^2x^2}}{9\pi x^2} - \frac{2be^{b^2x^2}\operatorname{erfi}(bx)}{15\sqrt{\pi}\,x^5} - \frac{4b^3e^{b^2x^2}\operatorname{erfi}(bx)}{45\sqrt{\pi}\,x^3} - \frac{8b^5e^{b^2x^2}\operatorname{erfi}(bx)}{45\sqrt{\pi}\,x} + \frac{4}{45}b^6\operatorname{erfi}(bx)^2 -$$

Mathematica [A] time = 0.04, size = 114, normalized size = 0.66

$$\frac{\pi\left(8b^6x^6-15\right)\operatorname{erfi}(bx)^2 - 2b^2x^2e^{2b^2x^2}\left(10b^2x^2+3\right) + 56b^6x^6\operatorname{Ei}\left(2b^2x^2\right) - 4\sqrt{\pi}\,bxe^{b^2x^2}\left(4b^4x^4+2b^2x^2+3\right)\operatorname{erfi}(bx}{90\pi x^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]^2/x^7,x]
```

```
[Out] (-2*b^2*E^(2*b^2*x^2)*x^2*(3 + 10*b^2*x^2) - 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(3
+ 2*b^2*x^2 + 4*b^4*x^4)*Erfi[b*x] + Pi*(-15 + 8*b^6*x^6)*Erfi[b*x]^2 + 56*
b^6*x^6*ExpIntegralEi[2*b^2*x^2])/(90*Pi*x^6)
```

fricas [A] time = 0.53, size = 113, normalized size = 0.65

$$\frac{56\,b^6x^6\operatorname{Ei}\left(2\,b^2x^2\right) - 4\sqrt{\pi}\left(4\,b^5x^5+2\,b^3x^3+3\,bx\right)\operatorname{erfi}(bx)\,e^{\left(b^2x^2\right)} - \left(15\,\pi - 8\,\pi b^6x^6\right)\operatorname{erfi}(bx)^2 - 2\left(10\,b^4x^4+3\,b^2\right.}{90\,\pi x^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^7,x, algorithm="fricas")
```

```
[Out] 1/90*(56*b^6*x^6*Ei(2*b^2*x^2) - 4*sqrt(pi)*(4*b^5*x^5 + 2*b^3*x^3 + 3*b*x)
*erfi(b*x)*e^(b^2*x^2) - (15*pi - 8*pi*b^6*x^6)*erfi(b*x)^2 - 2*(10*b^4*x^4
 + 3*b^2*x^2)*e^(2*b^2*x^2))/(pi*x^6)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^7,x, algorithm="giac")
[Out] integrate(erfi(b*x)^2/x^7, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^7,x)
[Out] int(erfi(b*x)^2/x^7,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^7,x, algorithm="maxima")
[Out] integrate(erfi(b*x)^2/x^7, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{erfi}(b\,x)^2}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^7,x)
[Out] int(erfi(b*x)^2/x^7, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}^2(bx)}{x^7}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)**2/x**7,x)
```

```
[Out] Integral(erfi(b*x)**2/x**7, x)
```

3.235 $\int x^4 \mathbf{erfi}(bx)^2\,dx$

Optimal. Leaf size=162

$$\frac{43\operatorname{erfi}\left(\sqrt{2}\,bx\right)}{40\sqrt{2\pi}\,b^5}-\frac{2x^4e^{b^2x^2}\operatorname{erfi}(bx)}{5\sqrt{\pi}\,b}+\frac{x^3e^{2b^2x^2}}{5\pi b^2}-\frac{4e^{b^2x^2}\operatorname{erfi}(bx)}{5\sqrt{\pi}\,b^5}-\frac{11xe^{2b^2x^2}}{20\pi b^4}+\frac{4x^2e^{b^2x^2}\operatorname{erfi}(bx)}{5\sqrt{\pi}\,b^3}+\frac{1}{5}x^5\operatorname{erfi}(bx)^2$$

```
[Out] -11/20*exp(2*b^2*x^2)*x/b^4/Pi+1/5*exp(2*b^2*x^2)*x^3/b^2/Pi+1/5*x^5*erfi(b
*x)^2-4/5*exp(b^2*x^2)*erfi(b*x)/b^5/Pi^(1/2)+4/5*exp(b^2*x^2)*x^2*erfi(b*x
)/b^3/Pi^(1/2)-2/5*exp(b^2*x^2)*x^4*erfi(b*x)/b/Pi^(1/2)+43/80*erfi(b*x*2^(
1/2))/b^5*2^(1/2)/Pi^(1/2)
```

Rubi [A] time = 0.23, antiderivative size = 162, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6366, 6387, 6384, 2204, 2212}

$$-\frac{2x^4e^{b^2x^2}\text{Erfi}(bx)}{5\sqrt{\pi}\,b}+\frac{4x^2e^{b^2x^2}\text{Erfi}(bx)}{5\sqrt{\pi}\,b^3}-\frac{4e^{b^2x^2}\text{Erfi}(bx)}{5\sqrt{\pi}\,b^5}+\frac{43\text{Erfi}\left(\sqrt{2}\,bx\right)}{40\sqrt{2\pi}\,b^5}+\frac{x^3e^{2b^2x^2}}{5\pi b^2}-\frac{11xe^{2b^2x^2}}{20\pi b^4}+\frac{1}{5}x^5\text{Erfi}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^4*Erfi[b*x]^2,x]
```

```
[Out] (-11*E^(2*b^2*x^2)*x)/(20*b^4*Pi) + (E^(2*b^2*x^2)*x^3)/(5*b^2*Pi) - (4*E^(
b^2*x^2)*Erfi[b*x])/(5*b^5*Sqrt[Pi]) + (4*E^(b^2*x^2)*x^2*Erfi[b*x])/(5*b^3
*Sqrt[Pi]) - (2*E^(b^2*x^2)*x^4*Erfi[b*x])/(5*b*Sqrt[Pi]) + (x^5*Erfi[b*x]^
2)/5 + (43*Erfi[Sqrt[2]*b*x])/(40*b^5*Sqrt[2*Pi])
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}
\int x^4\mathrm{erfi}(bx)^2\,dx &= \frac{1}{5}x^5\mathrm{erfi}(bx)^2 - \frac{(4b)\int e^{b^2x^2}x^5\mathrm{erfi}(bx)\,dx}{5\sqrt{\pi}}\\
&= -\frac{2e^{b^2x^2}x^4\mathrm{erfi}(bx)}{5b\sqrt{\pi}} + \frac{1}{5}x^5\mathrm{erfi}(bx)^2 + \frac{4\int e^{2b^2x^2}x^4\,dx}{5\pi} + \frac{8\int e^{b^2x^2}x^3\mathrm{erfi}(bx)\,dx}{5b\sqrt{\pi}}\\
&= \frac{e^{2b^2x^2}x^3}{5b^2\pi} + \frac{4e^{b^2x^2}x^2\mathrm{erfi}(bx)}{5b^3\sqrt{\pi}} - \frac{2e^{b^2x^2}x^4\mathrm{erfi}(bx)}{5b\sqrt{\pi}} + \frac{1}{5}x^5\mathrm{erfi}(bx)^2 - \frac{3\int e^{2b^2x^2}x^2\,dx}{5b^2\pi} - \frac{8\int e^{2b^2x^2}x^2
\end{aligned}$$

$$\begin{aligned}
&= -\frac{11e^{2b^2x^2}x}{20b^4\pi} + \frac{e^{2b^2x^2}x^3}{5b^2\pi} - \frac{4e^{b^2x^2}\mathrm{erfi}(bx)}{5b^5\sqrt{\pi}} + \frac{4e^{b^2x^2}x^2\mathrm{erfi}(bx)}{5b^3\sqrt{\pi}} - \frac{2e^{b^2x^2}x^4\mathrm{erfi}(bx)}{5b\sqrt{\pi}} + \frac{1}{5}x^5\mathrm{erfi}(bx)^2 -\\
&= -\frac{11e^{2b^2x^2}x}{20b^4\pi} + \frac{e^{2b^2x^2}x^3}{5b^2\pi} - \frac{4e^{b^2x^2}\mathrm{erfi}(bx)}{5b^5\sqrt{\pi}} + \frac{4e^{b^2x^2}x^2\mathrm{erfi}(bx)}{5b^3\sqrt{\pi}} - \frac{2e^{b^2x^2}x^4\mathrm{erfi}(bx)}{5b\sqrt{\pi}} + \frac{1}{5}x^5\mathrm{erfi}(bx)^2 -
\end{aligned}$$

Mathematica [A] time = 0.05, size = 105, normalized size = 0.65

$$\frac{16\pi b^5x^5\mathrm{erfi}(bx)^2 + 4bxe^{2b^2x^2}\left(4b^2x^2-11\right) - 32\sqrt{\pi}\,e^{b^2x^2}\left(b^4x^4-2b^2x^2+2\right)\mathrm{erfi}(bx) + 43\sqrt{2\pi}\,\mathrm{erfi}\left(\sqrt{2}\,bx\right)}{80\pi b^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*Erfi[b*x]^2,x]
```

```
[Out] (4*b*E^(2*b^2*x^2)*x*(-11 + 4*b^2*x^2) - 32*E^(b^2*x^2)*Sqrt[Pi]*(2 - 2*b^2
*x^2 + b^4*x^4)*Erfi[b*x] + 16*b^5*Pi*x^5*Erfi[b*x]^2 + 43*Sqrt[2*Pi]*Erfi[
Sqrt[2]*b*x])/(80*b^5*Pi)
```

fricas [A] time = 0.61, size = 110, normalized size = 0.68

$$\frac{16\,\pi b^6 x^5\,\mathrm{erfi}\,(bx)^2 - 32\,\sqrt{\pi}\left(b^5x^4 - 2\,b^3x^2 + 2\,b\right)\mathrm{erfi}\,(bx)\,e^{\left(b^2x^2\right)} + 43\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,\mathrm{erfi}\left(\sqrt{2}\,\sqrt{b^2}\,x\right) + 4\left(4\,b^4x^3 - \right.}{80\,\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfi(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/80*(16*pi*b^6*x^5*erfi(b*x)^2 - 32*sqrt(pi)*(b^5*x^4 - 2*b^3*x^2 + 2*b)*e
rfi(b*x)*e^(b^2*x^2) + 43*sqrt(2)*sqrt(pi)*sqrt(b^2)*erfi(sqrt(2)*sqrt(b^2)
*x) + 4*(4*b^4*x^3 - 11*b^2*x)*e^(2*b^2*x^2))/(pi*b^6)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\,\mathrm{erfi}\,(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfi(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^4*erfi(b*x)^2, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int x^4\,\mathrm{erfi}\,(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfi(b*x)^2,x)
```

```
[Out] int(x^4*erfi(b*x)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\,\mathrm{erfi}\,(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfi(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x^4*erfi(b*x)^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^4 \operatorname{erfi}(b\,x)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfi(b*x)^2,x)
```

```
[Out] int(x^4*erfi(b*x)^2, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erfi}^2(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*erfi(b*x)**2,x)
```

```
[Out] Integral(x**4*erfi(b*x)**2, x)
```

3.236 $\int x^2\,\mathbf{erfi}(bx)^2\,dx$

Optimal. Leaf size=111

$$-\frac{5\text{erfi}\left(\sqrt{2}\,bx\right)}{6\sqrt{2\pi}\,b^3}-\frac{2x^2e^{b^2x^2}\text{erfi}(bx)}{3\sqrt{\pi}\,b}+\frac{xe^{2b^2x^2}}{3\pi b^2}+\frac{2e^{b^2x^2}\text{erfi}(bx)}{3\sqrt{\pi}\,b^3}+\frac{1}{3}x^3\text{erfi}(bx)^2$$

```
[Out] 1/3*exp(2*b^2*x^2)*x/b^2/Pi+1/3*x^3*erfi(b*x)^2+2/3*exp(b^2*x^2)*erfi(b*x)/
b^3/Pi^(1/2)-2/3*exp(b^2*x^2)*x^2*erfi(b*x)/b/Pi^(1/2)-5/12*erfi(b*x*2^(1/2
))/b^3*2^(1/2)/Pi^(1/2)
```

Rubi [A] time = 0.12, antiderivative size = 111, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6366, 6387, 6384, 2204, 2212}

$$-\frac{2x^2e^{b^2x^2}\text{Erfi}(bx)}{3\sqrt{\pi}\,b}+\frac{2e^{b^2x^2}\text{Erfi}(bx)}{3\sqrt{\pi}\,b^3}-\frac{5\text{Erfi}\left(\sqrt{2}\,bx\right)}{6\sqrt{2\pi}\,b^3}+\frac{xe^{2b^2x^2}}{3\pi b^2}+\frac{1}{3}x^3\text{Erfi}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Erfi[b*x]^2,x]
```

```
[Out] (E^(2*b^2*x^2)*x)/(3*b^2*Pi) + (2*E^(b^2*x^2)*Erfi[b*x])/(3*b^3*Sqrt[Pi]) -
 (2*E^(b^2*x^2)*x^2*Erfi[b*x])/(3*b*Sqrt[Pi]) + (x^3*Erfi[b*x]^2)/3 - (5*Er
fi[Sqrt[2]*b*x])/(6*b^3*Sqrt[2*Pi])
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
```

```
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$
\begin{aligned}
\int x^2\operatorname{erfi}(bx)^2\,dx &= \frac{1}{3}x^3\operatorname{erfi}(bx)^2-\frac{(4b)\int e^{b^2x^2}x^3\operatorname{erfi}(bx)\,dx}{3\sqrt{\pi}}\\
&= -\frac{2e^{b^2x^2}x^2\operatorname{erfi}(bx)}{3b\sqrt{\pi}}+\frac{1}{3}x^3\operatorname{erfi}(bx)^2+\frac{4\int e^{2b^2x^2}x^2\,dx}{3\pi}+\frac{4\int e^{b^2x^2}x\operatorname{erfi}(bx)\,dx}{3b\sqrt{\pi}}\\
&= \frac{e^{2b^2x^2}x}{3b^2\pi}+\frac{2e^{b^2x^2}\operatorname{erfi}(bx)}{3b^3\sqrt{\pi}}-\frac{2e^{b^2x^2}x^2\operatorname{erfi}(bx)}{3b\sqrt{\pi}}+\frac{1}{3}x^3\operatorname{erfi}(bx)^2-\frac{\int e^{2b^2x^2}\,dx}{3b^2\pi}-\frac{4\int e^{2b^2x^2}\,dx}{3b^2\pi}\\
&= \frac{e^{2b^2x^2}x}{3b^2\pi}+\frac{2e^{b^2x^2}\operatorname{erfi}(bx)}{3b^3\sqrt{\pi}}-\frac{2e^{b^2x^2}x^2\operatorname{erfi}(bx)}{3b\sqrt{\pi}}+\frac{1}{3}x^3\operatorname{erfi}(bx)^2-\frac{\sqrt{\frac{2}{\pi}}\operatorname{erfi}\left(\sqrt{2}\,bx\right)}{3b^3}-\frac{\operatorname{erfi}\left(\sqrt{2}\,bx\right)}{6b^3\sqrt{2\pi}}
\end{aligned}
$$

Mathematica [A] time = 0.03, size = 87, normalized size = 0.78

$$
\frac{4\pi b^3x^3\operatorname{erfi}(bx)^2-8\sqrt{\pi}\,e^{b^2x^2}\left(b^2x^2-1\right)\operatorname{erfi}(bx)+4bxe^{2b^2x^2}-5\sqrt{2\pi}\operatorname{erfi}\left(\sqrt{2}\,bx\right)}{12\pi b^3}
$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*Erfi[b*x]^2,x]
```

```
[Out] (4*b*E^(2*b^2*x^2)*x - 8*E^(b^2*x^2)*Sqrt[Pi]*(-1 + b^2*x^2)*Erfi[b*x] + 4*
b^3*Pi*x^3*Erfi[b*x]^2 - 5*Sqrt[2*Pi]*Erfi[Sqrt[2]*b*x])/(12*b^3*Pi)
```

fricas [A] time = 0.43, size = 91, normalized size = 0.82

$$\frac{4\,\pi b^4x^3\operatorname{erfi}\left(bx\right)^2+4\,b^2xe^{\left(2\,b^2x^2\right)}-8\,\sqrt{\pi}\left(b^3x^2-b\right)\operatorname{erfi}\left(bx\right)e^{\left(b^2x^2\right)}-5\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,\operatorname{erfi}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)}{12\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(b*x)^2,x, algorithm="fricas")
```

```
[Out] 1/12*(4*pi*b^4*x^3*erfi(b*x)^2 + 4*b^2*x*e^(2*b^2*x^2) - 8*sqrt(pi)*(b^3*x^
2 - b)*erfi(b*x)*e^(b^2*x^2) - 5*sqrt(2)*sqrt(pi)*sqrt(b^2)*erfi(sqrt(2)*sq
rt(b^2)*x))/(pi*b^4)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{erfi}\left(bx\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^2*erfi(b*x)^2, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int x^2\operatorname{erfi}\left(bx\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfi(b*x)^2,x)
```

```
[Out] int(x^2*erfi(b*x)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{erfi}\left(bx\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(x^2*erfi(b*x)^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,{\operatorname{erfi}\left(b\,x\right)}^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfi(b*x)^2,x)
```

```
[Out] int(x^2*erfi(b*x)^2, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfi}^2(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erfi(b*x)**2,x)
```

```
[Out] Integral(x**2*erfi(b*x)**2, x)
```

3.237 $\int \mathbf{erfi}(bx)^2\,dx$

Optimal. Leaf size=54

$$-\frac{2e^{b^2x^2}\text{erfi}(bx)}{\sqrt{\pi}\,b}+x\text{erfi}(bx)^2+\frac{\sqrt{\frac{2}{\pi}}\,\text{erfi}\left(\sqrt{2}\,bx\right)}{b}$$

[Out] x*erfi(b*x)^2+erfi(b*x*2^(1/2))*2^(1/2)/Pi^(1/2)/b-2*exp(b^2*x^2)*erfi(b*x)/b/Pi^(1/2)

Rubi [A] time = 0.04, antiderivative size = 54, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {6354, 12, 6384, 2204}

$$-\frac{2e^{b^2x^2}\text{Erfi}(bx)}{\sqrt{\pi}\,b}+x\text{Erfi}(bx)^2+\frac{\sqrt{\frac{2}{\pi}}\,\text{Erfi}\left(\sqrt{2}\,bx\right)}{b}$$

Antiderivative was successfully verified.

[In] Int[Erfi[b*x]^2,x]

[Out] (-2*E^(b^2*x^2)*Erfi[b*x])/(b*Sqrt[Pi]) + x*Erfi[b*x]^2 + (Sqrt[2/Pi]*Erfi[Sqrt[2]*b*x])/b

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6354

```
Int[Erfi[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erfi[a + b*x]^
2)/b, x] - Dist[4/Sqrt[Pi], Int[(a + b*x)*E^(a + b*x)^2*Erfi[a + b*x], x],
x] /; FreeQ[{a, b}, x]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
```

```
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int \operatorname{erfi}(bx)^2\,dx = x\operatorname{erfi}(bx)^2 - \frac{4\int be^{b^2x^2}x\operatorname{erfi}(bx)\,dx}{\sqrt{\pi}}$$
$$= x\operatorname{erfi}(bx)^2 - \frac{(4b)\int e^{b^2x^2}x\operatorname{erfi}(bx)\,dx}{\sqrt{\pi}}$$
$$= -\frac{2e^{b^2x^2}\operatorname{erfi}(bx)}{b\sqrt{\pi}} + x\operatorname{erfi}(bx)^2 + \frac{4\int e^{2b^2x^2}\,dx}{\pi}$$
$$= -\frac{2e^{b^2x^2}\operatorname{erfi}(bx)}{b\sqrt{\pi}} + x\operatorname{erfi}(bx)^2 + \frac{\sqrt{\frac{2}{\pi}}\operatorname{erfi}\left(\sqrt{2}\,bx\right)}{b}$$

Mathematica [A] time = 0.02, size = 54, normalized size = 1.00

$$-\frac{2e^{b^2x^2}\operatorname{erfi}(bx)}{\sqrt{\pi}\,b} + x\operatorname{erfi}(bx)^2 + \frac{\sqrt{\frac{2}{\pi}}\operatorname{erfi}\left(\sqrt{2}\,bx\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]^2,x]
```

```
[Out] (-2*E^(b^2*x^2)*Erfi[b*x])/(b*Sqrt[Pi]) + x*Erfi[b*x]^2 + (Sqrt[2/Pi]*Erfi[
Sqrt[2]*b*x])/b
```

fricas [A] time = 0.45, size = 61, normalized size = 1.13

$$\frac{\pi b^2 x\operatorname{erfi}(bx)^2 - 2\sqrt{\pi}\,b\operatorname{erfi}(bx)\,e^{\left(b^2x^2\right)} + \sqrt{2}\sqrt{\pi}\sqrt{b^2}\operatorname{erfi}\left(\sqrt{2}\sqrt{b^2}\,x\right)}{\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2,x, algorithm="fricas")
```

```
[Out] (pi*b^2*x*erfi(b*x)^2 - 2*sqrt(pi)*b*erfi(b*x)*e^(b^2*x^2) + sqrt(2)*sqrt(p
i)*sqrt(b^2)*erfi(sqrt(2)*sqrt(b^2)*x))/(pi*b^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)^2, x)
```

maple [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2,x)
```

```
[Out] int(erfi(b*x)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \operatorname{erfi}(b\,x)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2,x)
```

```
[Out] int(erfi(b*x)^2, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}^2(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)**2,x)
```

```
[Out] Integral(erfi(b*x)**2, x)
```

3.238 $\int \frac{\mathbf{erfi}(bx)^2}{x^2}\,dx$

Optimal. Leaf size=13

$$\mathrm{Int}\left(\frac{\mathrm{erfi}(bx)^2}{x^2},x\right)$$

```
[Out] Unintegrable(erfi(b*x)^2/x^2,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\mathrm{Erfi}(bx)^2}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfi[b*x]^2/x^2,x]
```

```
[Out] Defer[Int][Erfi[b*x]^2/x^2, x]
```

Rubi steps

$$\int \frac{\mathrm{erfi}(bx)^2}{x^2}\,dx = \int \frac{\mathrm{erfi}(bx)^2}{x^2}\,dx$$

Mathematica [A] time = 0.04, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfi}(bx)^2}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[b*x]^2/x^2,x]
```

```
[Out] Integrate[Erfi[b*x]^2/x^2, x]
```

fricas [A] time = 0.50, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{erfi}\left(bx\right)^2}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^2,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x)^2/x^2, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}(bx)^2}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^2,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)^2/x^2, x)
```

maple [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}(bx)^2}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^2,x)
```

```
[Out] int(erfi(b*x)^2/x^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}(bx)^2}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^2,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)^2/x^2, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\text{erfi}(b\, x)^2}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^2,x)
```

```
[Out] int(erfi(b*x)^2/x^2, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}^2(bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)**2/x**2,x)
```

```
[Out] Integral(erfi(b*x)**2/x**2, x)
```

3.239 $\int \frac{\textbf{erfi}(bx)^2}{x^4}\,dx$

Optimal. Leaf size=13

$$\mathrm{Int}\left(\frac{\mathrm{erfi}(bx)^2}{x^4},x\right)$$

```
[Out] Unintegrable(erfi(b*x)^2/x^4,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\mathrm{Erfi}(bx)^2}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfi[b*x]^2/x^4,x]
```

```
[Out] Defer[Int][Erfi[b*x]^2/x^4, x]
```

Rubi steps

$$\int \frac{\mathrm{erfi}(bx)^2}{x^4}\,dx = \int \frac{\mathrm{erfi}(bx)^2}{x^4}\,dx$$

Mathematica [A] time = 0.04, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfi}(bx)^2}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[b*x]^2/x^4,x]
```

```
[Out] Integrate[Erfi[b*x]^2/x^4, x]
```

fricas [A] time = 0.39, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{erfi}\,(bx)^2}{x^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^4,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x)^2/x^4, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^4,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)^2/x^4, x)
```

maple [A] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^4,x)
```

```
[Out] int(erfi(b*x)^2/x^4,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^4,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)^2/x^4, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erfi}(b\,x)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^4,x)
```

```
[Out] int(erfi(b*x)^2/x^4, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}^2(bx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)**2/x**4,x)
```

```
[Out] Integral(erfi(b*x)**2/x**4, x)
```

3.240 $\int \frac{\text{erfi}(bx)^2}{x^6}\,dx$

Optimal. Leaf size=13

$$\text{Int}\left(\frac{\text{erfi}(bx)^2}{x^6},x\right)$$

```
[Out] Unintegrable(erfi(b*x)^2/x^6,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfi}(bx)^2}{x^6}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfi[b*x]^2/x^6,x]
[Out] Defer[Int][Erfi[b*x]^2/x^6, x]
```

Rubi steps

$$\int \frac{\text{erfi}(bx)^2}{x^6}\,dx = \int \frac{\text{erfi}(bx)^2}{x^6}\,dx$$

Mathematica [A] time = 0.04, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}(bx)^2}{x^6}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[b*x]^2/x^6,x]
[Out] Integrate[Erfi[b*x]^2/x^6, x]
```

fricas [A] time = 0.58, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\left(bx\right)^2}{x^6},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^6,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x)^2/x^6, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^6,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)^2/x^6, x)
```

maple [A] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^6,x)
```

```
[Out] int(erfi(b*x)^2/x^6,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)^2/x^6,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)^2/x^6, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{\operatorname{erfi}(b\,x)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)^2/x^6,x)
```

```
[Out] int(erfi(b*x)^2/x^6, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}^2(bx)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)**2/x**6,x)
```

```
[Out] Integral(erfi(b*x)**2/x**6, x)
```

3.241 $\int (c+dx)^2 \mathbf{erfi}(a+bx)^2 \, dx$

Optimal. Leaf size=366

$$\frac{d(a+bx)^2(bc-ad)\text{erfi}(a+bx)^2}{b^3}+\frac{(a+bx)(bc-ad)^2\text{erfi}(a+bx)^2}{b^3}-\frac{2de^{(a+bx)^2}(a+bx)(bc-ad)\text{erfi}(a+bx)}{\sqrt{\pi}\,b^3}+\frac{d(bc}{}$$

```
[Out] d*(-a*d+b*c)*exp(2*(b*x+a)^2)/b^3/Pi+1/3*d^2*exp(2*(b*x+a)^2)*(b*x+a)/b^3/P
i+1/2*d*(-a*d+b*c)*erfi(b*x+a)^2/b^3+(-a*d+b*c)^2*(b*x+a)*erfi(b*x+a)^2/b^3
+d*(-a*d+b*c)*(b*x+a)^2*erfi(b*x+a)^2/b^3+1/3*d^2*(b*x+a)^3*erfi(b*x+a)^2/b
^3+(-a*d+b*c)^2*erfi((b*x+a)*2^(1/2))*2^(1/2)/Pi^(1/2)/b^3+2/3*d^2*exp((b*x
+a)^2)*erfi(b*x+a)/b^3/Pi^(1/2)-2*(-a*d+b*c)^2*exp((b*x+a)^2)*erfi(b*x+a)/b
^3/Pi^(1/2)-2*d*(-a*d+b*c)*exp((b*x+a)^2)*(b*x+a)*erfi(b*x+a)/b^3/Pi^(1/2)-
2/3*d^2*exp((b*x+a)^2)*(b*x+a)^2*erfi(b*x+a)/b^3/Pi^(1/2)-5/12*d^2*erfi((b*
x+a)*2^(1/2))/b^3*2^(1/2)/Pi^(1/2)
```

Rubi [A] time = 0.36, antiderivative size = 366, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 10, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}} = 0.625$, Rules used = {6369, 6354, 6384, 2204, 6366, 6387, 6375, 30, 2209, 2212}

$$\frac{d(a+bx)^2(bc-ad)\text{Erfi}(a+bx)^2}{b^3}+\frac{(a+bx)(bc-ad)^2\text{Erfi}(a+bx)^2}{b^3}-\frac{2de^{(a+bx)^2}(a+bx)(bc-ad)\text{Erfi}(a+bx)}{\sqrt{\pi}\,b^3}+\frac{d(b}{}$$

Antiderivative was successfully verified.

```
[In] Int[(c + d*x)^2*Erfi[a + b*x]^2,x]
```

```
[Out] (d*(b*c - a*d)*E^(2*(a + b*x)^2))/(b^3*Pi) + (d^2*E^(2*(a + b*x)^2)*(a + b*
x))/(3*b^3*Pi) + (2*d^2*E^(a + b*x)^2*Erfi[a + b*x])/(3*b^3*Sqrt[Pi]) - (2*
(b*c - a*d)^2*E^(a + b*x)^2*Erfi[a + b*x])/(b^3*Sqrt[Pi]) - (2*d*(b*c - a*d
)*E^(a + b*x)^2*(a + b*x)*Erfi[a + b*x])/(b^3*Sqrt[Pi]) - (2*d^2*E^(a + b*x
)^2*(a + b*x)^2*Erfi[a + b*x])/(3*b^3*Sqrt[Pi]) + (d*(b*c - a*d)*Erfi[a + b
*x]^2)/(2*b^3) + ((b*c - a*d)^2*(a + b*x)*Erfi[a + b*x]^2)/b^3 + (d*(b*c -
a*d)*(a + b*x)^2*Erfi[a + b*x]^2)/b^3 + (d^2*(a + b*x)^3*Erfi[a + b*x]^2)/(
3*b^3) + ((b*c - a*d)^2*Sqrt[2/Pi]*Erfi[Sqrt[2]*(a + b*x)])/b^3 - (5*d^2*Er
fi[Sqrt[2]*(a + b*x)])/(6*b^3*Sqrt[2*Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6354

```
Int[Erfi[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erfi[a + b*x]^
2)/b, x] - Dist[4/Sqrt[Pi], Int[(a + b*x)*E^(a + b*x)^2*Erfi[a + b*x], x],
x] /; FreeQ[{a, b}, x]
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6369

```
Int[Erfi[(a_) + (b_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Dist
[1/b^(m + 1), Subst[Int[ExpandIntegrand[Erfi[x]^2, (b*c - a*d + d*x)^m, x],
 x], x, a + b*x], x] /; FreeQ[{a, b, c, d}, x] && IGtQ[m, 0]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int (c+dx)^2 \text{erfi}(a+bx)^2\,dx = \frac{\text{Subst}\left(\int \left(b^2c^2\left(1+\frac{ad(-2bc+ad)}{b^2c^2}\right)\text{erfi}(x)^2+2bcd\left(1-\frac{ad}{bc}\right)x\text{erfi}(x)^2+d^2x^2\text{erfi}(x)^2\right)\right.}{b^3}$$

$$= \frac{d^2\,\text{Subst}\left(\int x^2\text{erfi}(x)^2\,dx,x,a+bx\right)}{b^3}+\frac{(2d(bc-ad))\,\text{Subst}\left(\int x\text{erfi}(x)^2\,dx,x,a+\right.}{b^3}$$

$$= \frac{(bc-ad)^2(a+bx)\text{erfi}(a+bx)^2}{b^3}+\frac{d(bc-ad)(a+bx)^2\text{erfi}(a+bx)^2}{b^3}+\frac{d^2(a+bx)^3\text{e}}{3}$$

$$= -\frac{2(bc-ad)^2e^{(a+bx)^2}\text{erfi}(a+bx)}{b^3\sqrt{\pi}}-\frac{2d(bc-ad)e^{(a+bx)^2}(a+bx)\text{erfi}(a+bx)}{b^3\sqrt{\pi}}-\frac{2d^2e^{(}}{}$$

$$= \frac{d(bc-ad)e^{2(a+bx)^2}}{b^3\pi}+\frac{d^2e^{2(a+bx)^2}(a+bx)}{3b^3\pi}+\frac{2d^2e^{(a+bx)^2}\text{erfi}(a+bx)}{3b^3\sqrt{\pi}}-\frac{2(bc-ad)^2e^{(}}{b}$$

$$= \frac{d(bc-ad)e^{2(a+bx)^2}}{b^3\pi}+\frac{d^2e^{2(a+bx)^2}(a+bx)}{3b^3\pi}+\frac{2d^2e^{(a+bx)^2}\text{erfi}(a+bx)}{3b^3\sqrt{\pi}}-\frac{2(bc-ad)^2e^{(}}{b}$$

Mathematica [F] time = 0.86, size = 0, normalized size = 0.00

$$\int (c+dx)^2\text{erfi}(a+bx)^2\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(c + d*x)^2*Erfi[a + b*x]^2,x]
```

```
[Out] Integrate[(c + d*x)^2*Erfi[a + b*x]^2, x]
```

fricas [A] time = 0.61, size = 278, normalized size = 0.76

$$\sqrt{2}\sqrt{\pi}\left(12\,b^2c^2-24\,abcd+\left(12\,a^2-5\right)d^2\right)\sqrt{b^2}\,\mathrm{erfi}\left(\frac{\sqrt{2}\,\sqrt{b^2}\,(bx+a)}{b}\right)-8\,\sqrt{\pi}\left(b^3d^2x^2+3\,b^3c^2-3\,ab^2cd+\left(a^2-1\right)bd\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)^2*erfi(b*x+a)^2,x, algorithm="fricas")
```

```
[Out] 1/12*(sqrt(2)*sqrt(pi)*(12*b^2*c^2 - 24*a*b*c*d + (12*a^2 - 5)*d^2)*sqrt(b^
2)*erfi(sqrt(2)*sqrt(b^2)*(b*x + a)/b) - 8*sqrt(pi)*(b^3*d^2*x^2 + 3*b^3*c^
2 - 3*a*b^2*c*d + (a^2 - 1)*b*d^2 + (3*b^3*c*d - a*b^2*d^2)*x)*erfi(b*x + a
)*e^(b^2*x^2 + 2*a*b*x + a^2) + 2*(2*pi*b^4*d^2*x^3 + 6*pi*b^4*c*d*x^2 + 6*
pi*b^4*c^2*x + pi*(6*a*b^3*c^2 - 3*(2*a^2 - 1)*b^2*c*d + (2*a^3 - 3*a)*b*d^
2))*erfi(b*x + a)^2 + 4*(b^2*d^2*x + 3*b^2*c*d - 2*a*b*d^2)*e^(2*b^2*x^2 +
4*a*b*x + 2*a^2))/(pi*b^4)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx+c)^2\,\mathrm{erfi}\,(bx+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)^2*erfi(b*x+a)^2,x, algorithm="giac")
```

```
[Out] integrate((d*x + c)^2*erfi(b*x + a)^2, x)
```

maple [F] time = 0.09, size = 0, normalized size = 0.00

$$\int (dx+c)^2\,\mathrm{erfi}\,(bx+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x+c)^2*erfi(b*x+a)^2,x)
```

```
[Out] int((d*x+c)^2*erfi(b*x+a)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx+c)^2\,\mathrm{erfi}\,(bx+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)^2*erfi(b*x+a)^2,x, algorithm="maxima")
```

```
[Out] integrate((d*x + c)^2*erfi(b*x + a)^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.00

$$\int \operatorname{erfi}\left(a+b\,x\right)^2\,{\left(c+d\,x\right)}^2 \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)^2*(c + d*x)^2,x)
```

```
[Out] int(erfi(a + b*x)^2*(c + d*x)^2, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \left(c + dx\right)^{2} \operatorname{erfi}^{2}{\left(a + bx \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)**2*erfi(b*x+a)**2,x)
```

```
[Out] Integral((c + d*x)**2*erfi(a + b*x)**2, x)
```

3.242 $\int (c+dx)\,\mathbf{erfi}(a+bx)^2\,dx$

Optimal. Leaf size=184

$$\frac{(a+bx)(bc-ad)\text{erfi}(a+bx)^2}{b^2}-\frac{2e^{(a+bx)^2}(bc-ad)\text{erfi}(a+bx)}{\sqrt{\pi}\,b^2}+\frac{\sqrt{\frac{2}{\pi}}\,(bc-ad)\text{erfi}\left(\sqrt{2}\,(a+bx)\right)}{b^2}+\frac{d(a+bx)^2\text{erfi}(a+}{2b^2}$$

```
[Out] 1/2*d*exp(2*(b*x+a)^2)/b^2/Pi+1/4*d*erfi(b*x+a)^2/b^2+(-a*d+b*c)*(b*x+a)*er
fi(b*x+a)^2/b^2+1/2*d*(b*x+a)^2*erfi(b*x+a)^2/b^2+(-a*d+b*c)*erfi((b*x+a)*2
^(1/2))*2^(1/2)/Pi^(1/2)/b^2-2*(-a*d+b*c)*exp((b*x+a)^2)*erfi(b*x+a)/b^2/Pi
^(1/2)-d*exp((b*x+a)^2)*(b*x+a)*erfi(b*x+a)/b^2/Pi^(1/2)
```

Rubi [A] time = 0.18, antiderivative size = 184, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 9, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.643, Rules used = {6369, 6354, 6384, 2204, 6366, 6387, 6375, 30, 2209}

$$\frac{(a+bx)(bc-ad)\text{Erfi}(a+bx)^2}{b^2}-\frac{2e^{(a+bx)^2}(bc-ad)\text{Erfi}(a+bx)}{\sqrt{\pi}\,b^2}+\frac{\sqrt{\frac{2}{\pi}}\,(bc-ad)\text{Erfi}\left(\sqrt{2}\,(a+bx)\right)}{b^2}+\frac{d(a+bx)^2\text{Erfi}(a}{2b^2}$$

Antiderivative was successfully verified.

```
[In] Int[(c + d*x)*Erfi[a + b*x]^2,x]
```

```
[Out] (d*E^(2*(a + b*x)^2))/(2*b^2*Pi) - (2*(b*c - a*d)*E^(a + b*x)^2*Erfi[a + b*
x])/(b^2*Sqrt[Pi]) - (d*E^(a + b*x)^2*(a + b*x)*Erfi[a + b*x])/(b^2*Sqrt[Pi
]) + (d*Erfi[a + b*x]^2)/(4*b^2) + ((b*c - a*d)*(a + b*x)*Erfi[a + b*x]^2)/
b^2 + (d*(a + b*x)^2*Erfi[a + b*x]^2)/(2*b^2) + ((b*c - a*d)*Sqrt[2/Pi]*Erf
i[Sqrt[2]*(a + b*x)])/b^2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
```

```
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 6354

```
Int[Erfi[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erfi[a + b*x]^
2)/b, x] - Dist[4/Sqrt[Pi], Int[(a + b*x)*E^(a + b*x)^2*Erfi[a + b*x], x],
x] /; FreeQ[{a, b}, x]
```

Rule 6366

```
Int[Erfi[(b_.)*(x_)]^2*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*Erfi[b*x]^2
)/(m + 1), x] - Dist[(4*b)/(Sqrt[Pi]*(m + 1)), Int[x^(m + 1)*E^(b^2*x^2)*Er
fi[b*x], x], x] /; FreeQ[b, x] && (IGtQ[m, 0] || ILtQ[(m + 1)/2, 0])
```

Rule 6369

```
Int[Erfi[(a_) + (b_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Dist
[1/b^(m + 1), Subst[Int[ExpandIntegrand[Erfi[x]^2, (b*c - a*d + d*x)^m, x],
 x], x, a + b*x], x] /; FreeQ[{a, b, c, d}, x] && IGtQ[m, 0]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int (c+dx)\text{erfi}(a+bx)^2\,dx = \frac{\text{Subst}\left(\int \left(bc\left(1-\frac{ad}{bc}\right)\text{erfi}(x)^2+dx\text{erfi}(x)^2\right)dx,x,a+bx\right)}{b^2}$$
$$= \frac{d\,\text{Subst}\left(\int x\text{erfi}(x)^2\,dx,x,a+bx\right)}{b^2}+\frac{(bc-ad)\,\text{Subst}\left(\int \text{erfi}(x)^2\,dx,x,a+bx\right)}{b^2}$$
$$= \frac{(bc-ad)(a+bx)\text{erfi}(a+bx)^2}{b^2}+\frac{d(a+bx)^2\text{erfi}(a+bx)^2}{2b^2}-\frac{(2d)\,\text{Subst}\left(\int e^{x^2}x^2\text{erfi}(x$$
$$= -\frac{2(bc-ad)e^{(a+bx)^2}\text{erfi}(a+bx)}{b^2\sqrt{\pi}}-\frac{de^{(a+bx)^2}(a+bx)\text{erfi}(a+bx)}{b^2\sqrt{\pi}}+\frac{(bc-ad)(a+bx)\text{er}}{b^2}$$
$$= \frac{de^{2(a+bx)^2}}{2b^2\pi}-\frac{2(bc-ad)e^{(a+bx)^2}\text{erfi}(a+bx)}{b^2\sqrt{\pi}}-\frac{de^{(a+bx)^2}(a+bx)\text{erfi}(a+bx)}{b^2\sqrt{\pi}}+\frac{(bc-ad}{}$$
$$= \frac{de^{2(a+bx)^2}}{2b^2\pi}-\frac{2(bc-ad)e^{(a+bx)^2}\text{erfi}(a+bx)}{b^2\sqrt{\pi}}-\frac{de^{(a+bx)^2}(a+bx)\text{erfi}(a+bx)}{b^2\sqrt{\pi}}+\frac{d\text{erfi}(a}{4b^2}$$

Mathematica [A] time = 0.18, size = 128, normalized size = 0.70

$$\frac{\pi\text{erfi}(a+bx)^2\left(-2a^2d+4abc+4b^2cx+2b^2dx^2+d\right)-4\sqrt{\pi}\,e^{(a+bx)^2}\text{erfi}(a+bx)(-ad+2bc+bdx)+4\sqrt{2\pi}\,(bc-a}{4\pi b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(c + d*x)*Erfi[a + b*x]^2,x]
```

```
[Out] (2*d*E^(2*(a + b*x)^2) - 4*E^(a + b*x)^2*Sqrt[Pi]*(2*b*c - a*d + b*d*x)*Erf
i[a + b*x] + Pi*(4*a*b*c + d - 2*a^2*d + 4*b^2*c*x + 2*b^2*d*x^2)*Erfi[a +
b*x]^2 + 4*(b*c - a*d)*Sqrt[2*Pi]*Erfi[Sqrt[2]*(a + b*x)])/(4*b^2*Pi)
```

fricas [A] time = 0.42, size = 167, normalized size = 0.91

$$\frac{4\sqrt{2}\sqrt{\pi}\sqrt{b^2}\,(bc-ad)\,\text{erfi}\left(\frac{\sqrt{2}\sqrt{b^2}\,(bx+a)}{b}\right)-4\sqrt{\pi}\left(b^2dx+2\,b^2c-abd\right)\text{erfi}\,(bx+a)\,e^{\left(b^2x^2+2\,abx+a^2\right)}+\left(2\,\pi b^3dx^2+\right.}{4\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)*erfi(b*x+a)^2,x, algorithm="fricas")
```

```
[Out] 1/4*(4*sqrt(2)*sqrt(pi)*sqrt(b^2)*(b*c - a*d)*erfi(sqrt(2)*sqrt(b^2)*(b*x +
 a)/b) - 4*sqrt(pi)*(b^2*d*x + 2*b^2*c - a*b*d)*erfi(b*x + a)*e^(b^2*x^2 +
```

```
2*a*b*x + a^2) + (2*pi*b^3*d*x^2 + 4*pi*b^3*c*x + pi*(4*a*b^2*c - (2*a^2 -
1)*b*d))*erfi(b*x + a)^2 + 2*b*d*e^(2*b^2*x^2 + 4*a*b*x + 2*a^2))/(pi*b^3)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx + c)\operatorname{erfi}(bx + a)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)*erfi(b*x+a)^2,x, algorithm="giac")
[Out] integrate((d*x + c)*erfi(b*x + a)^2, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int (dx + c)\operatorname{erfi}(bx + a)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x+c)*erfi(b*x+a)^2,x)
[Out] int((d*x+c)*erfi(b*x+a)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (dx + c)\operatorname{erfi}(bx + a)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)*erfi(b*x+a)^2,x, algorithm="maxima")
[Out] integrate((d*x + c)*erfi(b*x + a)^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{erfi}(a + b\,x)^2\,(c + d\,x) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)^2*(c + d*x),x)
[Out] int(erfi(a + b*x)^2*(c + d*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (c + dx)\operatorname{erfi}^2(a + bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x+c)*erfi(b*x+a)**2,x)
```

```
[Out] Integral((c + d*x)*erfi(a + b*x)**2, x)
```

3.243 $\int \operatorname{erfi}(a+bx)^2\,dx$

Optimal. Leaf size=68

$$\frac{(a+bx)\operatorname{erfi}(a+bx)^2}{b}-\frac{2e^{(a+bx)^2}\operatorname{erfi}(a+bx)}{\sqrt{\pi}\,b}+\frac{\sqrt{\frac{2}{\pi}}\operatorname{erfi}\left(\sqrt{2}\,(a+bx)\right)}{b}$$

```
[Out] (b*x+a)*erfi(b*x+a)^2/b+erfi((b*x+a)*2^(1/2))*2^(1/2)/Pi^(1/2)/b-2*exp((b*x
+a)^2)*erfi(b*x+a)/b/Pi^(1/2)
```

Rubi [A] time = 0.13, antiderivative size = 68, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {6354, 6384, 2204}

$$\frac{(a+bx)\operatorname{Erfi}(a+bx)^2}{b}-\frac{2e^{(a+bx)^2}\operatorname{Erfi}(a+bx)}{\sqrt{\pi}\,b}+\frac{\sqrt{\frac{2}{\pi}}\operatorname{Erfi}\left(\sqrt{2}\,(a+bx)\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[a + b*x]^2,x]
```

```
[Out] (-2*E^(a + b*x)^2*Erfi[a + b*x])/(b*Sqrt[Pi]) + ((a + b*x)*Erfi[a + b*x]^2)
/b + (Sqrt[2/Pi]*Erfi[Sqrt[2]*(a + b*x)])/b
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6354

```
Int[Erfi[(a_.) + (b_.)*(x_)]^2, x_Symbol] :> Simp[((a + b*x)*Erfi[a + b*x]^
2)/b, x] - Dist[4/Sqrt[Pi], Int[(a + b*x)*E^(a + b*x)^2*Erfi[a + b*x], x],
x] /; FreeQ[{a, b}, x]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int \text{erfi}(a+bx)^2\,dx = \frac{(a+bx)\text{erfi}(a+bx)^2}{b} - \frac{4\int e^{(a+bx)^2}(a+bx)\text{erfi}(a+bx)\,dx}{\sqrt{\pi}}$$
$$= \frac{(a+bx)\text{erfi}(a+bx)^2}{b} - \frac{4\,\text{Subst}\left(\int e^{x^2}x\text{erfi}(x)\,dx, x, a+bx\right)}{b\sqrt{\pi}}$$
$$= -\frac{2e^{(a+bx)^2}\text{erfi}(a+bx)}{b\sqrt{\pi}} + \frac{(a+bx)\text{erfi}(a+bx)^2}{b} + \frac{4\,\text{Subst}\left(\int e^{2x^2}\,dx, x, a+bx\right)}{b\pi}$$
$$= -\frac{2e^{(a+bx)^2}\text{erfi}(a+bx)}{b\sqrt{\pi}} + \frac{(a+bx)\text{erfi}(a+bx)^2}{b} + \frac{\sqrt{\frac{2}{\pi}}\,\text{erfi}\left(\sqrt{2}\,(a+bx)\right)}{b}$$

Mathematica [A]   time = 0.06, size = 64, normalized size = 0.94

$$\frac{\sqrt{\pi}\,(a+bx)\text{erfi}(a+bx)^2 - 2e^{(a+bx)^2}\text{erfi}(a+bx) + \sqrt{2}\,\text{erfi}\left(\sqrt{2}\,(a+bx)\right)}{\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[a + b*x]^2,x]
```

```
[Out] (-2*E^(a + b*x)^2*Erfi[a + b*x] + Sqrt[Pi]*(a + b*x)*Erfi[a + b*x]^2 + Sqrt
[2]*Erfi[Sqrt[2]*(a + b*x)])/(b*Sqrt[Pi])
```

fricas [A]   time = 0.43, size = 90, normalized size = 1.32

$$-\frac{2\,\sqrt{\pi}\,b\,\text{erfi}\left(bx+a\right)e^{\left(b^2x^2+2\,abx+a^2\right)} - \left(\pi b^2x + \pi ab\right)\text{erfi}\left(bx+a\right)^2 - \sqrt{2}\,\sqrt{\pi}\,\sqrt{b^2}\,\,\text{erfi}\left(\frac{\sqrt{2}\,\sqrt{b^2}\,(bx+a)}{b}\right)}{\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)^2,x, algorithm="fricas")
```

```
[Out] -(2*sqrt(pi)*b*erfi(b*x + a)*e^(b^2*x^2 + 2*a*b*x + a^2) - (pi*b^2*x + pi*a
*b)*erfi(b*x + a)^2 - sqrt(2)*sqrt(pi)*sqrt(b^2)*erfi(sqrt(2)*sqrt(b^2)*(b*
x + a)/b))/(pi*b^2)
```

giac [F]   time = 0.00, size = 0, normalized size = 0.00

$$\int \text{erfi}\left(bx+a\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)^2,x, algorithm="giac")
[Out] integrate(erfi(b*x + a)^2, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx+a)^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x+a)^2,x)
[Out] int(erfi(b*x+a)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx+a)^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)^2,x, algorithm="maxima")
[Out] integrate(erfi(b*x + a)^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{erfi}(a+b\,x)^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)^2,x)
[Out] int(erfi(a + b*x)^2, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}^2(a+bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)**2,x)
[Out] Integral(erfi(a + b*x)**2, x)
```

3.244 $\int \frac{\text{erfi}(a+bx)^2}{c+dx}\,dx$

Optimal. Leaf size=19

$$\text{Int}\left(\frac{\text{erfi}(a+bx)^2}{c+dx},x\right)$$

```
[Out] Unintegrable(erfi(b*x+a)^2/(d*x+c),x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\text{Erfi}(a+bx)^2}{c+dx}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfi[a + b*x]^2/(c + d*x),x]
[Out] Defer[Int][Erfi[a + b*x]^2/(c + d*x), x]
```

Rubi steps

$$\int \frac{\text{erfi}(a+bx)^2}{c+dx}\,dx = \int \frac{\text{erfi}(a+bx)^2}{c+dx}\,dx$$

Mathematica [A] time = 0.06, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}(a+bx)^2}{c+dx}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[a + b*x]^2/(c + d*x),x]
[Out] Integrate[Erfi[a + b*x]^2/(c + d*x), x]
```

fricas [A] time = 0.40, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\left(bx+a\right)^2}{dx+c},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)^2/(d*x+c),x, algorithm="fricas")
[Out] integral(erfi(b*x + a)^2/(d*x + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)^2}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)^2/(d*x+c),x, algorithm="giac")
[Out] integrate(erfi(b*x + a)^2/(d*x + c), x)
```

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)^2}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x+a)^2/(d*x+c),x)
[Out] int(erfi(b*x+a)^2/(d*x+c),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)^2}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)^2/(d*x+c),x, algorithm="maxima")
[Out] integrate(erfi(b*x + a)^2/(d*x + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{erfi}(a+b\,x)^2}{c+d\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)^2/(c + d*x),x)
[Out] int(erfi(a + b*x)^2/(c + d*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}^2(a+bx)}{c+dx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)**2/(d*x+c),x)
```

```
[Out] Integral(erfi(a + b*x)**2/(c + d*x), x)
```

3.245 $\int \frac{\mathbf{erfi}(a+bx)^2}{(c+dx)^2}\,dx$

Optimal. Leaf size=19

$$\mathrm{Int}\left(\frac{\mathrm{erfi}(a+bx)^2}{(c+dx)^2},x\right)$$

```
[Out] Unintegrable(erfi(b*x+a)^2/(d*x+c)^2,x)
```

Rubi [A] time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\mathrm{Erfi}(a+bx)^2}{(c+dx)^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[Erfi[a + b*x]^2/(c + d*x)^2,x]
```

```
[Out] Defer[Int][Erfi[a + b*x]^2/(c + d*x)^2, x]
```

Rubi steps

$$\int \frac{\mathrm{erfi}(a+bx)^2}{(c+dx)^2}\,dx=\int \frac{\mathrm{erfi}(a+bx)^2}{(c+dx)^2}\,dx$$

Mathematica [A] time = 0.12, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfi}(a+bx)^2}{(c+dx)^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[a + b*x]^2/(c + d*x)^2,x]
```

```
[Out] Integrate[Erfi[a + b*x]^2/(c + d*x)^2, x]
```

fricas [A] time = 0.46, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{erfi}\left(bx+a\right)^2}{d^2x^2+2\,cdx+c^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)^2/(d*x+c)^2,x, algorithm="fricas")
[Out] integral(erfi(b*x + a)^2/(d^2*x^2 + 2*c*d*x + c^2), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)^2}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)^2/(d*x+c)^2,x, algorithm="giac")
[Out] integrate(erfi(b*x + a)^2/(d*x + c)^2, x)
```

maple [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)^2}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x+a)^2/(d*x+c)^2,x)
[Out] int(erfi(b*x+a)^2/(d*x+c)^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx+a)^2}{(dx+c)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)^2/(d*x+c)^2,x, algorithm="maxima")
[Out] integrate(erfi(b*x + a)^2/(d*x + c)^2, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{erfi}(a+b\,x)^2}{(c+d\,x)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)^2/(c + d*x)^2,x)
[Out] int(erfi(a + b*x)^2/(c + d*x)^2, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfi}^2(a+bx)}{(c+dx)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x+a)**2/(d*x+c)**2,x)
```

```
[Out] Integral(erfi(a + b*x)**2/(c + d*x)**2, x)
```

3.246 $\int x^2\mathbf{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=102

$$\frac{1}{3}x^3\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{1}{3}x^3\left(cx^n\right)^{-3/n}e^{-\frac{3\left(4abd^2n+3\right)}{4b^2d^2n^2}}\text{erfi}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)+\frac{3}{n}}{2bd}\right)$$

```
[Out] 1/3*x^3*erfi(d*(a+b*ln(c*x^n)))-1/3*x^3*erfi(1/2*(2*a*b*d^2+3/n+2*b^2*d^2*l
n(c*x^n))/b/d)/exp(3/4*(4*a*b*d^2*n+3)/b^2/d^2/n^2)/((c*x^n)^(3/n))
```

Rubi [A] time = 0.22, antiderivative size = 102, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.412, Rules used = {6403, 2278, 2274, 15, 2276, 2234, 2204}

$$\frac{1}{3}x^3\text{Erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{1}{3}x^3\left(cx^n\right)^{-3/n}e^{-\frac{3\left(4abd^2n+3\right)}{4b^2d^2n^2}}\text{Erfi}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)+\frac{3}{n}}{2bd}\right)$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Erfi[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (x^3*Erfi[d*(a + b*Log[c*x^n])])/3 - (x^3*Erfi[(2*a*b*d^2 + 3/n + 2*b^2*d^2
*Log[c*x^n])/(2*b*d)])/(3*E^((3*(3 + 4*a*b*d^2*n))/(4*b^2*d^2*n^2))*(c*x^n)
^(3/n))
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 &&  !IntegerQ[m]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6403

```
Int[Erfi[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfi[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 - Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m*E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx = \frac{1}{3}x^3\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int e^{d^2\left(a+b\log(cx^n)\right)^2}x^2\,dx}{3\sqrt{\pi}}$$
$$= \frac{1}{3}x^3\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int \exp\left(a^2d^2+2abd^2\log\left(cx^n\right)+b^2d^2\text{lo}\right.}{3\sqrt{\pi}}$$
$$= \frac{1}{3}x^3\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int e^{a^2d^2+b^2d^2\log^2(cx^n)}x^2\left(cx^n\right)^{2abd^2}\,dx}{3\sqrt{\pi}}$$
$$= \frac{1}{3}x^3\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bdnx^{-2abd^2n}\left(cx^n\right)^{2abd^2}\right)\int e^{a^2d^2+b^2d^2\log^2(cx^n)}x^2}{3\sqrt{\pi}}$$
$$= \frac{1}{3}x^3\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bdx^3\left(cx^n\right)^{2abd^2-\frac{3+2abd^2n}{n}}\right)\text{Subst}\left(\int\exp\left(a^2d^2\right.\right.}{3\sqrt{\pi}}$$
$$= \frac{1}{3}x^3\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bde^{-\frac{3\left(3+4abd^2n\right)}{4b^2d^2n^2}}x^3\left(cx^n\right)^{2abd^2-\frac{3+2abd^2n}{n}}\right)\text{Subst}\left(\int\right.}{3\sqrt{\pi}}$$
$$= \frac{1}{3}x^3\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{1}{3}e^{-\frac{3\left(3+4abd^2n\right)}{4b^2d^2n^2}}x^3\left(cx^n\right)^{-3/n}\text{erfi}\left(\frac{2abd^2+\frac{3}{n}+2b^2}{2bd}\right.$$

Mathematica [A] time = 0.36, size = 90, normalized size = 0.88

$$\frac{1}{3}\left(x^3\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x^3\left(cx^n\right)^{-3/n}e^{-\frac{3\left(4abd^2n+3\right)}{4b^2d^2n^2}}\text{erfi}\left(ad+bd\log\left(cx^n\right)+\frac{3}{2bdn}\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*Erfi[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (x^3*Erfi[d*(a + b*Log[c*x^n])] - (x^3*Erfi[a*d + 3/(2*b*d*n) + b*d*Log[c*x
^n]])/(E^((3*(3 + 4*a*b*d^2*n))/(4*b^2*d^2*n^2))*(c*x^n)^(3/n)))/3
```

fricas [A] time = 0.58, size = 125, normalized size = 1.23

$$\frac{1}{3}x^3\,\text{erfi}\left(bd\log\left(cx^n\right)+ad\right)-\frac{1}{3}\sqrt{b^2d^2n^2}\,\text{erfi}\left(\frac{\left(2\,b^2d^2n^2\log(x)+2\,b^2d^2n\log(c)+2\,abd^2n+3\right)\sqrt{b^2d^2n^2}}{2\,b^2d^2n^2}\right)e^{\left(-\frac{3\left(4\,b^2\right.}{}\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

```
[Out] 1/3*x^3*erfi(b*d*log(c*x^n) + a*d) - 1/3*sqrt(b^2*d^2*n^2)*erfi(1/2*(2*b^2*
d^2*n^2*log(x) + 2*b^2*d^2*n*log(c) + 2*a*b*d^2*n + 3)*sqrt(b^2*d^2*n^2)/(b
^2*d^2*n^2))*e^(-3/4*(4*b^2*d^2*n*log(c) + 4*a*b*d^2*n + 3)/(b^2*d^2*n^2))
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfi}\left(\left(b\log\left(cx^n\right)+a\right)d\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] integrate(x^2*erfi((b*log(c*x^n) + a)*d), x)
```

maple [F] time = 0.12, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfi}\left(d\left(a+b\ln\left(c\,x^n\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfi(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int(x^2*erfi(d*(a+b*ln(c*x^n))),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfi}\left(\left(b\log\left(cx^n\right)+a\right)d\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] integrate(x^2*erfi((b*log(c*x^n) + a)*d), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^2 \operatorname{erfi}\left(d\,\left(a+b\,\ln\left(c\,x^n\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfi(d*(a + b*log(c*x^n))),x)
```

```
[Out] int(x^2*erfi(d*(a + b*log(c*x^n))), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfi}\left(ad + bd\log\left(cx^n\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erfi(d*(a+b*ln(c*x**n))),x)
```

```
[Out] Integral(x**2*erfi(a*d + b*d*log(c*x**n)), x)
```

3.247 $\int x\,\mathbf{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=93

$$\frac{1}{2}x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{1}{2}x^2\left(cx^n\right)^{-2/n}e^{-\frac{2abd^2n+1}{b^2d^2n^2}}\text{erfi}\left(\frac{abd^2+b^2d^2\log\left(cx^n\right)+\frac{1}{n}}{bd}\right)$$

```
[Out] 1/2*x^2*erfi(d*(a+b*ln(c*x^n)))-1/2*x^2*erfi((a*b*d^2+1/n+b^2*d^2*ln(c*x^n)
)/b/d)/exp((2*a*b*d^2*n+1)/b^2/d^2/n^2)/((c*x^n)^(2/n))
```

Rubi [A] time = 0.17, antiderivative size = 93, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.467, Rules used = {6403, 2278, 2274, 15, 2276, 2234, 2204}

$$\frac{1}{2}x^2\text{Erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\frac{1}{2}x^2\left(cx^n\right)^{-2/n}e^{-\frac{2abd^2n+1}{b^2d^2n^2}}\text{Erfi}\left(\frac{abd^2+b^2d^2\log\left(cx^n\right)+\frac{1}{n}}{bd}\right)$$

Antiderivative was successfully verified.

```
[In] Int[x*Erfi[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (x^2*Erfi[d*(a + b*Log[c*x^n])])/2 - (x^2*Erfi[(a*b*d^2 + n^(-1) + b^2*d^2*
Log[c*x^n])/(b*d)])/(2*E^((1 + 2*a*b*d^2*n)/(b^2*d^2*n^2))*(c*x^n)^(2/n))
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6403

```
Int[Erfi[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfi[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 - Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m*E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx = \frac{1}{2}x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(bdn)\int e^{d^2\left(a+b\log(cx^n)\right)^2}x\,dx}{\sqrt{\pi}}$$
$$= \frac{1}{2}x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(bdn)\int \exp\left(a^2d^2+2abd^2\log\left(cx^n\right)+b^2d^2\text{lo}\right.}{\sqrt{\pi}}$$
$$= \frac{1}{2}x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(bdn)\int e^{a^2d^2+b^2d^2\log^2(cx^n)}x\left(cx^n\right)^{2abd^2}\,dx}{\sqrt{\pi}}$$
$$= \frac{1}{2}x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(bdnx^{-2abd^2n}\left(cx^n\right)^{2abd^2}\right)\int e^{a^2d^2+b^2d^2\log^2(cx^n)}x^{1-}}{\sqrt{\pi}}$$
$$= \frac{1}{2}x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(bdx^2\left(cx^n\right)^{2abd^2-\frac{2+2abd^2n}{n}}\right)\text{Subst}\left(\int\exp\left(a^2d^2\right.\right.}{\sqrt{\pi}}$$
$$= \frac{1}{2}x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(bde^{-\frac{1+2abd^2n}{b^2d^2n^2}}x^2\left(cx^n\right)^{2abd^2-\frac{2+2abd^2n}{n}}\right)\text{Subst}\left(\int\text{ex}\right.}{\sqrt{\pi}}$$
$$= \frac{1}{2}x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{1}{2}e^{-\frac{1+2abd^2n}{b^2d^2n^2}}x^2\left(cx^n\right)^{-2/n}\text{erfi}\left(\frac{abd^2+\frac{1}{n}+b^2d^2\text{lo}}{bd}\right.$$

Mathematica [A] time = 0.36, size = 81, normalized size = 0.87

$$\frac{1}{2}\left(x^2\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x^2e^{-\frac{\frac{2abn+\frac{1}{d^2}}{b^2}+2n\log\left(cx^n\right)}{n^2}}\text{erfi}\left(ad+bd\log\left(cx^n\right)+\frac{1}{bdn}\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Erfi[d*(a + b*Log[c*x^n])],x]
```

```
[Out] (x^2*Erfi[d*(a + b*Log[c*x^n])] - (x^2*Erfi[a*d + 1/(b*d*n) + b*d*Log[c*x^n
]])/E^(((d^(-2) + 2*a*b*n)/b^2 + 2*n*Log[c*x^n])/n^2))/2
```

fricas [A] time = 0.54, size = 121, normalized size = 1.30

$$\frac{1}{2}x^2\text{erfi}\left(bd\log\left(cx^n\right)+ad\right)-\frac{1}{2}\sqrt{b^2d^2n^2}\;\text{erfi}\left(\frac{\left(b^2d^2n^2\log(x)+b^2d^2n\log(c)+abd^2n+1\right)\sqrt{b^2d^2n^2}}{b^2d^2n^2}\right)e^{\left(-\frac{2b^2d^2n\log}{b^2}\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

```
[Out] 1/2*x^2*erfi(b*d*log(c*x^n) + a*d) - 1/2*sqrt(b^2*d^2*n^2)*erfi((b^2*d^2*n^
2*log(x) + b^2*d^2*n*log(c) + a*b*d^2*n + 1)*sqrt(b^2*d^2*n^2)/(b^2*d^2*n^2
))*e^(-(2*b^2*d^2*n*log(c) + 2*a*b*d^2*n + 1)/(b^2*d^2*n^2))
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{erfi}\left(\left(b \log\left(cx^{n}\right) + a\right)d\right) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] integrate(x*erfi((b*log(c*x^n) + a)*d), x)
```

maple [F] time = 0.10, size = 0, normalized size = 0.00

$$\int x \operatorname{erfi}\left(d \left(a + b \ln\left(c \,x^{n}\right)\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfi(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int(x*erfi(d*(a+b*ln(c*x^n))),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{erfi}\left(\left(b \log\left(cx^{n}\right) + a\right)d\right) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] integrate(x*erfi((b*log(c*x^n) + a)*d), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x \operatorname{erfi}\left(d\,\left(a + b\,\ln\left(c\,x^{n}\right)\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfi(d*(a + b*log(c*x^n))),x)
```

```
[Out] int(x*erfi(d*(a + b*log(c*x^n))), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{erfi}\left(ad + bd \log\left(cx^{n}\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(d*(a+b*ln(c*x**n))),x)
```

```
[Out] Integral(x*erfi(a*d + b*d*log(c*x**n)), x)
```

3.248 $\int \mathbf{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=91

$$x\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x\left(cx^n\right)^{-1/n}e^{-\frac{4abd^2n+1}{4b^2d^2n^2}}\text{erfi}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)+\frac{1}{n}}{2bd}\right)$$

```
[Out] x*erfi(d*(a+b*ln(c*x^n)))-x*erfi(1/2*(2*a*b*d^2+1/n+2*b^2*d^2*ln(c*x^n))/b/
d)/exp(1/4*(4*a*b*d^2*n+1)/b^2/d^2/n^2)/((c*x^n)^(1/n))
```

Rubi [A] time = 0.13, antiderivative size = 91, 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 = {6399, 2277, 2274, 15, 2276, 2234, 2204}

$$x\text{Erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x\left(cx^n\right)^{-1/n}e^{-\frac{4abd^2n+1}{4b^2d^2n^2}}\text{Erfi}\left(\frac{2abd^2+2b^2d^2\log\left(cx^n\right)+\frac{1}{n}}{2bd}\right)$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[d*(a + b*Log[c*x^n])],x]
```

```
[Out] x*Erfi[d*(a + b*Log[c*x^n])] - (x*Erfi[(2*a*b*d^2 + n^(-1) + 2*b^2*d^2*Log[
c*x^n])/(2*b*d)])/(E^((1 + 4*a*b*d^2*n)/(4*b^2*d^2*n^2))*(c*x^n)^n^(-1))
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2277

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.)), x_Symbol] :> Int[
F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]^2), x] /; FreeQ[{F, a, b,
c, d, n}, x]
```

Rule 6399

```
Int[Erfi[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)], x_Symbol] :> Simp[x*
Erfi[d*(a + b*Log[c*x^n])], x] - Dist[(2*b*d*n)/Sqrt[Pi], Int[E^(d*(a + b*L
og[c*x^n]))^2, x], x] /; FreeQ[{a, b, c, d, n}, x]
```

Rubi steps

$$\int \operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)dx = x\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int e^{d^2\left(a+b\log(cx^n)\right)^2}dx}{\sqrt{\pi}}$$

$$= x\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int \exp\left(a^2d^2+2abd^2\log\left(cx^n\right)+b^2d^2\log^2\left(c\right.\right.}{\sqrt{\pi}}$$

$$= x\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{(2bdn)\int e^{a^2d^2+b^2d^2\log^2(cx^n)}\left(cx^n\right)^{2abd^2}dx}{\sqrt{\pi}}$$

$$= x\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bdnx^{-2abd^2n}\left(cx^n\right)^{2abd^2}\right)\int e^{a^2d^2+b^2d^2\log^2(cx^n)}x^{2abd^2n}}{\sqrt{\pi}}$$

$$= x\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bdx\left(cx^n\right)^{2abd^2-\frac{1+2abd^2n}{n}}\right)\operatorname{Subst}\left(\int\exp\left(a^2d^2+\frac{(1+}{}\right.\right.}{\sqrt{\pi}}$$

$$= x\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - \frac{\left(2bde^{-\frac{1+4abd^2n}{4b^2d^2n^2}}x\left(cx^n\right)^{2abd^2-\frac{1+2abd^2n}{n}}\right)\operatorname{Subst}\left(\int\exp\left(\frac{(1}{}\right.\right.}{\sqrt{\pi}}$$

$$= x\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - e^{-\frac{1+4abd^2n}{4b^2d^2n^2}}x\left(cx^n\right)^{-1/n}\operatorname{erfi}\left(\frac{2abd^2+\frac{1}{n}+2b^2d^2\log\left(cx\right.}{2bd}\right.$$

Mathematica [A] time = 0.36, size = 78, normalized size = 0.86

$$x\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right) - x\operatorname{erfi}\left(ad+bd\log\left(cx^n\right)+\frac{1}{2bdn}\right)\exp\left(-\frac{\frac{4abn+\frac{1}{d^2}}{b^2}+4n\log\left(cx^n\right)}{4n^2}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[d*(a + b*Log[c*x^n])],x]
```

```
[Out] x*Erfi[d*(a + b*Log[c*x^n])] - (x*Erfi[a*d + 1/(2*b*d*n) + b*d*Log[c*x^n]])
/E^(((d^(-2) + 4*a*b*n)/b^2 + 4*n*Log[c*x^n])/(4*n^2))
```

fricas [A] time = 0.59, size = 122, normalized size = 1.34

$$-\sqrt{b^2d^2n^2}\operatorname{erfi}\left(\frac{\left(2b^2d^2n^2\log(x)+2b^2d^2n\log(c)+2abd^2n+1\right)\sqrt{b^2d^2n^2}}{2b^2d^2n^2}\right)e^{\left(-\frac{4b^2d^2n\log(c)+4abd^2n+1}{4b^2d^2n^2}\right)}+x\operatorname{erfi}\left(bd\log\left(c\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

```
[Out] -sqrt(b^2*d^2*n^2)*erfi(1/2*(2*b^2*d^2*n^2*log(x) + 2*b^2*d^2*n*log(c) + 2*
a*b*d^2*n + 1)*sqrt(b^2*d^2*n^2)/(b^2*d^2*n^2))*e^(-1/4*(4*b^2*d^2*n*log(c)
 + 4*a*b*d^2*n + 1)/(b^2*d^2*n^2)) + x*erfi(b*d*log(c*x^n) + a*d)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}\left(\left(b \log\left(cx^n\right) + a\right)d\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] integrate(erfi((b*log(c*x^n) + a)*d), x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}\left(d\left(a + b\ln\left(c\,x^n\right)\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int(erfi(d*(a+b*ln(c*x^n))),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}\left(\left(b \log\left(cx^n\right) + a\right)d\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] integrate(erfi((b*log(c*x^n) + a)*d), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{erfi}\left(d\,\left(a + b\,\ln\left(c\,x^n\right)\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(d*(a + b*log(c*x^n))),x)
```

```
[Out] int(erfi(d*(a + b*log(c*x^n))), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}\left(d\left(a+b\log\left(cx^{n}\right)\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*ln(c*x**n))),x)
```

```
[Out] Integral(erfi(d*(a + b*log(c*x**n))), x)
```

3.249 $\int \frac{\text{erfi}\left(d\left(a+b\log(cx^n)\right)\right)}{x}\,dx$

Optimal. Leaf size=64

$$\frac{\left(a+b\log\left(cx^n\right)\right)\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{bn}-\frac{e^{\left(ad+bd\log(cx^n)\right)^2}}{\sqrt{\pi}\,bdn}$$

```
[Out] erfi(d*(a+b*ln(c*x^n)))*(a+b*ln(c*x^n))/b/n-exp((a*d+b*d*ln(c*x^n))^2)/b/d/
n/Pi^(1/2)
```

Rubi [A] time = 0.04, antiderivative size = 64, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 1, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.059, Rules used = {6351}

$$\frac{\left(a+b\log\left(cx^n\right)\right)\text{Erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{bn}-\frac{e^{\left(ad+bd\log(cx^n)\right)^2}}{\sqrt{\pi}\,bdn}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[d*(a + b*Log[c*x^n])]/x,x]
```

```
[Out] -(E^(a*d + b*d*Log[c*x^n])^2/(b*d*n*Sqrt[Pi])) + (Erfi[d*(a + b*Log[c*x^n])
]*(a + b*Log[c*x^n]))/(b*n)
```

Rule 6351

```
Int[Erfi[(a_.) + (b_.)*(x_)], x_Symbol] :> Simp[((a + b*x)*Erfi[a + b*x])/b
, x] - Simp[E^(a + b*x)^2/(b*Sqrt[Pi]), x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\begin{aligned}\int \frac{\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}\,dx &= \frac{\text{Subst}\left(\int \text{erfi}(d(a+bx))\,dx,x,\log\left(cx^n\right)\right)}{n}\\ &= \frac{\text{Subst}\left(\int \text{erfi}(x)\,dx,x,ad+bd\log\left(cx^n\right)\right)}{bdn}\\ &= -\frac{e^{\left(ad+bd\log(cx^n)\right)^2}}{bdn\sqrt{\pi}}+\frac{\text{erfi}\left(ad+bd\log\left(cx^n\right)\right)\left(a+b\log\left(cx^n\right)\right)}{bn}\end{aligned}$$

Mathematica [A] time = 0.13, size = 83, normalized size = 1.30

$$\frac{\sqrt{\pi}\, d\left(a+b\log\left(cx^n\right)\right)\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-\left(cx^n\right)^{2abd^2}e^{d^2\left(a^2+b^2\log^2\left(cx^n\right)\right)}}{\sqrt{\pi}\, bdn}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[d*(a + b*Log[c*x^n])]/x,x]
```

```
[Out] (-(E^(d^2*(a^2 + b^2*Log[c*x^n]^2))*(c*x^n)^(2*a*b*d^2)) + d*Sqrt[Pi]*Erfi[
d*(a + b*Log[c*x^n])]*(a + b*Log[c*x^n]))/(b*d*n*Sqrt[Pi])
```

fricas [A] time = 0.72, size = 117, normalized size = 1.83

$$\frac{\left(\pi bdn\log(x)+\pi bd\log(c)+\pi ad\right)\operatorname{erfi}\left(bd\log\left(cx^n\right)+ad\right)-\sqrt{\pi}\,e^{\left(b^2d^2n^2\log(x)^2+b^2d^2\log(c)^2+2\,abd^2\log(c)+a^2d^2+2\,\left(b^2d^2n\log(c)+abd^2n\right)\log(x)\right)}}{\pi bdn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n)))/x,x, algorithm="fricas")
```

```
[Out] ((pi*b*d*n*log(x) + pi*b*d*log(c) + pi*a*d)*erfi(b*d*log(c*x^n) + a*d) - sq
rt(pi)*e^(b^2*d^2*n^2*log(x)^2 + b^2*d^2*log(c)^2 + 2*a*b*d^2*log(c) + a^2*
d^2 + 2*(b^2*d^2*n*log(c) + a*b*d^2*n)*log(x)))/(pi*b*d*n)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(\left(b\log\left(cx^n\right)+a\right)d\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n)))/x,x, algorithm="giac")
```

```
[Out] integrate(erfi((b*log(c*x^n) + a)*d)/x, x)
```

maple [A] time = 0.06, size = 78, normalized size = 1.22

$$\frac{\ln\left(c\,x^n\right)\operatorname{erfi}\left(ad+bd\ln\left(c\,x^n\right)\right)}{n}+\frac{\operatorname{erfi}\left(ad+bd\ln\left(c\,x^n\right)\right)a}{nb}-\frac{\mathrm{e}^{\left(ad+bd\ln\left(c\,x^n\right)\right)^2}}{bdn\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(d*(a+b*ln(c*x^n)))/x,x)
```

```
[Out] 1/n*ln(c*x^n)*erfi(a*d+b*d*ln(c*x^n))+1/n/b*erfi(a*d+b*d*ln(c*x^n))*a-exp((
a*d+b*d*ln(c*x^n))^2)/b/d/n/Pi^(1/2)
```

maxima [A] time = 0.32, size = 58, normalized size = 0.91

$$\frac{\left(b\log\left(cx^{n}\right)+a\right)d\,\mathrm{erfi}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)-\frac{e^{\left(\left(b\log\left(cx^{n}\right)+a\right)^{2}d^{2}\right)}}{\sqrt{\pi}}}{bdn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n)))/x,x, algorithm="maxima")
```

```
[Out] ((b*log(c*x^n) + a)*d*erfi((b*log(c*x^n) + a)*d) - e^((b*log(c*x^n) + a)^2*
d^2)/sqrt(pi))/(b*d*n)
```

mupad [B] time = 0.45, size = 112, normalized size = 1.75

$$\frac{\ln\left(c\,x^{n}\right)\,\mathrm{erfi}\left(a\,d+b\,d\,\ln\left(c\,x^{n}\right)\right)}{n}+\frac{a\,d\,\mathrm{erfi}\left(a\,\sqrt{d^{2}}+b\,\ln\left(c\,x^{n}\right)\,\sqrt{d^{2}}\right)}{b\,n\,\sqrt{d^{2}}}-\frac{\mathrm{e}^{b^{2}\,d^{2}\,\ln\left(c\,x^{n}\right)^{2}}\,\mathrm{e}^{a^{2}\,d^{2}}\,\left(c\,x^{n}\right)^{2\,a\,b\,d^{2}}}{b\,d\,n\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(d*(a + b*log(c*x^n)))/x,x)
```

```
[Out] (log(c*x^n)*erfi(a*d + b*d*log(c*x^n)))/n + (a*d*erfi(a*(d^2)^(1/2) + b*log
(c*x^n)*(d^2)^(1/2)))/(b*n*(d^2)^(1/2)) - (exp(b^2*d^2*log(c*x^n)^2)*exp(a^
2*d^2)*(c*x^n)^(2*a*b*d^2))/(b*d*n*pi^(1/2))
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\mathrm{erfi}\left(ad+bd\log\left(cx^{n}\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*ln(c*x**n)))/x,x)
```

```
[Out] Integral(erfi(a*d + b*d*log(c*x**n))/x, x)
```

3.250 $\int \frac{\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x^2}\,dx$

Optimal. Leaf size=94

$$\frac{\left(cx^n\right)^{\frac{1}{n}} e^{\frac{a}{bn}-\frac{1}{4b^2d^2n^2}} \text{erfi}\left(\frac{2abd^2+2b^2d^2\log(cx^n)-\frac{1}{n}}{2bd}\right)}{x}-\frac{\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

```
[Out] -erfi(d*(a+b*ln(c*x^n)))/x+exp(-1/4/b^2/d^2/n^2+a/b/n)*(c*x^n)^(1/n)*erfi(1
/2*(2*a*b*d^2-1/n+2*b^2*d^2*ln(c*x^n))/b/d)/x
```

Rubi [A] time = 0.22, antiderivative size = 94, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.412, Rules used = {6403, 2278, 2274, 15, 2276, 2234, 2204}

$$\frac{\left(cx^n\right)^{\frac{1}{n}} e^{\frac{a}{bn}-\frac{1}{4b^2d^2n^2}} \text{Erfi}\left(\frac{2abd^2+2b^2d^2\log(cx^n)-\frac{1}{n}}{2bd}\right)}{x}-\frac{\text{Erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[d*(a + b*Log[c*x^n])]/x^2,x]
```

```
[Out] -(Erfi[d*(a + b*Log[c*x^n])]/x) + (E^(-1/(4*b^2*d^2*n^2) + a/(b*n))*(c*x^n)
^n^(-1)*Erfi[(2*a*b*d^2 - n^(-1) + 2*b^2*d^2*Log[c*x^n])/(2*b*d)])/x
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6403

```
Int[Erfi[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfi[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 - Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m*E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x^2}\,dx = -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}+\frac{(2bdn)\int \frac{e^{d^2\left(a+b\log\left(cx^n\right)\right)^2}}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}+\frac{(2bdn)\int \frac{\exp\left(a^2d^2+2abd^2\log(cx^n)+b^2d^2\log^2(cx^n)\right)}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}+\frac{(2bdn)\int \frac{e^{a^2d^2+b^2d^2\log^2(cx^n)}(cx^n)^{2abd^2}}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}+\frac{\left(2bdnx^{-2abd^2n}\left(cx^n\right)^{2abd^2}\right)\int e^{a^2d^2+b^2d^2\log^2(cx^n)}x^{-2+2a}}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}+\frac{\left(2bd\left(cx^n\right)^{2abd^2-\frac{-1+2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\left(a^2d^2+\frac{(-1}{}\right.\right.}{\sqrt{\pi}\,x}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}+\frac{\left(2bde^{-\frac{1}{4b^2d^2n^2}+\frac{a}{bn}}\left(cx^n\right)^{2abd^2-\frac{-1+2abd^2n}{n}}\right)\operatorname{Subst}\left(\int \exp\right.}{\sqrt{\pi}\,x}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}+\frac{e^{-\frac{1}{4b^2d^2n^2}+\frac{a}{bn}}\left(cx^n\right)^{\frac{1}{n}}\operatorname{erfi}\left(\frac{2abd^2-\frac{1}{n}+2b^2d^2\log(cx^n)}{2bd}\right)}{x}$$

Mathematica [A] time = 0.31, size = 82, normalized size = 0.87

$$\frac{\left(cx^n\right)^{\frac{1}{n}}e^{\frac{4abd^2n-1}{4b^2d^2n^2}}\operatorname{erfi}\left(ad+bd\log\left(cx^n\right)-\frac{1}{2bdn}\right)-\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[d*(a + b*Log[c*x^n])]/x^2,x]
```

```
[Out] (-Erfi[d*(a + b*Log[c*x^n])] + E^((-1 + 4*a*b*d^2*n)/(4*b^2*d^2*n^2))*(c*x^
n)^n^(-1)*Erfi[a*d - 1/(2*b*d*n) + b*d*Log[c*x^n]])/x
```

fricas [A] time = 0.56, size = 126, normalized size = 1.34

$$\frac{\sqrt{b^2d^2n^2}\,x\operatorname{erfi}\left(\frac{\left(2\,b^2d^2n^2\log(x)+2\,b^2d^2n\log(c)+2\,abd^2n-1\right)\sqrt{b^2d^2n^2}}{2\,b^2d^2n^2}\right)e^{\left(\frac{4\,b^2d^2n\log(c)+4\,abd^2n-1}{4\,b^2d^2n^2}\right)}-\operatorname{erfi}\left(bd\log\left(cx^n\right)+ad\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n)))/x^2,x, algorithm="fricas")
```

```
[Out] (sqrt(b^2*d^2*n^2)*x*erfi(1/2*(2*b^2*d^2*n^2*log(x) + 2*b^2*d^2*n*log(c) +
2*a*b*d^2*n - 1)*sqrt(b^2*d^2*n^2)/(b^2*d^2*n^2))*e^(1/4*(4*b^2*d^2*n*log(c
) + 4*a*b*d^2*n - 1)/(b^2*d^2*n^2)) - erfi(b*d*log(c*x^n) + a*d))/x
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(\left(b \log\left(cx^n\right) + a\right)d\right)}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n)))/x^2,x, algorithm="giac")
```

```
[Out] integrate(erfi((b*log(c*x^n) + a)*d)/x^2, x)
```

maple [F] time = 0.21, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(d\left(a + b\ln\left(c\, x^n\right)\right)\right)}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(d*(a+b*ln(c*x^n)))/x^2,x)
```

```
[Out] int(erfi(d*(a+b*ln(c*x^n)))/x^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(\left(b \log\left(cx^n\right) + a\right)d\right)}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n)))/x^2,x, algorithm="maxima")
```

```
[Out] integrate(erfi((b*log(c*x^n) + a)*d)/x^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{erfi}\left(d\ \left(a + b\ \ln\left(c\, x^n\right)\right)\right)}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(d*(a + b*log(c*x^n)))/x^2,x)
```

```
[Out] int(erfi(d*(a + b*log(c*x^n)))/x^2, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(ad + bd\log\left(cx^{n}\right)\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*ln(c*x**n)))/x**2,x)
```

```
[Out] Integral(erfi(a*d + b*d*log(c*x**n))/x**2, x)
```

3.251 $\int \frac{\text{erfi}\left(d\left(a+b\log(cx^n)\right)\right)}{x^3}\,dx$

Optimal. Leaf size=95

$$\frac{(cx^n)^{2/n}\, e^{-\frac{1-2abd^2n}{b^2d^2n^2}}\,\text{erfi}\left(\frac{abd^2+b^2d^2\log(cx^n)-\frac{1}{n}}{bd}\right)}{2x^2}-\frac{\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

```
[Out] -1/2*erfi(d*(a+b*ln(c*x^n)))/x^2+1/2*(c*x^n)^(2/n)*erfi((a*b*d^2-1/n+b^2*d^
2*ln(c*x^n))/b/d)/exp((-2*a*b*d^2*n+1)/b^2/d^2/n^2)/x^2
```

Rubi [A] time = 0.21, antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.412, Rules used = {6403, 2278, 2274, 15, 2276, 2234, 2204}

$$\frac{(cx^n)^{2/n}\, e^{-\frac{1-2abd^2n}{b^2d^2n^2}}\,\text{Erfi}\left(\frac{abd^2+b^2d^2\log(cx^n)-\frac{1}{n}}{bd}\right)}{2x^2}-\frac{\text{Erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[d*(a + b*Log[c*x^n])]/x^3,x]
```

```
[Out] -Erfi[d*(a + b*Log[c*x^n])]/(2*x^2) + ((c*x^n)^(2/n)*Erfi[(a*b*d^2 - n^(-1)
 + b^2*d^2*Log[c*x^n])/(b*d)])/(2*E^((1 - 2*a*b*d^2*n)/(b^2*d^2*n^2))*x^2)
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6403

```
Int[Erfi[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfi[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 - Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m*E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{x^3}\,dx = -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{(bdn)\int \frac{e^{d^2\left(a+b\log\left(cx^n\right)\right)^2}}{x^3}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{(bdn)\int \frac{\exp\left(a^2d^2+2abd^2\log(cx^n)+b^2d^2\log^2(cx^n)\right)}{x^3}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{(bdn)\int \frac{e^{a^2d^2+b^2d^2\log^2(cx^n)}(cx^n)^{2abd^2}}{x^3}\,dx}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{\left(bdnx^{-2abd^2n}\left(cx^n\right)^{2abd^2}\right)\int e^{a^2d^2+b^2d^2\log^2(cx^n)}x^{-3+2a\cdots}}{\sqrt{\pi}}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{\left(bd\left(cx^n\right)^{2abd^2-\frac{-2+2abd^2n}{n}}\right)\operatorname{Subst}\left(\int\exp\left(a^2d^2+\frac{(-\cdots}{\cdots}\right.\right.}{\sqrt{\pi}\,x^2}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{\left(bde^{-\frac{1-2abd^2n}{b^2d^2n^2}}\left(cx^n\right)^{2abd^2-\frac{-2+2abd^2n}{n}}\right)\operatorname{Subst}\left(\int\exp\left(\cdots\right.\right.}{\sqrt{\pi}\,x^2}$$

$$= -\frac{\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2} + \frac{e^{-\frac{1-2abd^2n}{b^2d^2n^2}}\left(cx^n\right)^{2/n}\operatorname{erfi}\left(\frac{abd^2-\frac{1}{n}+b^2d^2\log(cx^n)}{bd}\right)}{2x^2}$$

Mathematica [A] time = 0.30, size = 80, normalized size = 0.84

$$\frac{e^{\frac{\frac{2abn-\frac{1}{d^2}}{b^2}+2n\log\left(cx^n\right)}{n^2}}\operatorname{erfi}\left(ad+bd\log\left(cx^n\right)-\frac{1}{bdn}\right)-\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[d*(a + b*Log[c*x^n])]/x^3,x]
```

```
[Out] (-Erfi[d*(a + b*Log[c*x^n])] + E^(((-d^(-2) + 2*a*b*n)/b^2 + 2*n*Log[c*x^n]
)/n^2)*Erfi[a*d - 1/(b*d*n) + b*d*Log[c*x^n]])/(2*x^2)
```

fricas [A] time = 0.59, size = 124, normalized size = 1.31

$$\frac{\sqrt{b^2d^2n^2}\,x^2\,\mathrm{erfi}\left(\frac{\left(b^2d^2n^2\log(x)+b^2d^2n\log(c)+abd^2n-1\right)\sqrt{b^2d^2n^2}}{b^2d^2n^2}\right)e^{\left(\frac{2\,b^2d^2n\log(c)+2\,abd^2n-1}{b^2d^2n^2}\right)}-\mathrm{erfi}\left(bd\log\left(cx^n\right)+ad\right)}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n)))/x^3,x, algorithm="fricas")
```

```
[Out] 1/2*(sqrt(b^2*d^2*n^2)*x^2*erfi((b^2*d^2*n^2*log(x) + b^2*d^2*n*log(c) + a*
b*d^2*n - 1)*sqrt(b^2*d^2*n^2)/(b^2*d^2*n^2))*e^((2*b^2*d^2*n*log(c) + 2*a*
b*d^2*n - 1)/(b^2*d^2*n^2)) - erfi(b*d*log(c*x^n) + a*d))/x^2
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\mathrm{erfi}\left(\left(b\log\left(cx^n\right)+a\right)d\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n)))/x^3,x, algorithm="giac")
```

```
[Out] integrate(erfi((b*log(c*x^n) + a)*d)/x^3, x)
```

maple [F] time = 0.21, size = 0, normalized size = 0.00

$$\int\frac{\mathrm{erfi}\left(d\left(a+b\ln\left(c\,x^n\right)\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(d*(a+b*ln(c*x^n)))/x^3,x)
```

```
[Out] int(erfi(d*(a+b*ln(c*x^n)))/x^3,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\mathrm{erfi}\left(\left(b\log\left(cx^n\right)+a\right)d\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*log(c*x^n)))/x^3,x, algorithm="maxima")
```

```
[Out] integrate(erfi((b*log(c*x^n) + a)*d)/x^3, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{erfi}\left(d\ \left(a+b\ \ln\left(c\,x^n\right)\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(d*(a + b*log(c*x^n)))/x^3,x)
```

```
[Out] int(erfi(d*(a + b*log(c*x^n)))/x^3, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(ad+bd\log\left(cx^n\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(d*(a+b*ln(c*x**n)))/x**3,x)
```

```
[Out] Integral(erfi(a*d + b*d*log(c*x**n))/x**3, x)
```

3.252 $\int (ex)^m \mathbf{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx$

Optimal. Leaf size=126

$$\frac{(ex)^{m+1}\operatorname{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(m+1)}-\frac{x(ex)^m\left(cx^n\right)^{-\frac{m+1}{n}}\exp\left(-\frac{(m+1)\left(4abd^2n+m+1\right)}{4b^2d^2n^2}\right)\operatorname{erfi}\left(\frac{2abd^2n+2b^2d^2n\log(cx^n)+m+1}{2bdn}\right)}{m+1}$$

```
[Out] (e*x)^(1+m)*erfi(d*(a+b*ln(c*x^n)))/e/(1+m)-x*(e*x)^m*erfi(1/2*(1+m+2*a*b*d
^2*n+2*b^2*d^2*n*ln(c*x^n))/b/d/n)/exp(1/4*(1+m)*(4*a*b*d^2*n+m+1)/b^2/d^2/
n^2)/(1+m)/((c*x^n)^((1+m)/n))
```

Rubi [A] time = 0.32, antiderivative size = 126, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.421, Rules used = {6403, 2278, 2274, 15, 20, 2276, 2234, 2204}

$$\frac{(ex)^{m+1}\operatorname{Erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(m+1)}-\frac{x(ex)^m\left(cx^n\right)^{-\frac{m+1}{n}}\exp\left(-\frac{(m+1)\left(4abd^2n+m+1\right)}{4b^2d^2n^2}\right)\operatorname{Erfi}\left(\frac{2abd^2n+2b^2d^2n\log(cx^n)+m+1}{2bdn}\right)}{m+1}$$

Antiderivative was successfully verified.

```
[In] Int[(e*x)^m*Erfi[d*(a + b*Log[c*x^n])],x]
```

```
[Out] ((e*x)^(1 + m)*Erfi[d*(a + b*Log[c*x^n])])/(e*(1 + m)) - (x*(e*x)^m*Erfi[(1
 + m + 2*a*b*d^2*n + 2*b^2*d^2*n*Log[c*x^n])/(2*b*d*n)])/(E^(((1 + m)*(1 +
m + 4*a*b*d^2*n))/(4*b^2*d^2*n^2))*(1 + m)*(c*x^n)^((1 + m)/n))
```

Rule 15

```
Int[(u_.)*((a_.)*(x_)^(n_))^(m_), x_Symbol] :> Dist[(a^IntPart[m]*(a*x^n)^F
racPart[m])/x^(n*FracPart[m]), Int[u*x^(m*n), x], x] /; FreeQ[{a, m, n}, x]
 && !IntegerQ[m]
```

Rule 20

```
Int[(u_.)*((a_.)*(v_))^(m_)*((b_.)*(v_))^(n_), x_Symbol] :> Dist[(b^IntPart
[n]*(b*v)^FracPart[n])/(a^IntPart[n]*(a*v)^FracPart[n]), Int[u*(a*v)^(m + n
), x], x] /; FreeQ[{a, b, m, n}, x] && !IntegerQ[m] && !IntegerQ[n] && !
IntegerQ[m + n]
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
```

```
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2274

```
Int[(u_.)*(F_)^((a_.)*(Log[z_]*(b_.) + (v_.))), x_Symbol] :> Int[u*F^(a*v)*
z^(a*b*Log[F]), x] /; FreeQ[{F, a, b}, x]
```

Rule 2276

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]^2*(b_.))*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Dist[(e*x)^(m + 1)/(e*n*(c*x^n)^((m + 1)/n)), Subst[Int[E^(a
*d*Log[F] + ((m + 1)*x)/n + b*d*Log[F]*x^2), x], x, Log[c*x^n]], x] /; Free
Q[{F, a, b, c, d, e, m, n}, x]
```

Rule 2278

```
Int[(F_)^(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^2*(d_.))*((e_.)*(x_))^(m_.)
, x_Symbol] :> Int[(e*x)^m*F^(a^2*d + 2*a*b*d*Log[c*x^n] + b^2*d*Log[c*x^n]
^2), x] /; FreeQ[{F, a, b, c, d, e, m, n}, x]
```

Rule 6403

```
Int[Erfi[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*(d_.)]*((e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((e*x)^(m + 1)*Erfi[d*(a + b*Log[c*x^n])])/(e*(m + 1)), x]
 - Dist[(2*b*d*n)/(Sqrt[Pi]*(m + 1)), Int[(e*x)^m*E^(d*(a + b*Log[c*x^n]))^
2, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (ex)^m \text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)\,dx = \frac{(ex)^{1+m}\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{(2bdn)\int e^{d^2\left(a+b\log(cx^n)\right)^2}(ex)^m\,dx}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{(2bdn)\int \exp\left(a^2d^2+2abd^2\log\left(cx^n\right)+\right.}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{(2bdn)\int e^{a^2d^2+b^2d^2\log^2(cx^n)}(ex)^m\left(cx^n\right)^{2ab}}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{\left(2bdnx^{-2abd^2n}\left(cx^n\right)^{2abd^2}\right)\int e^{a^2d^2+b^2d^2\log}}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{\left(2bdnx^{-m-2abd^2n}(ex)^m\left(cx^n\right)^{2abd^2}\right)\int e^{a^2d^2}}{(1+m)\sqrt{\pi}}$$

$$= \frac{(ex)^{1+m}\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{\left(2bdx(ex)^m\left(cx^n\right)^{2abd^2-\frac{1+m+2abd^2n}{n}}\right)\text{Subst}}{}$$

$$= \frac{(ex)^{1+m}\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{\left(2bd\exp\left(-\frac{(1+m)\left(1+m+4abd^2n\right)}{4b^2d^2n^2}\right)x(ex)^m\left(c\right.\right.}{}$$

$$= \frac{(ex)^{1+m}\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)}{e(1+m)} - \frac{\exp\left(-\frac{(1+m)\left(1+m+4abd^2n\right)}{4b^2d^2n^2}\right)x(ex)^m\left(cx^n\right)^{-}}{1+m}$$

Mathematica [A] time = 0.54, size = 126, normalized size = 1.00

$$\frac{(ex)^m\left(x\text{erfi}\left(d\left(a+b\log\left(cx^n\right)\right)\right)-x^{-m}\text{erfi}\left(\frac{2abd^2n+m+1}{2bdn}+bd\log\left(cx^n\right)\right)\exp\left(-\frac{(m+1)\left(4abd^2n+4b^2d^2n\log(cx^n)-4b^2d^2n^2\log(\right.}{4b^2d^2n^2}\right.\right.}{m+1}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e*x)^m*Erfi[d*(a + b*Log[c*x^n])],x]
```

```
[Out] ((e*x)^m*(x*Erfi[d*(a + b*Log[c*x^n])] - Erfi[(1 + m + 2*a*b*d^2*n)/(2*b*d*
n) + b*d*Log[c*x^n]]/(E^(((1 + m)*(1 + m + 4*a*b*d^2*n - 4*b^2*d^2*n^2*Log[
x] + 4*b^2*d^2*n*Log[c*x^n]))/(4*b^2*d^2*n^2))*x^m)))/(1 + m)
```

fricas [A] time = 0.53, size = 180, normalized size = 1.43

$$\frac{x\,\mathrm{erfi}\left(bd\log\left(cx^{n}\right)+ad\right)e^{\left(m\log(e)+m\log(x)\right)}-\sqrt{b^{2}d^{2}n^{2}}\,\mathrm{erfi}\left(\frac{\left(2\,b^{2}d^{2}n^{2}\log(x)+2\,b^{2}d^{2}n\log(c)+2\,abd^{2}n+m+1\right)\sqrt{b^{2}d^{2}n^{2}}}{2\,b^{2}d^{2}n^{2}}\right)e^{\left(\frac{4\,b^{2}d^{2}m\ldots}{\ldots}\right)}}{m+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)^m*erfi(d*(a+b*log(c*x^n))),x, algorithm="fricas")
```

```
[Out] (x*erfi(b*d*log(c*x^n) + a*d)*e^(m*log(e) + m*log(x)) - sqrt(b^2*d^2*n^2)*e
rfi(1/2*(2*b^2*d^2*n^2*log(x) + 2*b^2*d^2*n*log(c) + 2*a*b*d^2*n + m + 1)*s
qrt(b^2*d^2*n^2)/(b^2*d^2*n^2))*e^(1/4*(4*b^2*d^2*m*n^2*log(e) - 4*(b^2*d^2
*m + b^2*d^2)*n*log(c) - m^2 - 4*(a*b*d^2*m + a*b*d^2)*n - 2*m - 1)/(b^2*d^
2*n^2)))/(m + 1)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (ex)^{m}\,\mathrm{erfi}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)^m*erfi(d*(a+b*log(c*x^n))),x, algorithm="giac")
```

```
[Out] integrate((e*x)^m*erfi((b*log(c*x^n) + a)*d), x)
```

maple [F] time = 0.06, size = 0, normalized size = 0.00

$$\int (ex)^{m}\,\mathrm{erfi}\left(d\left(a+b\ln\left(c\,x^{n}\right)\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x)^m*erfi(d*(a+b*ln(c*x^n))),x)
```

```
[Out] int((e*x)^m*erfi(d*(a+b*ln(c*x^n))),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (ex)^{m}\,\mathrm{erfi}\left(\left(b\log\left(cx^{n}\right)+a\right)d\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)^m*erfi(d*(a+b*log(c*x^n))),x, algorithm="maxima")
```

```
[Out] integrate((e*x)^m*erfi((b*log(c*x^n) + a)*d), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \text{erfi}\left(d\ \left(a+b\ \ln\left(c\,x^n\right)\right)\right)\ {\left(e\,x\right)}^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(d*(a + b*log(c*x^n)))*(e*x)^m,x)
[Out] int(erfi(d*(a + b*log(c*x^n)))*(e*x)^m, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (ex)^m \,\text{erfi}\left(ad + bd\log\left(cx^n\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x)**m*erfi(d*(a+b*ln(c*x**n))),x)
[Out] Integral((e*x)**m*erfi(a*d + b*d*log(c*x**n)), x)
```

3.253 $\int e^{c+b^2x^2}\mathbf{erfi}(bx)^2\,dx$

Optimal. Leaf size=21

$$\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)^3}{6b}$$

```
[Out] 1/6*exp(c)*erfi(b*x)^3*Pi^(1/2)/b
```

Rubi [A] time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {6375, 30}

$$\frac{\sqrt{\pi}\,e^c\text{Erfi}(bx)^3}{6b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*Erfi[b*x]^2,x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^3)/(6*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}\text{erfi}(bx)^2\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int x^2\,dx,x,\text{erfi}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}\,\text{erfi}(bx)^3}{6b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)^3}{6b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*Erfi[b*x]^2,x]
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^3)/(6*b)
```

fricas [A] time = 0.45, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\ \mathrm{erfi}\,(bx)^3\,e^c}{6\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)^2,x, algorithm="fricas")
[Out] 1/6*sqrt(pi)*erfi(b*x)^3*e^c/b
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{erfi}\,(bx)^2\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)^2,x, algorithm="giac")
[Out] integrate(erfi(b*x)^2*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{b^2x^2+c}\,\mathrm{erfi}\,(bx)^2\ dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfi(b*x)^2,x)
[Out] int(exp(b^2*x^2+c)*erfi(b*x)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{erfi}\,(bx)^2\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)^2,x, algorithm="maxima")
[Out] integrate(erfi(b*x)^2*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.10, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\ \mathrm{e}^c\,\mathrm{erfi}\left(b\,x\right)^3}{6\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + b^2*x^2)*erfi(b*x)^2,x)
[Out] (pi^(1/2)*exp(c)*erfi(b*x)^3)/(6*b)
```

sympy [A] time = 1.59, size = 19, normalized size = 0.90

$$\begin{cases} \frac{\sqrt{\pi} e^{c} \operatorname{erfi}^{3}{\left(bx \right)}}{6b} & \text{for}\: b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfi(b*x)**2,x)
[Out] Piecewise((sqrt(pi)*exp(c)*erfi(b*x)**3/(6*b), Ne(b, 0)), (0, True))
```

3.254 $\int e^{c+b^2x^2} \textbf{erfi}(bx)\,dx$

Optimal. Leaf size=21

$$\frac{\sqrt{\pi}\, e^c \text{erfi}(bx)^2}{4b}$$

```
[Out] 1/4*exp(c)*erfi(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.02, antiderivative size = 21, 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 = {6375, 30}

$$\frac{\sqrt{\pi}\, e^c \text{Erfi}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*Erfi[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^2)/(4*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}\text{erfi}(bx)\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}(\int x\,dx, x, \text{erfi}(bx))}{2b}\\ &= \frac{e^c\sqrt{\pi}\,\text{erfi}(bx)^2}{4b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$\frac{\sqrt{\pi}\, e^c \text{erfi}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*Erfi[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^2)/(4*b)
```

fricas [A] time = 0.42, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\,\operatorname{erfi}\left(bx\right)^2 e^c}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x),x, algorithm="fricas")
```

```
[Out] 1/4*sqrt(pi)*erfi(b*x)^2*e^c/b
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}\left(bx\right) e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.06, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{b^2x^2+c} \operatorname{erfi}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfi(b*x),x)
```

```
[Out] int(exp(b^2*x^2+c)*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}\left(bx\right) e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.45, size = 91, normalized size = 4.33

$$\frac{\sqrt{\pi}\,\mathrm{erfi}\left(\frac{b^2\,x}{\sqrt{b^2}}\right)\,\mathrm{e}^c\,\mathrm{erfi}\left(b\,x\right)}{2\,\sqrt{b^2}}-\frac{\sqrt{\pi}\,\mathrm{e}^c\,\mathrm{erf}{\left(x\,\sqrt{-b^2}\right)}^2}{4\,b}-\frac{b\,\sqrt{\pi}\,\mathrm{erfi}\left(\frac{b^2\,x}{\sqrt{b^2}}\right)\,\mathrm{e}^c\,\mathrm{erf}\left(x\,\sqrt{-b^2}\right)}{2\,\sqrt{b^2}\,\sqrt{-b^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + b^2*x^2)*erfi(b*x),x)
```

```
[Out] (pi^(1/2)*erfi((b^2*x)/(b^2)^(1/2))*exp(c)*erfi(b*x))/(2*(b^2)^(1/2)) - (pi
^(1/2)*exp(c)*erf(x*(-b^2)^(1/2))^2)/(4*b) - (b*pi^(1/2)*erfi((b^2*x)/(b^2)
^(1/2))*exp(c)*erf(x*(-b^2)^(1/2)))/(2*(b^2)^(1/2)*(-b^2)^(1/2))
```

sympy [A] time = 0.52, size = 19, normalized size = 0.90

$$\begin{cases} \frac{\sqrt{\pi}\,e^{c}\,\mathrm{erfi}^{2}\,(bx)}{4b} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfi(b*x),x)
```

```
[Out] Piecewise((sqrt(pi)*exp(c)*erfi(b*x)**2/(4*b), Ne(b, 0)), (0, True))
```

3.255 $\int \frac{e^{c+b^2x^2}}{\text{erfi}(bx)}\,dx$

Optimal. Leaf size=20

$$\frac{\sqrt{\pi}\,e^c\log(\text{erfi}(bx))}{2b}$$

```
[Out] 1/2*exp(c)*ln(erfi(b*x))*Pi^(1/2)/b
```

Rubi [A] time = 0.03, antiderivative size = 20, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {6375, 29}

$$\frac{\sqrt{\pi}\,e^c\log(\text{Erfi}(bx))}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)/Erfi[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Log[Erfi[b*x]])/(2*b)
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+b^2x^2}}{\text{erfi}(bx)}\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int \frac{1}{x}\,dx, x, \text{erfi}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}\,\log(\text{erfi}(bx))}{2b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 20, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c\log(\text{erfi}(bx))}{2b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)/Erfi[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Log[Erfi[b*x]])/(2*b)
```

fricas [A] time = 0.47, size = 15, normalized size = 0.75

$$\frac{\sqrt{\pi}\, e^{c} \log\left(\operatorname{erfi}\left(bx\right)\right)}{2\, b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)/erfi(b*x),x, algorithm="fricas")
```

```
[Out] 1/2*sqrt(pi)*e^c*log(erfi(b*x))/b
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{\left(b^{2} x^{2}+c\right)}}{\operatorname{erfi}\left(bx\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)/erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(e^(b^2*x^2 + c)/erfi(b*x), x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^{2} x^{2}+c}}{\operatorname{erfi}\left(bx\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)/erfi(b*x),x)
```

```
[Out] int(exp(b^2*x^2+c)/erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{\left(b^{2} x^{2}+c\right)}}{\operatorname{erfi}\left(bx\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)/erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(e^(b^2*x^2 + c)/erfi(b*x), x)
```

mupad [B] time = 0.17, size = 15, normalized size = 0.75

$$\frac{\sqrt{\pi}\ \ln\left(\mathrm{erfi}\left(b\,x\right)\right)\ \mathrm{e}^{c}}{2\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + b^2*x^2)/erfi(b*x),x)
```

```
[Out] (pi^(1/2)*log(erfi(b*x))*exp(c))/(2*b)
```

sympy [A] time = 0.34, size = 24, normalized size = 1.20

$$\begin{cases} \frac{\sqrt{\pi} e^{c} \log\left(\operatorname{erfi}\left(bx\right)\right)}{2b} & \text{for}\: b \neq 0 \\ \tilde{\infty} x e^{c} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)/erfi(b*x),x)
```

```
[Out] Piecewise((sqrt(pi)*exp(c)*log(erfi(b*x))/(2*b), Ne(b, 0)), (zoo*x*exp(c),
True))
```

3.256 $\int \frac{e^{c+b^2x^2}}{\mathbf{erfi}(bx)^2}\,dx$

Optimal. Leaf size=21

$$-\frac{\sqrt{\pi}\,e^c}{2b\text{erfi}(bx)}$$

```
[Out] -1/2*exp(c)*Pi^(1/2)/b/erfi(b*x)
```

Rubi [A] time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {6375, 30}

$$-\frac{\sqrt{\pi}\,e^c}{2b\text{Erfi}(bx)}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)/Erfi[b*x]^2,x]
```

```
[Out] -(E^c*Sqrt[Pi])/(2*b*Erfi[b*x])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+b^2x^2}}{\text{erfi}(bx)^2}\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int \frac{1}{x^2}\,dx, x, \text{erfi}(bx)\right)}{2b}\\ &= -\frac{e^c\sqrt{\pi}}{2b\text{erfi}(bx)}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$-\frac{\sqrt{\pi}\,e^c}{2b\text{erfi}(bx)}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)/Erfi[b*x]^2,x]
```

```
[Out] -1/2*(E^c*Sqrt[Pi])/(b*Erfi[b*x])
```

fricas [A] time = 0.56, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\, e^{c}}{2\, b \operatorname{erfi}\left(bx\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)/erfi(b*x)^2,x, algorithm="fricas")
```

```
[Out] -1/2*sqrt(pi)*e^c/(b*erfi(b*x))
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{\left(b^{2} x^{2}+c\right)}}{\operatorname{erfi}\left(bx\right)^{2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)/erfi(b*x)^2,x, algorithm="giac")
```

```
[Out] integrate(e^(b^2*x^2 + c)/erfi(b*x)^2, x)
```

maple [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^{2} x^{2}+c}}{\operatorname{erfi}\left(bx\right)^{2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)/erfi(b*x)^2,x)
```

```
[Out] int(exp(b^2*x^2+c)/erfi(b*x)^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{\left(b^{2} x^{2}+c\right)}}{\operatorname{erfi}\left(bx\right)^{2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)/erfi(b*x)^2,x, algorithm="maxima")
```

```
[Out] integrate(e^(b^2*x^2 + c)/erfi(b*x)^2, x)
```

mupad [B] time = 0.10, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\,\mathrm{e}^{c}}{2\,b\,\mathrm{erfi}\left(b\,x\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + b^2*x^2)/erfi(b*x)^2,x)
```

```
[Out] -(pi^(1/2)*exp(c))/(2*b*erfi(b*x))
```

sympy [A] time = 0.97, size = 24, normalized size = 1.14

$$\begin{cases} -\frac{\sqrt{\pi}e^{c}}{2b\,\mathrm{erfi}\,(bx)} & \text{for } b \neq 0 \\ \tilde{\infty}xe^{c} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)/erfi(b*x)**2,x)
```

```
[Out] Piecewise((-sqrt(pi)*exp(c)/(2*b*erfi(b*x)), Ne(b, 0)), (zoo*x*exp(c), True
))
```

3.257 $\int \frac{e^{c+b^2x^2}}{\mathbf{erfi}(bx)^3} \, dx$

Optimal. Leaf size=21

$$-\frac{\sqrt{\pi}\, e^c}{4b\text{erfi}(bx)^2}$$

```
[Out] -1/4*exp(c)*Pi^(1/2)/b/erfi(b*x)^2
```

Rubi [A] time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {6375, 30}

$$-\frac{\sqrt{\pi}\, e^c}{4b\text{Erfi}(bx)^2}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)/Erfi[b*x]^3,x]
```

```
[Out] -(E^c*Sqrt[Pi])/(4*b*Erfi[b*x]^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+b^2x^2}}{\text{erfi}(bx)^3} \, dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int \frac{1}{x^3} \, dx, x, \text{erfi}(bx)\right)}{2b}\\ &= -\frac{e^c\sqrt{\pi}}{4b\text{erfi}(bx)^2}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 1.00

$$-\frac{\sqrt{\pi}\, e^c}{4b\text{erfi}(bx)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)/Erfi[b*x]^3,x]
```

```
[Out] -1/4*(E^c*Sqrt[Pi])/(b*Erfi[b*x]^2)
```

fricas [A] time = 0.58, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\, e^{c}}{4\, b \operatorname{erfi}\left(bx\right)^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)/erfi(b*x)^3,x, algorithm="fricas")
```

```
[Out] -1/4*sqrt(pi)*e^c/(b*erfi(b*x)^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{\left(b^{2} x^{2} + c\right)}}{\operatorname{erfi}\left(bx\right)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)/erfi(b*x)^3,x, algorithm="giac")
```

```
[Out] integrate(e^(b^2*x^2 + c)/erfi(b*x)^3, x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int \frac{{\mathrm e}^{b^{2} x^{2}+c}}{\operatorname{erfi}\left(bx\right)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)/erfi(b*x)^3,x)
```

```
[Out] int(exp(b^2*x^2+c)/erfi(b*x)^3,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{e^{\left(b^{2} x^{2} + c\right)}}{\operatorname{erfi}\left(bx\right)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)/erfi(b*x)^3,x, algorithm="maxima")
```

```
[Out] integrate(e^(b^2*x^2 + c)/erfi(b*x)^3, x)
```

mupad [B] time = 0.14, size = 16, normalized size = 0.76

$$-\frac{\sqrt{\pi}\ \mathrm{e}^{c}}{4\,b\,\mathrm{erfi}\left(b\,x\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + b^2*x^2)/erfi(b*x)^3,x)
```

```
[Out] -(pi^(1/2)*exp(c))/(4*b*erfi(b*x)^2)
```

sympy [A] time = 2.07, size = 26, normalized size = 1.24

$$\begin{cases} -\frac{\sqrt{\pi}e^{c}}{4b\,\mathrm{erfi}^{2}\left(bx\right)} & \text{for}\ b \neq 0 \\ \tilde{\infty}xe^{c} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)/erfi(b*x)**3,x)
```

```
[Out] Piecewise((-sqrt(pi)*exp(c)/(4*b*erfi(b*x)**2), Ne(b, 0)), (zoo*x*exp(c), T
rue))
```

3.258 $\int e^{c+b^2x^2}\mathbf{erfi}(bx)^n\,dx$

Optimal. Leaf size=28

$$\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)^{n+1}}{2b(n+1)}$$

```
[Out] 1/2*exp(c)*erfi(b*x)^(1+n)*Pi^(1/2)/b/(1+n)
```

Rubi [A] time = 0.03, antiderivative size = 28, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {6375, 30}

$$\frac{\sqrt{\pi}\,e^c\text{Erfi}(bx)^{n+1}}{2b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*Erfi[b*x]^n,x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^(1 + n))/(2*b*(1 + n))
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}\text{erfi}(bx)^n\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int x^n\,dx,x,\text{erfi}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}\,\text{erfi}(bx)^{1+n}}{2b(1+n)}\end{aligned}$$

Mathematica [A] time = 0.02, size = 28, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)^{n+1}}{2b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*Erfi[b*x]^n,x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^(1 + n))/(2*b*(1 + n))
```

fricas [A] time = 0.59, size = 24, normalized size = 0.86

$$\frac{\sqrt{\pi}\,\operatorname{erfi}(bx)^n\operatorname{erfi}(bx)\,e^c}{2\,(bn+b)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)^n,x, algorithm="fricas")
```

```
[Out] 1/2*sqrt(pi)*erfi(b*x)^n*erfi(b*x)*e^c/(b*n + b)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)^n\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)^n,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)^n*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.01, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{b^2x^2+c}\operatorname{erfi}(bx)^n\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfi(b*x)^n,x)
```

```
[Out] int(exp(b^2*x^2+c)*erfi(b*x)^n,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)^n\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)^n,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)^n*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.19, size = 23, normalized size = 0.82

$$\frac{\sqrt{\pi}\ \mathrm{e}^{c}\,\mathrm{erfi}\left(b\,x\right)^{n+1}}{2\,b\,\left(n+1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + b^2*x^2)*erfi(b*x)^n,x)
```

```
[Out] (pi^(1/2)*exp(c)*erfi(b*x)^(n + 1))/(2*b*(n + 1))
```

sympy [A] time = 5.02, size = 63, normalized size = 2.25

$$\begin{cases} \tilde{\infty} x e^{c} & \text{for}\: b = 0 \wedge n = -1 \\ 0^{n} x e^{c} & \text{for}\: b = 0 \\ \frac{\sqrt{\pi} e^{c} \log{\left(\operatorname{erfi}{\left(b x \right)} \right)}}{2 b} & \text{for}\: n = -1 \\ \frac{\sqrt{\pi} e^{c} \operatorname{erfi}{\left(b x \right)} \operatorname{erfi}^{n}{\left(b x \right)}}{2 b n + 2 b} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfi(b*x)**n,x)
```

```
[Out] Piecewise((zoo*x*exp(c), Eq(b, 0) & Eq(n, -1)), (0**n*x*exp(c), Eq(b, 0)),
(sqrt(pi)*exp(c)*log(erfi(b*x))/(2*b), Eq(n, -1)), (sqrt(pi)*exp(c)*erfi(b*
x)*erfi(b*x)**n/(2*b*n + 2*b), True))
```

3.259 $\int e^{c+dx^2}x^5\,\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=257

$$-\frac{be^c\operatorname{erfi}\left(x\sqrt{b^2+d}\right)}{d^3\sqrt{b^2+d}}-\frac{be^c\operatorname{erfi}\left(x\sqrt{b^2+d}\right)}{2d^2\left(b^2+d\right)^{3/2}}+\frac{bxe^{x^2\left(b^2+d\right)+c}}{\sqrt{\pi}\,d^2\left(b^2+d\right)}-\frac{3be^c\operatorname{erfi}\left(x\sqrt{b^2+d}\right)}{8d\left(b^2+d\right)^{5/2}}+\frac{3bxe^{x^2\left(b^2+d\right)+c}}{4\sqrt{\pi}\,d\left(b^2+d\right)^2}-\frac{bx^3e^{x^2(b^2+}}{2\sqrt{\pi}\,d\,(b^2}$$

```
[Out] exp(d*x^2+c)*erfi(b*x)/d^3-exp(d*x^2+c)*x^2*erfi(b*x)/d^2+1/2*exp(d*x^2+c)*
x^4*erfi(b*x)/d-3/8*b*exp(c)*erfi(x*(b^2+d)^(1/2))/d/(b^2+d)^(5/2)-1/2*b*ex
p(c)*erfi(x*(b^2+d)^(1/2))/d^2/(b^2+d)^(3/2)-b*exp(c)*erfi(x*(b^2+d)^(1/2))
/d^3/(b^2+d)^(1/2)+3/4*b*exp(c+(b^2+d)*x^2)*x/d/(b^2+d)^2/Pi^(1/2)+b*exp(c+
(b^2+d)*x^2)*x/d^2/(b^2+d)/Pi^(1/2)-1/2*b*exp(c+(b^2+d)*x^2)*x^3/d/(b^2+d)/
Pi^(1/2)
```

Rubi [A] time = 0.41, antiderivative size = 257, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.235, Rules used = {6387, 6384, 2204, 2212}

$$-\frac{be^c\operatorname{Erfi}\left(x\sqrt{b^2+d}\right)}{d^3\sqrt{b^2+d}}-\frac{be^c\operatorname{Erfi}\left(x\sqrt{b^2+d}\right)}{2d^2\left(b^2+d\right)^{3/2}}+\frac{bxe^{x^2\left(b^2+d\right)+c}}{\sqrt{\pi}\,d^2\left(b^2+d\right)}-\frac{3be^c\operatorname{Erfi}\left(x\sqrt{b^2+d}\right)}{8d\left(b^2+d\right)^{5/2}}-\frac{bx^3e^{x^2\left(b^2+d\right)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)}+\frac{3bxe^{x^2(b^2}}{4\sqrt{\pi}\,d\,(b^2}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x^5*Erfi[b*x],x]
```

```
[Out] (3*b*E^(c + (b^2 + d)*x^2)*x)/(4*d*(b^2 + d)^2*Sqrt[Pi]) + (b*E^(c + (b^2 +
 d)*x^2)*x)/(d^2*(b^2 + d)*Sqrt[Pi]) - (b*E^(c + (b^2 + d)*x^2)*x^3)/(2*d*(
b^2 + d)*Sqrt[Pi]) + (E^(c + d*x^2)*Erfi[b*x])/d^3 - (E^(c + d*x^2)*x^2*Erf
i[b*x])/d^2 + (E^(c + d*x^2)*x^4*Erfi[b*x])/(2*d) - (3*b*E^c*Erfi[Sqrt[b^2
+ d]*x])/(8*d*(b^2 + d)^(5/2)) - (b*E^c*Erfi[Sqrt[b^2 + d]*x])/(2*d^2*(b^2
+ d)^(3/2)) - (b*E^c*Erfi[Sqrt[b^2 + d]*x])/(d^3*Sqrt[b^2 + d])
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
```

```
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{c+dx^2}x^5\text{erfi}(bx)\,dx = \frac{e^{c+dx^2}x^4\text{erfi}(bx)}{2d} - \frac{2\int e^{c+dx^2}x^3\text{erfi}(bx)\,dx}{d} - \frac{b\int e^{c+\left(b^2+d\right)x^2}x^4\,dx}{d\sqrt{\pi}}$$

$$= -\frac{be^{c+\left(b^2+d\right)x^2}x^3}{2d\left(b^2+d\right)\sqrt{\pi}} - \frac{e^{c+dx^2}x^2\text{erfi}(bx)}{d^2} + \frac{e^{c+dx^2}x^4\text{erfi}(bx)}{2d} + \frac{2\int e^{c+dx^2}x\text{erfi}(bx)\,dx}{d^2} + \frac{(2b)\int}{}$$

$$= \frac{3be^{c+\left(b^2+d\right)x^2}x}{4d\left(b^2+d\right)^2\sqrt{\pi}} + \frac{be^{c+\left(b^2+d\right)x^2}x}{d^2\left(b^2+d\right)\sqrt{\pi}} - \frac{be^{c+\left(b^2+d\right)x^2}x^3}{2d\left(b^2+d\right)\sqrt{\pi}} + \frac{e^{c+dx^2}\text{erfi}(bx)}{d^3} - \frac{e^{c+dx^2}x^2\text{erfi}(bx}{d^2}$$

$$= \frac{3be^{c+\left(b^2+d\right)x^2}x}{4d\left(b^2+d\right)^2\sqrt{\pi}} + \frac{be^{c+\left(b^2+d\right)x^2}x}{d^2\left(b^2+d\right)\sqrt{\pi}} - \frac{be^{c+\left(b^2+d\right)x^2}x^3}{2d\left(b^2+d\right)\sqrt{\pi}} + \frac{e^{c+dx^2}\text{erfi}(bx)}{d^3} - \frac{e^{c+dx^2}x^2\text{erfi}(bx}{d^2}$$

Mathematica [A] time = 0.34, size = 131, normalized size = 0.51

$$\frac{e^c\left(-\frac{2bdxe^{x^2\left(b^2+d\right)}\left(2b^2\left(dx^2-2\right)+d\left(2dx^2-7\right)\right)}{\sqrt{\pi}\left(b^2+d\right)^2} - \frac{b\left(8b^4+20b^2d+15d^2\right)\text{erfi}\left(x\sqrt{b^2+d}\right)}{\left(b^2+d\right)^{5/2}} + 4e^{dx^2}\left(d^2x^4-2dx^2+2\right)\text{erfi}(bx)\right)}{8d^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x^5*Erfi[b*x],x]
```

```
[Out] (E^c*((-2*b*d*E^((b^2 + d)*x^2)*x*(2*b^2*(-2 + d*x^2) + d*(-7 + 2*d*x^2)))/
((b^2 + d)^2*Sqrt[Pi]) + 4*E^(d*x^2)*(2 - 2*d*x^2 + d^2*x^4)*Erfi[b*x] - (b
*(8*b^4 + 20*b^2*d + 15*d^2)*Erfi[Sqrt[b^2 + d]*x])/(b^2 + d)^(5/2)))/(8*d^
3)
```

fricas [A] time = 0.57, size = 255, normalized size = 0.99

$$\frac{\pi\left(8\,b^5+20\,b^3d+15\,bd^2\right)\sqrt{-b^2-d}\,\operatorname{erf}\left(\sqrt{-b^2-d}\,x\right)e^c+4\left(\pi\left(b^6d^2+3\,b^4d^3+3\,b^2d^4+d^5\right)x^4-2\,\pi\left(b^6d+3\,b^4d\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^5*erfi(b*x),x, algorithm="fricas")
```

```
[Out] 1/8*(pi*(8*b^5 + 20*b^3*d + 15*b*d^2)*sqrt(-b^2 - d)*erf(sqrt(-b^2 - d)*x)*
e^c + 4*(pi*(b^6*d^2 + 3*b^4*d^3 + 3*b^2*d^4 + d^5)*x^4 - 2*pi*(b^6*d + 3*b
^4*d^2 + 3*b^2*d^3 + d^4)*x^2 + 2*pi*(b^6 + 3*b^4*d + 3*b^2*d^2 + d^3))*erf
i(b*x)*e^(d*x^2 + c) - 2*sqrt(pi)*(2*(b^5*d^2 + 2*b^3*d^3 + b*d^4)*x^3 - (4
*b^5*d + 11*b^3*d^2 + 7*b*d^3)*x)*e^(b^2*x^2 + d*x^2 + c))/(pi*(b^6*d^3 + 3
*b^4*d^4 + 3*b^2*d^5 + d^6))
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5\operatorname{erfi}\left(bx\right)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^5*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^5*erfi(b*x)*e^(d*x^2 + c), x)
```

maple [F] time = 0.06, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c}x^5\operatorname{erfi}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^5*erfi(b*x),x)
```

```
[Out] int(exp(d*x^2+c)*x^5*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5\operatorname{erfi}\left(bx\right)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^5*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x^5*erfi(b*x)*e^(d*x^2 + c), x)
```

mupad [B] time = 0.77, size = 232, normalized size = 0.90

$$\operatorname{erfi}(b\,x)\left(\frac{e^{d\,x^2+c}}{d^3}-\frac{x^2\,e^{d\,x^2+c}}{d^2}+\frac{x^4\,e^{d\,x^2+c}}{2\,d}\right)-\frac{b\,\operatorname{erfi}\left(x\,\sqrt{b^2+d}\right)\,e^c}{2\,d^2\,\left(b^2+d\right)^{3/2}}-\frac{b\,e^c\,\operatorname{erf}\left(x\,\sqrt{-b^2-d}\right)}{d^3\,\sqrt{-b^2-d}}+\frac{b\,x\,e^{b^2\,x^2+d\,x^2+c}}{d^2\,\sqrt{\pi}\,\left(b^2+d\right)}+\frac{b\,x^5\,e}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*exp(c + d*x^2)*erfi(b*x),x)
```

```
[Out] erfi(b*x)*(exp(c + d*x^2)/d^3 - (x^2*exp(c + d*x^2))/d^2 + (x^4*exp(c + d*x
^2))/(2*d)) - (b*erfi(x*(d + b^2)^(1/2))*exp(c))/(2*d^2*(d + b^2)^(3/2)) -
(b*exp(c)*erf(x*(- d - b^2)^(1/2)))/(d^3*(- d - b^2)^(1/2)) + (b*x*exp(c +
d*x^2 + b^2*x^2))/(d^2*pi^(1/2)*(d + b^2)) + (b*x^5*exp(c)*((3*pi^(1/2)*erf
c((-x^2*(d + b^2))^(1/2)))/4 + exp(d*x^2 + b^2*x^2)*((3*(-x^2*(d + b^2))^(1
/2))/2 + (-x^2*(d + b^2))^(3/2)) - (3*pi^(1/2))/4))/(2*d*pi^(1/2)*(-x^2*(d
+ b^2))^(5/2))
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**5*erfi(b*x),x)
```

```
[Out] Timed out
```

3.260 $\int e^{c+dx^2} x^3 \textbf{erfi}(bx)\,dx$

Optimal. Leaf size=142

$$\frac{be^c\text{erfi}\left(x\sqrt{b^2+d}\right)}{2d^2\sqrt{b^2+d}}+\frac{be^c\text{erfi}\left(x\sqrt{b^2+d}\right)}{4d\left(b^2+d\right)^{3/2}}-\frac{bxe^{x^2\left(b^2+d\right)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)}-\frac{\text{erfi}(bx)e^{c+dx^2}}{2d^2}+\frac{x^2\text{erfi}(bx)e^{c+dx^2}}{2d}$$

```
[Out] -1/2*exp(d*x^2+c)*erfi(b*x)/d^2+1/2*exp(d*x^2+c)*x^2*erfi(b*x)/d+1/4*b*exp(
c)*erfi(x*(b^2+d)^(1/2))/d/(b^2+d)^(3/2)+1/2*b*exp(c)*erfi(x*(b^2+d)^(1/2))
/d^2/(b^2+d)^(1/2)-1/2*b*exp(c+(b^2+d)*x^2)*x/d/(b^2+d)/Pi^(1/2)
```

Rubi [A] time = 0.15, antiderivative size = 142, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.235, Rules used = {6387, 6384, 2204, 2212}

$$\frac{be^c\text{Erfi}\left(x\sqrt{b^2+d}\right)}{2d^2\sqrt{b^2+d}}+\frac{be^c\text{Erfi}\left(x\sqrt{b^2+d}\right)}{4d\left(b^2+d\right)^{3/2}}-\frac{bxe^{x^2\left(b^2+d\right)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)}-\frac{\text{Erfi}(bx)e^{c+dx^2}}{2d^2}+\frac{x^2\text{Erfi}(bx)e^{c+dx^2}}{2d}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x^3*Erfi[b*x],x]
```

```
[Out] -(b*E^(c + (b^2 + d)*x^2)*x)/(2*d*(b^2 + d)*Sqrt[Pi]) - (E^(c + d*x^2)*Erfi
[b*x])/(2*d^2) + (E^(c + d*x^2)*x^2*Erfi[b*x])/(2*d) + (b*E^c*Erfi[Sqrt[b^2
 + d]*x])/(4*d*(b^2 + d)^(3/2)) + (b*E^c*Erfi[Sqrt[b^2 + d]*x])/(2*d^2*Sqrt
[b^2 + d])
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{c+dx^2}x^3\text{erfi}(bx)\,dx = \frac{e^{c+dx^2}x^2\text{erfi}(bx)}{2d} - \frac{\int e^{c+dx^2}x\text{erfi}(bx)\,dx}{d} - \frac{b\int e^{c+\left(b^2+d\right)x^2}x^2\,dx}{d\sqrt{\pi}}$$

$$= -\frac{be^{c+\left(b^2+d\right)x^2}x}{2d\left(b^2+d\right)\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erfi}(bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erfi}(bx)}{2d} + \frac{b\int e^{c+\left(b^2+d\right)x^2}\,dx}{d^2\sqrt{\pi}} + \frac{b\int e^{c+\left(b^2+d\right)x}}{2d\left(b^2+d\right)}$$

$$= -\frac{be^{c+\left(b^2+d\right)x^2}x}{2d\left(b^2+d\right)\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erfi}(bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erfi}(bx)}{2d} + \frac{be^c\text{erfi}\left(\sqrt{b^2+d}\,x\right)}{4d\left(b^2+d\right)^{3/2}} + \frac{be^c\text{erfi}\left(\sqrt{\right.}}{2d^2\sqrt{b}}$$

Mathematica [A] time = 0.22, size = 91, normalized size = 0.64

$$\frac{e^c\left(-\frac{2bdxe^{x^2\left(b^2+d\right)}}{\sqrt{\pi}\left(b^2+d\right)} + \frac{\left(2b^3+3bd\right)\text{erfi}\left(x\sqrt{b^2+d}\right)}{\left(b^2+d\right)^{3/2}} + 2e^{dx^2}\left(dx^2-1\right)\text{erfi}(bx)\right)}{4d^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x^3*Erfi[b*x],x]
```

```
[Out] (E^c*((-2*b*d*E^((b^2 + d)*x^2)*x)/((b^2 + d)*Sqrt[Pi]) + 2*E^(d*x^2)*(-1 +
 d*x^2)*Erfi[b*x] + ((2*b^3 + 3*b*d)*Erfi[Sqrt[b^2 + d]*x])/(b^2 + d)^(3/2)
))/(4*d^2)
```

fricas [A] time = 0.41, size = 151, normalized size = 1.06

$$-\frac{\pi\left(2\,b^3+3\,bd\right)\sqrt{-b^2-d}\;\text{erf}\left(\sqrt{-b^2-d}\,x\right)e^c + 2\sqrt{\pi}\left(b^3d+bd^2\right)xe^{\left(b^2x^2+dx^2+c\right)} - 2\left(\pi\left(b^4d+2\,b^2d^2+d^3\right)x^2 - \pi\left(b\right.\right.}{4\,\pi\left(b^4d^2+2\,b^2d^3+d^4\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfi(b*x),x, algorithm="fricas")
```

```
[Out] -1/4*(pi*(2*b^3 + 3*b*d)*sqrt(-b^2 - d)*erf(sqrt(-b^2 - d)*x)*e^c + 2*sqrt(
pi)*(b^3*d + b*d^2)*x*e^(b^2*x^2 + d*x^2 + c) - 2*(pi*(b^4*d + 2*b^2*d^2 +
d^3)*x^2 - pi*(b^4 + 2*b^2*d + d^2))*erfi(b*x)*e^(d*x^2 + c))/(pi*(b^4*d^2
+ 2*b^2*d^3 + d^4))
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{erfi}(bx) e^{(dx^2+c)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^3*erfi(b*x)*e^(d*x^2 + c), x)
```

maple [F] time = 0.22, size = 0, normalized size = 0.00

$$\int e^{d x^2+c} x^3 \operatorname{erfi}(bx) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^3*erfi(b*x),x)
```

```
[Out] int(exp(d*x^2+c)*x^3*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{erfi}(bx) e^{(dx^2+c)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x^3*erfi(b*x)*e^(d*x^2 + c), x)
```

mupad [B] time = 0.59, size = 128, normalized size = 0.90

$$\frac{b \operatorname{erfi}\left(x \sqrt{b^2+d}\right) e^c}{4 d \left(b^2+d\right)^{3/2}} - \operatorname{erfi}(b\,x) \left(\frac{e^{d\,x^2+c}}{2\,d^2} - \frac{x^2\,e^{d\,x^2+c}}{2\,d}\right) - \frac{b\,x\,e^{b^2\,x^2+d\,x^2+c}}{2\,\sqrt{\pi}\,\left(b^2\,d+d^2\right)} + \frac{b\,e^c \operatorname{erf}\left(x\,\sqrt{-b^2-d}\right)}{2\,d^2\,\sqrt{-b^2-d}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*exp(c + d*x^2)*erfi(b*x),x)
```

```
[Out] (b*erfi(x*(d + b^2)^(1/2))*exp(c))/(4*d*(d + b^2)^(3/2)) - erfi(b*x)*(exp(c
 + d*x^2)/(2*d^2) - (x^2*exp(c + d*x^2))/(2*d)) - (b*x*exp(c + d*x^2 + b^2*
x^2))/(2*pi^(1/2)*(b^2*d + d^2)) + (b*exp(c)*erf(x*(- d - b^2)^(1/2)))/(2*d
^2*(- d - b^2)^(1/2))
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int x^{3}e^{dx^{2}}\operatorname{erfi}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**3*erfi(b*x),x)
```

```
[Out] exp(c)*Integral(x**3*exp(d*x**2)*erfi(b*x), x)
```

3.261 $\int e^{c+dx^2} x \,\mathbf{erfi}(bx)\, dx$

Optimal. Leaf size=53

$$\frac{\text{erfi}(bx)e^{c+dx^2}}{2d}-\frac{be^c\text{erfi}\left(x\sqrt{b^2+d}\right)}{2d\sqrt{b^2+d}}$$

```
[Out] 1/2*exp(d*x^2+c)*erfi(b*x)/d-1/2*b*exp(c)*erfi(x*(b^2+d)^(1/2))/d/(b^2+d)^(
1/2)
```

Rubi [A] time = 0.04, antiderivative size = 53, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {6384, 2204}

$$\frac{\text{Erfi}(bx)e^{c+dx^2}}{2d}-\frac{be^c\text{Erfi}\left(x\sqrt{b^2+d}\right)}{2d\sqrt{b^2+d}}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x*Erfi[b*x],x]
```

```
[Out] (E^(c + d*x^2)*Erfi[b*x])/(2*d) - (b*E^c*Erfi[Sqrt[b^2 + d]*x])/(2*d*Sqrt[b
^2 + d])
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int e^{c+dx^2} x\,\mathrm{erfi}(bx)\,dx = \frac{e^{c+dx^2}\mathrm{erfi}(bx)}{2d} - \frac{b\int e^{c+(b^2+d)x^2}\,dx}{d\sqrt{\pi}}$$
$$= \frac{e^{c+dx^2}\mathrm{erfi}(bx)}{2d} - \frac{be^c\mathrm{erfi}\left(\sqrt{b^2+d}\,x\right)}{2d\sqrt{b^2+d}}$$

Mathematica [**A**] time = 0.03, size = 47, normalized size = 0.89

$$\frac{e^c\left(e^{dx^2}\mathrm{erfi}(bx) - \frac{b\mathrm{erfi}\left(x\sqrt{b^2+d}\right)}{\sqrt{b^2+d}}\right)}{2d}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x*Erfi[b*x],x]
[Out] (E^c*(E^(d*x^2)*Erfi[b*x] - (b*Erfi[Sqrt[b^2 + d]*x])/Sqrt[b^2 + d]))/(2*d)
```

fricas [**A**] time = 0.45, size = 61, normalized size = 1.15

$$\frac{\sqrt{-b^2-d}\,b\,\mathrm{erf}\left(\sqrt{-b^2-d}\,x\right)e^c + \left(b^2+d\right)\mathrm{erfi}\left(bx\right)e^{\left(dx^2+c\right)}}{2\left(b^2d+d^2\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfi(b*x),x, algorithm="fricas")
[Out] 1/2*(sqrt(-b^2 - d)*b*erf(sqrt(-b^2 - d)*x)*e^c + (b^2 + d)*erfi(b*x)*e^(d*
x^2 + c))/(b^2*d + d^2)
```

giac [**F**] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{erfi}\left(bx\right)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfi(b*x),x, algorithm="giac")
[Out] integrate(x*erfi(b*x)*e^(d*x^2 + c), x)
```

maple [F] time = 0.21, size = 0, normalized size = 0.00

$$\int e^{d\,x^{2}+c} x \operatorname{erfi}\left(b x\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x*erfi(b*x),x)
```

```
[Out] int(exp(d*x^2+c)*x*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{erfi}\left(bx\right) e^{\left(dx^{2}+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x*erfi(b*x)*e^(d*x^2 + c), x)
```

mupad [B] time = 0.17, size = 51, normalized size = 0.96

$$\frac{e^{d\,x^{2}}\, e^{c} \operatorname{erfi}\left(b\,x\right)}{2\,d} - \frac{b\, e^{c} \operatorname{erf}\left(x\,\sqrt{-b^{2}-d}\right)}{2\,d\,\sqrt{-b^{2}-d}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(c + d*x^2)*erfi(b*x),x)
```

```
[Out] (exp(d*x^2)*exp(c)*erfi(b*x))/(2*d) - (b*exp(c)*erf(x*(- d - b^2)^(1/2)))/(
2*d*(- d - b^2)^(1/2))
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$e^{c} \int x e^{d x^{2}} \operatorname{erfi}\left(b x\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x*erfi(b*x),x)
```

```
[Out] exp(c)*Integral(x*exp(d*x**2)*erfi(b*x), x)
```

3.262 $\int \frac{e^{c+dx^2}\mathbf{erfi}(bx)}{x}\,dx$

Optimal. Leaf size=20

$$\operatorname{Int}\left(\frac{\operatorname{erfi}(bx)e^{c+dx^2}}{x},x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erfi(b*x)/x,x)
```

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\operatorname{Erfi}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfi[b*x])/x,x]
```

```
[Out] Defer[Int][(E^(c + d*x^2)*Erfi[b*x])/x, x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{x}\,dx = \int \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{x}\,dx$$

Mathematica [A] time = 0.15, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x, x]
```

fricas [A] time = 0.41, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erfi}(bx)\,e^{\left(dx^2+c\right)}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x,x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(d*x^2 + c)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\, e^{\left(dx^2+c\right)}}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x, x)
```

maple [A] time = 0.04, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c} \operatorname{erfi}(bx)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x)/x,x)
[Out] int(exp(d*x^2+c)*erfi(b*x)/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\, e^{\left(dx^2+c\right)}}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x,x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{e^{d\,x^2+c} \operatorname{erfi}(b\,x)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfi(b*x))/x,x)
[Out] int((exp(c + d*x^2)*erfi(b*x))/x, x)
```

sympy [**A**] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\operatorname{erfi}\left(bx\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x)/x,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfi(b*x)/x, x)
```

3.263 $\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x^3}\,dx$

Optimal. Leaf size=93

$$d\text{Int}\left(\frac{\text{erfi}(bx)e^{c+dx^2}}{x},x\right)+be^c\sqrt{b^2+d}\,\text{erfi}\left(x\sqrt{b^2+d}\right)-\frac{be^{x^2(b^2+d)+c}}{\sqrt{\pi}\,x}-\frac{\text{erfi}(bx)e^{c+dx^2}}{2x^2}$$

```
[Out] -1/2*exp(d*x^2+c)*erfi(b*x)/x^2+b*exp(c)*erfi(x*(b^2+d)^(1/2))*(b^2+d)^(1/2
)-b*exp(c+(b^2+d)*x^2)/x/Pi^(1/2)+d*Unintegrable(exp(d*x^2+c)*erfi(b*x)/x,x
)
```

Rubi [A] time = 0.15, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfi}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfi[b*x])/x^3,x]
```

```
[Out] -((b*E^(c + (b^2 + d)*x^2))/(Sqrt[Pi]*x)) - (E^(c + d*x^2)*Erfi[b*x])/(2*x^
2) + b*Sqrt[b^2 + d]*E^c*Erfi[Sqrt[b^2 + d]*x] + d*Defer[Int][(E^(c + d*x^2
)*Erfi[b*x])/x, x]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x^3}\,dx &= -\frac{e^{c+dx^2}\text{erfi}(bx)}{2x^2}+d\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x}\,dx+\frac{b\int \frac{e^{c+(b^2+d)x^2}}{x^2}\,dx}{\sqrt{\pi}}\\ &= -\frac{be^{c+(b^2+d)x^2}}{\sqrt{\pi}\,x}-\frac{e^{c+dx^2}\text{erfi}(bx)}{2x^2}+d\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x}\,dx+\frac{\left(2b\left(b^2+d\right)\right)\int e^{c+(b^2+d)x^2}\,dx}{\sqrt{\pi}}\\ &= -\frac{be^{c+(b^2+d)x^2}}{\sqrt{\pi}\,x}-\frac{e^{c+dx^2}\text{erfi}(bx)}{2x^2}+b\sqrt{b^2+d}\,e^c\text{erfi}\left(\sqrt{b^2+d}\,x\right)+d\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x}\,dx\end{aligned}$$

Mathematica [A] time = 0.25, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x^3,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x^3, x]
```

fricas [A] time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)\,e^{\left(dx^2+c\right)}}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^3,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x)*e^(d*x^2 + c)/x^3, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(dx^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^3,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x^3, x)
```

maple [A] time = 0.24, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\text{erfi}\,(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x)/x^3,x)
```

```
[Out] int(exp(d*x^2+c)*erfi(b*x)/x^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(dx^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^3,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x^3, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\mathrm{erfi}\left(b\,x\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfi(b*x))/x^3,x)
[Out] int((exp(c + d*x^2)*erfi(b*x))/x^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^2}\,\mathrm{erfi}\left(bx\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x)/x**3,x)
[Out] exp(c)*Integral(exp(d*x**2)*erfi(b*x)/x**3, x)
```

3.264 $\int \frac{e^{c+dx^2}\mathbf{erfi}(bx)}{x^5}\,dx$

Optimal. Leaf size=212

$$\frac{1}{2}d^2\text{Int}\left(\frac{\text{erfi}(bx)e^{c+dx^2}}{x},x\right)+\frac{1}{2}be^cd\sqrt{b^2+d}\,\text{erfi}\left(x\sqrt{b^2+d}\right)+\frac{1}{3}be^c\left(b^2+d\right)^{3/2}\text{erfi}\left(x\sqrt{b^2+d}\right)-\frac{bde^{x^2\left(b^2+d\right)+c}}{2\sqrt{\pi}\,x}-\frac{b\left(b^2\right.}{}$$

```
[Out] -1/4*exp(d*x^2+c)*erfi(b*x)/x^4-1/4*d*exp(d*x^2+c)*erfi(b*x)/x^2+1/3*b*(b^2
+d)^(3/2)*exp(c)*erfi(x*(b^2+d)^(1/2))+1/2*b*d*exp(c)*erfi(x*(b^2+d)^(1/2))
*(b^2+d)^(1/2)-1/6*b*exp(c+(b^2+d)*x^2)/x^3/Pi^(1/2)-1/2*b*d*exp(c+(b^2+d)*
x^2)/x/Pi^(1/2)-1/3*b*(b^2+d)*exp(c+(b^2+d)*x^2)/x/Pi^(1/2)+1/2*d^2*Uninteg
rable(exp(d*x^2+c)*erfi(b*x)/x,x)
```

Rubi [A] time = 0.32, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfi}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfi[b*x])/x^5,x]
```

```
[Out] -(b*E^(c + (b^2 + d)*x^2))/(6*Sqrt[Pi]*x^3) - (b*d*E^(c + (b^2 + d)*x^2))/(
2*Sqrt[Pi]*x) - (b*(b^2 + d)*E^(c + (b^2 + d)*x^2))/(3*Sqrt[Pi]*x) - (E^(c
+ d*x^2)*Erfi[b*x])/(4*x^4) - (d*E^(c + d*x^2)*Erfi[b*x])/(4*x^2) + (b*d*Sq
rt[b^2 + d]*E^c*Erfi[Sqrt[b^2 + d]*x])/2 + (b*(b^2 + d)^(3/2)*E^c*Erfi[Sqrt
[b^2 + d]*x])/3 + (d^2*Defer[Int][(E^(c + d*x^2)*Erfi[b*x])/x, x])/2
```

Rubi steps

$$\int \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{x^5}\,dx = -\frac{e^{c+dx^2}\operatorname{erfi}(bx)}{4x^4} + \frac{1}{2}d\int \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{x^3}\,dx + \frac{b\int \frac{e^{c+(b^2+d)x^2}}{x^4}\,dx}{2\sqrt{\pi}}$$

$$= -\frac{be^{c+(b^2+d)x^2}}{6\sqrt{\pi}\,x^3} - \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{4x^4} - \frac{de^{c+dx^2}\operatorname{erfi}(bx)}{4x^2} + \frac{1}{2}d^2\int \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{x}\,dx + \frac{(bd)\int \frac{e^{c+(b^2}}{x}}{2\sqrt{\pi}}$$

$$= -\frac{be^{c+(b^2+d)x^2}}{6\sqrt{\pi}\,x^3} - \frac{bde^{c+(b^2+d)x^2}}{2\sqrt{\pi}\,x} - \frac{b(b^2+d)\,e^{c+(b^2+d)x^2}}{3\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{4x^4} - \frac{de^{c+dx^2}\operatorname{erfi}(bx)}{4x^2} +$$

$$= -\frac{be^{c+(b^2+d)x^2}}{6\sqrt{\pi}\,x^3} - \frac{bde^{c+(b^2+d)x^2}}{2\sqrt{\pi}\,x} - \frac{b(b^2+d)\,e^{c+(b^2+d)x^2}}{3\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{4x^4} - \frac{de^{c+dx^2}\operatorname{erfi}(bx)}{4x^2} +$$

Mathematica [A] time = 0.30, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\operatorname{erfi}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x^5,x]
[Out] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x^5, x]
```

fricas [A] time = 0.42, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erfi}(bx)\,e^{(dx^2+c)}}{x^5}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^5,x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(d*x^2 + c)/x^5, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\,e^{(dx^2+c)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^5,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x^5, x)
```

maple [A] time = 0.26, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\,\mathrm{erfi}\,(bx)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x)/x^5,x)
```

```
[Out] int(exp(d*x^2+c)*erfi(b*x)/x^5,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfi}\,(bx)\,e^{\left(dx^2+c\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^5,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x^5, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{e^{d\,x^2+c}\,\mathrm{erfi}\,(b\,x)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfi(b*x))/x^5,x)
```

```
[Out] int((exp(c + d*x^2)*erfi(b*x))/x^5, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^2}\,\mathrm{erfi}\,(bx)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x)/x**5,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfi(b*x)/x**5, x)
```

3.265 $\int e^{c+dx^2} x^4 \text{erfi}(bx)\,dx$

Optimal. Leaf size=171

$$\frac{3\text{Int}\left(\text{erfi}(bx)e^{c+dx^2},x\right)}{4d^2}+\frac{3be^{x^2\left(b^2+d\right)+c}}{4\sqrt{\pi}\,d^2\left(b^2+d\right)}-\frac{bx^2e^{x^2\left(b^2+d\right)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)}+\frac{be^{x^2\left(b^2+d\right)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)^2}-\frac{3x\text{erfi}(bx)e^{c+dx^2}}{4d^2}+\frac{x^3\text{erfi}(bx)e^{c+dx^2}}{2d}$$

```
[Out] -3/4*exp(d*x^2+c)*x*erfi(b*x)/d^2+1/2*exp(d*x^2+c)*x^3*erfi(b*x)/d+1/2*b*ex
p(c+(b^2+d)*x^2)/d/(b^2+d)^2/Pi^(1/2)+3/4*b*exp(c+(b^2+d)*x^2)/d^2/(b^2+d)/
Pi^(1/2)-1/2*b*exp(c+(b^2+d)*x^2)*x^2/d/(b^2+d)/Pi^(1/2)+3/4*Unintegrable(e
xp(d*x^2+c)*erfi(b*x),x)/d^2
```

Rubi [A] time = 0.23, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2} x^4 \text{Erfi}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^4*Erfi[b*x],x]
```

```
[Out] (b*E^(c + (b^2 + d)*x^2))/(2*d*(b^2 + d)^2*Sqrt[Pi]) + (3*b*E^(c + (b^2 + d
)*x^2))/(4*d^2*(b^2 + d)*Sqrt[Pi]) - (b*E^(c + (b^2 + d)*x^2)*x^2)/(2*d*(b^
2 + d)*Sqrt[Pi]) - (3*E^(c + d*x^2)*x*Erfi[b*x])/(4*d^2) + (E^(c + d*x^2)*x
^3*Erfi[b*x])/(2*d) + (3*Defer[Int][E^(c + d*x^2)*Erfi[b*x], x])/(4*d^2)
```

Rubi steps

$$\begin{aligned}\int e^{c+dx^2} x^4 \text{erfi}(bx)\,dx &= \frac{e^{c+dx^2}x^3\text{erfi}(bx)}{2d}-\frac{3\int e^{c+dx^2}x^2\text{erfi}(bx)\,dx}{2d}-\frac{b\int e^{c+\left(b^2+d\right)x^2}x^3\,dx}{d\sqrt{\pi}}\\ &= -\frac{be^{c+\left(b^2+d\right)x^2}x^2}{2d\left(b^2+d\right)\sqrt{\pi}}-\frac{3e^{c+dx^2}x\text{erfi}(bx)}{4d^2}+\frac{e^{c+dx^2}x^3\text{erfi}(bx)}{2d}+\frac{3\int e^{c+dx^2}\text{erfi}(bx)\,dx}{4d^2}+\frac{(3b)}{}\\ &= \frac{be^{c+\left(b^2+d\right)x^2}}{2d\left(b^2+d\right)^2\sqrt{\pi}}+\frac{3be^{c+\left(b^2+d\right)x^2}}{4d^2\left(b^2+d\right)\sqrt{\pi}}-\frac{be^{c+\left(b^2+d\right)x^2}x^2}{2d\left(b^2+d\right)\sqrt{\pi}}-\frac{3e^{c+dx^2}x\text{erfi}(bx)}{4d^2}+\frac{e^{c+dx^2}x^3\text{e}}{2d}\end{aligned}$$

Mathematica [A] time = 0.28, size = 0, normalized size = 0.00

$$\int e^{c+dx^2} x^4 \text{erfi}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^4*Erfi[b*x],x]
[Out] Integrate[E^(c + d*x^2)*x^4*Erfi[b*x], x]
```

fricas [A] time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(x^4 \operatorname{erfi}(bx)e^{\left(dx^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfi(b*x),x, algorithm="fricas")
[Out] integral(x^4*erfi(b*x)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erfi}(bx)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfi(b*x),x, algorithm="giac")
[Out] integrate(x^4*erfi(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.06, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c}x^4 \operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^4*erfi(b*x),x)
[Out] int(exp(d*x^2+c)*x^4*erfi(b*x),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erfi}(bx)e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfi(b*x),x, algorithm="maxima")
[Out] integrate(x^4*erfi(b*x)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int x^4\,\mathrm{e}^{d\,x^2+c}\,\mathrm{erfi}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*exp(c + d*x^2)*erfi(b*x),x)
[Out] int(x^4*exp(c + d*x^2)*erfi(b*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int x^{4}e^{dx^{2}}\operatorname{erfi}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x***4*erfi(b*x),x)
[Out] exp(c)*Integral(x**4*exp(d*x**2)*erfi(b*x), x)
```

3.266 $\int e^{c+dx^2} x^2 \mathbf{erfi}(bx) \, dx$

Optimal. Leaf size=79

$$-\frac{\text{Int}\left(\text{erfi}(bx)e^{c+dx^2},x\right)}{2d}-\frac{be^{x^2\left(b^2+d\right)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)}+\frac{x\text{erfi}(bx)e^{c+dx^2}}{2d}$$

```
[Out] 1/2*exp(d*x^2+c)*x*erfi(b*x)/d-1/2*b*exp(c+(b^2+d)*x^2)/d/(b^2+d)/Pi^(1/2)-
1/2*Unintegrable(exp(d*x^2+c)*erfi(b*x),x)/d
```

Rubi [A] time = 0.09, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2} x^2 \text{Erfi}(bx) \, dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^2*Erfi[b*x],x]
```

```
[Out] -(b*E^(c + (b^2 + d)*x^2))/(2*d*(b^2 + d)*Sqrt[Pi]) + (E^(c + d*x^2)*x*Erfi
[b*x])/(2*d) - Defer[Int][E^(c + d*x^2)*Erfi[b*x], x]/(2*d)
```

Rubi steps

$$\begin{aligned}\int e^{c+dx^2} x^2 \text{erfi}(bx) \, dx &= \frac{e^{c+dx^2} x \text{erfi}(bx)}{2d} - \frac{\int e^{c+dx^2} \text{erfi}(bx) \, dx}{2d} - \frac{b \int e^{c+\left(b^2+d\right)x^2} x \, dx}{d\sqrt{\pi}} \\ &= -\frac{be^{c+\left(b^2+d\right)x^2}}{2d\left(b^2+d\right)\sqrt{\pi}} + \frac{e^{c+dx^2} x \text{erfi}(bx)}{2d} - \frac{\int e^{c+dx^2} \text{erfi}(bx) \, dx}{2d}\end{aligned}$$

Mathematica [A] time = 0.22, size = 0, normalized size = 0.00

$$\int e^{c+dx^2} x^2 \text{erfi}(bx) \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^2*Erfi[b*x],x]
```

```
[Out] Integrate[E^(c + d*x^2)*x^2*Erfi[b*x], x]
```

fricas [A] time = 0.82, size = 0, normalized size = 0.00

$$\text{integral}\left(x^2 \operatorname{erfi}(bx)\, e^{\left(dx^2+c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfi(b*x),x, algorithm="fricas")
[Out] integral(x^2*erfi(b*x)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfi}(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfi(b*x),x, algorithm="giac")
[Out] integrate(x^2*erfi(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.18, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^2+c} x^2 \operatorname{erfi}(bx)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^2*erfi(b*x),x)
[Out] int(exp(d*x^2+c)*x^2*erfi(b*x),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfi}(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfi(b*x),x, algorithm="maxima")
[Out] integrate(x^2*erfi(b*x)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\, \mathrm{e}^{d\,x^2+c} \operatorname{erfi}(b\,x)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(c + d*x^2)*erfi(b*x),x)
```

```
[Out] int(x^2*exp(c + d*x^2)*erfi(b*x), x)
```

sympy **[A]** time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int x^{2}e^{dx^{2}}\operatorname{erfi}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**2*erfi(b*x),x)
```

```
[Out] exp(c)*Integral(x**2*exp(d*x**2)*erfi(b*x), x)
```

3.267 $\int e^{c+dx^2}\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=17

$$\mathrm{Int}\left(\mathrm{erfi}(bx)e^{c+dx^2},x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erfi(b*x),x)
```

Rubi [A] time = 0.01, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}\mathrm{Erfi}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*Erfi[b*x],x]
[Out] Defer[Int][E^(c + d*x^2)*Erfi[b*x], x]
```

Rubi steps

$$\int e^{c+dx^2}\mathrm{erfi}(bx)\,dx=\int e^{c+dx^2}\mathrm{erfi}(bx)\,dx$$

Mathematica [A] time = 0.04, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}\mathrm{erfi}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*Erfi[b*x],x]
[Out] Integrate[E^(c + d*x^2)*Erfi[b*x], x]
```

fricas [A] time = 0.52, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\mathrm{erfi}\left(bx\right)e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x),x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x),x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(d*x^2 + c), x)
```

maple [A] time = 0.06, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^2+c}\operatorname{erfi}(bx)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x),x)
[Out] int(exp(d*x^2+c)*erfi(b*x),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x),x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \mathrm{e}^{d\,x^2+c}\operatorname{erfi}(b\,x)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + d*x^2)*erfi(b*x),x)
[Out] int(exp(c + d*x^2)*erfi(b*x), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c} \int e^{dx^{2}} \operatorname{erfi}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x),x)
[Out] exp(c)*Integral(exp(d*x**2)*erfi(b*x), x)
```

3.268 $\int \frac{e^{c+dx^2}\mathbf{erfi}(bx)}{x^2}\,dx$

Optimal. Leaf size=59

$$2d\text{Int}\left(\text{erfi}(bx)e^{c+dx^2},x\right)+\frac{be^c\text{Ei}\left(\left(b^2+d\right)x^2\right)}{\sqrt{\pi}}-\frac{\text{erfi}(bx)e^{c+dx^2}}{x}$$

```
[Out] -exp(d*x^2+c)*erfi(b*x)/x+b*exp(c)*Ei((b^2+d)*x^2)/Pi^(1/2)+2*d*Unintegrabl
e(exp(d*x^2+c)*erfi(b*x),x)
```

Rubi [A] time = 0.11, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfi}(bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfi[b*x])/x^2,x]
```

```
[Out] -((E^(c + d*x^2)*Erfi[b*x])/x) + (b*E^c*ExpIntegralEi[(b^2 + d)*x^2])/Sqrt[
Pi] + 2*d*Defer[Int][E^(c + d*x^2)*Erfi[b*x], x]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x^2}\,dx &= -\frac{e^{c+dx^2}\text{erfi}(bx)}{x}+(2d)\int e^{c+dx^2}\text{erfi}(bx)\,dx+\frac{(2b)\int \frac{e^{c+\left(b^2+d\right)x^2}}{x}\,dx}{\sqrt{\pi}}\\ &= -\frac{e^{c+dx^2}\text{erfi}(bx)}{x}+\frac{be^c\text{Ei}\left(\left(b^2+d\right)x^2\right)}{\sqrt{\pi}}+(2d)\int e^{c+dx^2}\text{erfi}(bx)\,dx\end{aligned}$$

Mathematica [A] time = 0.21, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x^2,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x^2, x]
```

fricas [A] time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)\,e^{\left(dx^2+c\right)}}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^2,x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(d*x^2 + c)/x^2, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^2,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x^2, x)
```

maple [A] time = 0.08, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\,\text{erfi}\,(bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x)/x^2,x)
[Out] int(exp(d*x^2+c)*erfi(b*x)/x^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^2,x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x^2, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{e^{d\,x^2+c}\,\text{erfi}\,(b\,x)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfi(b*x))/x^2,x)
```

```
[Out] int((exp(c + d*x^2)*erfi(b*x))/x^2, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c} \int \frac{e^{dx^{2}} \operatorname{erfi}\left(bx\right)}{x^{2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x)/x**2,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfi(b*x)/x**2, x)
```

3.269 $\int \frac{e^{c+dx^2}\mathbf{erfi}(bx)}{x^4}\,dx$

Optimal. Leaf size=144

$$\frac{4}{3}d^2\text{Int}\left(\text{erfi}(bx)e^{c+dx^2},x\right)+\frac{2be^c d\text{Ei}\left(\left(b^2+d\right)x^2\right)}{3\sqrt{\pi}}+\frac{be^c\left(b^2+d\right)\text{Ei}\left(\left(b^2+d\right)x^2\right)}{3\sqrt{\pi}}-\frac{be^{x^2\left(b^2+d\right)+c}}{3\sqrt{\pi}\,x^2}-\frac{2d\text{erfi}(bx)e^{c+dx^2}}{3x}-\text{er}$$

```
[Out] -1/3*exp(d*x^2+c)*erfi(b*x)/x^3-2/3*d*exp(d*x^2+c)*erfi(b*x)/x-1/3*b*exp(c+
(b^2+d)*x^2)/x^2/Pi^(1/2)+2/3*b*d*exp(c)*Ei((b^2+d)*x^2)/Pi^(1/2)+1/3*b*(b^
2+d)*exp(c)*Ei((b^2+d)*x^2)/Pi^(1/2)+4/3*d^2*Unintegrable(exp(d*x^2+c)*erfi
(b*x),x)
```

Rubi [A] time = 0.27, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfi}(bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfi[b*x])/x^4,x]
```

```
[Out] -(b*E^(c + (b^2 + d)*x^2))/(3*Sqrt[Pi]*x^2) - (E^(c + d*x^2)*Erfi[b*x])/(3*
x^3) - (2*d*E^(c + d*x^2)*Erfi[b*x])/(3*x) + (2*b*d*E^c*ExpIntegralEi[(b^2
+ d)*x^2])/(3*Sqrt[Pi]) + (b*(b^2 + d)*E^c*ExpIntegralEi[(b^2 + d)*x^2])/(3
*Sqrt[Pi]) + (4*d^2*Defer[Int][E^(c + d*x^2)*Erfi[b*x], x])/3
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x^4}\,dx &= -\frac{e^{c+dx^2}\text{erfi}(bx)}{3x^3}+\frac{1}{3}(2d)\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x^2}\,dx+\frac{(2b)\int \frac{e^{c+\left(b^2+d\right)x^2}}{x^3}\,dx}{3\sqrt{\pi}}\\
&= -\frac{be^{c+\left(b^2+d\right)x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+dx^2}\text{erfi}(bx)}{3x^3}-\frac{2de^{c+dx^2}\text{erfi}(bx)}{3x}+\frac{1}{3}\left(4d^2\right)\int e^{c+dx^2}\text{erfi}(bx)\,dx+\frac{(4bd)\int}{3}\\
&= -\frac{be^{c+\left(b^2+d\right)x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+dx^2}\text{erfi}(bx)}{3x^3}-\frac{2de^{c+dx^2}\text{erfi}(bx)}{3x}+\frac{2bde^c\text{Ei}\left(\left(b^2+d\right)x^2\right)}{3\sqrt{\pi}}+\frac{b\left(b^2+d\right)e^c\text{Ei}}{3\sqrt{}}
\end{aligned}$$

Mathematica [A] time = 0.32, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfi}(bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x^4,x]
[Out] Integrate[(E^(c + d*x^2)*Erfi[b*x])/x^4, x]
```

fricas [A] time = 0.59, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\left(bx\right)e^{\left(dx^2+c\right)}}{x^4}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^4,x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(d*x^2 + c)/x^4, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\left(bx\right)e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^4,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x^4, x)
```

maple [A] time = 0.25, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\text{erfi}\left(bx\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x)/x^4,x)
[Out] int(exp(d*x^2+c)*erfi(b*x)/x^4,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\left(bx\right)e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x)/x^4,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)*e^(d*x^2 + c)/x^4, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\mathrm{erfi}\left(b\,x\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + d*x^2)*erfi(b*x))/x^4,x)
```

```
[Out] int((exp(c + d*x^2)*erfi(b*x))/x^4, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\,\mathrm{erfi}\left(bx\right)}{x^{4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x)/x**4,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfi(b*x)/x**4, x)
```

3.270 $\int e^{-b^2x^2}x^5\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=107

$$\frac{2x}{\sqrt{\pi}\,b^5}+\frac{2x^3}{3\sqrt{\pi}\,b^3}-\frac{x^4e^{-b^2x^2}\text{erfi}(bx)}{2b^2}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{b^6}-\frac{x^2e^{-b^2x^2}\text{erfi}(bx)}{b^4}+\frac{x^5}{5\sqrt{\pi}\,b}$$

```
[Out] -erfi(b*x)/b^6/exp(b^2*x^2)-x^2*erfi(b*x)/b^4/exp(b^2*x^2)-1/2*x^4*erfi(b*x
)/b^2/exp(b^2*x^2)+2*x/b^5/Pi^(1/2)+2/3*x^3/b^3/Pi^(1/2)+1/5*x^5/b/Pi^(1/2)
```

Rubi [A] time = 0.12, antiderivative size = 107, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6387, 6384, 8, 30}

$$-\frac{x^4e^{-b^2x^2}\text{Erfi}(bx)}{2b^2}-\frac{x^2e^{-b^2x^2}\text{Erfi}(bx)}{b^4}-\frac{e^{-b^2x^2}\text{Erfi}(bx)}{b^6}+\frac{2x^3}{3\sqrt{\pi}\,b^3}+\frac{2x}{\sqrt{\pi}\,b^5}+\frac{x^5}{5\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[(x^5*Erfi[b*x])/E^(b^2*x^2),x]
```

```
[Out] (2*x)/(b^5*Sqrt[Pi]) + (2*x^3)/(3*b^3*Sqrt[Pi]) + x^5/(5*b*Sqrt[Pi]) - Erfi
[b*x]/(b^6*E^(b^2*x^2)) - (x^2*Erfi[b*x])/(b^4*E^(b^2*x^2)) - (x^4*Erfi[b*x
])/(2*b^2*E^(b^2*x^2))
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
```

```
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}
\int e^{-b^2x^2}x^5\text{erfi}(bx)\,dx &= -\frac{e^{-b^2x^2}x^4\text{erfi}(bx)}{2b^2}+\frac{2\int e^{-b^2x^2}x^3\text{erfi}(bx)\,dx}{b^2}+\frac{\int x^4\,dx}{b\sqrt{\pi}}\\
&= \frac{x^5}{5b\sqrt{\pi}}-\frac{e^{-b^2x^2}x^2\text{erfi}(bx)}{b^4}-\frac{e^{-b^2x^2}x^4\text{erfi}(bx)}{2b^2}+\frac{2\int e^{-b^2x^2}x\text{erfi}(bx)\,dx}{b^4}+\frac{2\int x^2\,dx}{b^3\sqrt{\pi}}\\
&= \frac{2x^3}{3b^3\sqrt{\pi}}+\frac{x^5}{5b\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{b^6}-\frac{e^{-b^2x^2}x^2\text{erfi}(bx)}{b^4}-\frac{e^{-b^2x^2}x^4\text{erfi}(bx)}{2b^2}+\frac{2\int 1\,dx}{b^5\sqrt{\pi}}\\
&= \frac{2x}{b^5\sqrt{\pi}}+\frac{2x^3}{3b^3\sqrt{\pi}}+\frac{x^5}{5b\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{b^6}-\frac{e^{-b^2x^2}x^2\text{erfi}(bx)}{b^4}-\frac{e^{-b^2x^2}x^4\text{erfi}(bx)}{2b^2}
\end{aligned}$$

Mathematica [A] time = 0.05, size = 68, normalized size = 0.64

$$\frac{\frac{6b^5x^5+20b^3x^3+60bx}{\sqrt{\pi}}-15e^{-b^2x^2}\left(b^4x^4+2b^2x^2+2\right)\text{erfi}(bx)}{30b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^5*Erfi[b*x])/E^(b^2*x^2),x]
```

```
[Out] ((60*b*x + 20*b^3*x^3 + 6*b^5*x^5)/Sqrt[Pi] - (15*(2 + 2*b^2*x^2 + b^4*x^4)
*Erfi[b*x])/E^(b^2*x^2))/(30*b^6)
```

fricas [A] time = 0.56, size = 79, normalized size = 0.74

$$\frac{\left(2\sqrt{\pi}\left(3b^5x^5+10b^3x^3+30bx\right)e^{\left(b^2x^2\right)}-15\left(2\pi+\pi b^4x^4+2\pi b^2x^2\right)\text{erfi}(bx)\right)e^{\left(-b^2x^2\right)}}{30\pi b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfi(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] 1/30*(2*sqrt(pi)*(3*b^5*x^5 + 10*b^3*x^3 + 30*b*x)*e^(b^2*x^2) - 15*(2*pi +
 pi*b^4*x^4 + 2*pi*b^2*x^2)*erfi(b*x))*e^(-b^2*x^2)/(pi*b^6)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5\,\text{erfi}(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfi(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x^5*erfi(b*x)*e^(-b^2*x^2), x)
```

maple [A] time = 0.28, size = 103, normalized size = 0.96

$$\frac{\left(6\,\mathrm{e}^{b^2x^2}b^5x^5-15\,\mathrm{erfi}\,(bx)\,x^4b^4\sqrt{\pi}\,+20\,\mathrm{e}^{b^2x^2}b^3x^3-30\sqrt{\pi}\,\;\mathrm{erfi}\,(bx)\,b^2x^2+60\,\mathrm{e}^{b^2x^2}bx-30\sqrt{\pi}\,\;\mathrm{erfi}\,(bx)\right)\mathrm{e}^{-b^2x^2}}{30b^6\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*erfi(b*x)/exp(b^2*x^2),x)
```

```
[Out] 1/30*(6*exp(b^2*x^2)*b^5*x^5-15*erfi(b*x)*x^4*b^4*Pi^(1/2)+20*exp(b^2*x^2)*
b^3*x^3-30*Pi^(1/2)*erfi(b*x)*b^2*x^2+60*exp(b^2*x^2)*b*x-30*Pi^(1/2)*erfi(
b*x))/b^6/Pi^(1/2)/exp(b^2*x^2)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5\,\mathrm{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*erfi(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x^5*erfi(b*x)*e^(-b^2*x^2), x)
```

mupad [B] time = 0.25, size = 82, normalized size = 0.77

$$\frac{3\,b^4\,x^5+10\,b^2\,x^3+30\,x}{15\,b^5\,\sqrt{\pi}}-\mathrm{erfi}\,(b\,x)\,\left(\frac{\mathrm{e}^{-b^2\,x^2}}{b^6}+\frac{x^4\,\mathrm{e}^{-b^2\,x^2}}{2\,b^2}+\frac{x^2\,\mathrm{e}^{-b^2\,x^2}}{b^4}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*exp(-b^2*x^2)*erfi(b*x),x)
```

```
[Out] (30*x + 10*b^2*x^3 + 3*b^4*x^5)/(15*b^5*pi^(1/2)) - erfi(b*x)*(exp(-b^2*x^2
)/b^6 + (x^4*exp(-b^2*x^2))/(2*b^2) + (x^2*exp(-b^2*x^2))/b^4)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*erfi(b*x)/exp(b**2*x**2),x)
```

```
[Out] Timed out
```

3.271 $\int e^{-b^2x^2}x^3\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=71

$$\frac{x}{\sqrt{\pi}\,b^3}-\frac{x^2e^{-b^2x^2}\mathrm{erfi}(bx)}{2b^2}-\frac{e^{-b^2x^2}\mathrm{erfi}(bx)}{2b^4}+\frac{x^3}{3\sqrt{\pi}\,b}$$

```
[Out] -1/2*erfi(b*x)/b^4/exp(b^2*x^2)-1/2*x^2*erfi(b*x)/b^2/exp(b^2*x^2)+x/b^3/Pi
^(1/2)+1/3*x^3/b/Pi^(1/2)
```

Rubi [A] time = 0.07, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6387, 6384, 8, 30}

$$-\frac{x^2e^{-b^2x^2}\mathrm{Erfi}(bx)}{2b^2}-\frac{e^{-b^2x^2}\mathrm{Erfi}(bx)}{2b^4}+\frac{x}{\sqrt{\pi}\,b^3}+\frac{x^3}{3\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*Erfi[b*x])/E^(b^2*x^2),x]
```

```
[Out] x/(b^3*Sqrt[Pi]) + x^3/(3*b*Sqrt[Pi]) - Erfi[b*x]/(2*b^4*E^(b^2*x^2)) - (x^
2*Erfi[b*x])/(2*b^2*E^(b^2*x^2))
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
```

```
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}x^3\text{erfi}(bx)\,dx &= -\frac{e^{-b^2x^2}x^2\text{erfi}(bx)}{2b^2}+\frac{\int e^{-b^2x^2}x\text{erfi}(bx)\,dx}{b^2}+\frac{\int x^2\,dx}{b\sqrt{\pi}}\\ &= \frac{x^3}{3b\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2b^4}-\frac{e^{-b^2x^2}x^2\text{erfi}(bx)}{2b^2}+\frac{\int 1\,dx}{b^3\sqrt{\pi}}\\ &= \frac{x}{b^3\sqrt{\pi}}+\frac{x^3}{3b\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2b^4}-\frac{e^{-b^2x^2}x^2\text{erfi}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.03, size = 51, normalized size = 0.72

$$\frac{\frac{2bx(b^2x^2+3)}{\sqrt{\pi}}-3e^{-b^2x^2}\left(b^2x^2+1\right)\text{erfi}(bx)}{6b^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^3*Erfi[b*x])/E^(b^2*x^2),x]
[Out] ((2*b*x*(3 + b^2*x^2))/Sqrt[Pi] - (3*(1 + b^2*x^2)*Erfi[b*x])/E^(b^2*x^2))/
(6*b^4)
```

fricas [A] time = 0.61, size = 59, normalized size = 0.83

$$\frac{\left(2\sqrt{\pi}\left(b^3x^3+3\,bx\right)e^{\left(b^2x^2\right)}-3\left(\pi+\pi b^2x^2\right)\text{erfi}\left(bx\right)\right)e^{\left(-b^2x^2\right)}}{6\,\pi b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfi(b*x)/exp(b^2*x^2),x, algorithm="fricas")
[Out] 1/6*(2*sqrt(pi)*(b^3*x^3 + 3*b*x)*e^(b^2*x^2) - 3*(pi + pi*b^2*x^2)*erfi(b*
x))*e^(-b^2*x^2)/(pi*b^4)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\text{erfi}\left(bx\right)e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfi(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x^3*erfi(b*x)*e^(-b^2*x^2), x)
```

maple [A] time = 0.09, size = 72, normalized size = 1.01

$$\frac{\left(2\,\mathrm{e}^{b^{2} x^{2}} b^{3} x^{3}-3 \sqrt{\pi}\;\operatorname{erfi}\left(b x\right) b^{2} x^{2}+6\,\mathrm{e}^{b^{2} x^{2}} b x -3 \sqrt{\pi}\;\operatorname{erfi}\left(b x\right)\right) \mathrm{e}^{-b^{2} x^{2}}}{6 b^{4} \sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfi(b*x)/exp(b^2*x^2),x)
```

```
[Out] 1/6*(2*exp(b^2*x^2)*b^3*x^3-3*Pi^(1/2)*erfi(b*x)*b^2*x^2+6*exp(b^2*x^2)*b*x
-3*Pi^(1/2)*erfi(b*x))/b^4/Pi^(1/2)/exp(b^2*x^2)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^{3} \operatorname{erfi}\left(b x\right) e^{\left(-b^{2} x^{2}\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*erfi(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x^3*erfi(b*x)*e^(-b^2*x^2), x)
```

mupad [B] time = 0.18, size = 56, normalized size = 0.79

$$\frac{\frac{b^2\,x^3}{3}+x}{b^3\,\sqrt{\pi}}-\mathrm{erfi}\left(b\,x\right)\,\left(\frac{{\mathrm{e}}^{-b^2\,x^2}}{2\,b^4}+\frac{x^2\,{\mathrm{e}}^{-b^2\,x^2}}{2\,b^2}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*exp(-b^2*x^2)*erfi(b*x),x)
```

```
[Out] (x + (b^2*x^3)/3)/(b^3*pi^(1/2)) - erfi(b*x)*(exp(-b^2*x^2)/(2*b^4) + (x^2*
exp(-b^2*x^2))/(2*b^2))
```

sympy [A] time = 154.66, size = 63, normalized size = 0.89

$$\begin{cases} \frac{x^{3}}{3 \sqrt{\pi} b} - \frac{x^{2} e^{- b^{2} x^{2}} \operatorname{erfi}{\left(b x \right)}}{2 b^{2}} + \frac{x}{\sqrt{\pi} b^{3}} - \frac{e^{- b^{2} x^{2}} \operatorname{erfi}{\left(b x \right)}}{2 b^{4}} & \text{for}\: b \neq 0 \\0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*erfi(b*x)/exp(b**2*x**2),x)
```

```
[Out] Piecewise((x**3/(3*sqrt(pi)*b) - x**2*exp(-b**2*x**2)*erfi(b*x)/(2*b**2) +
x/(sqrt(pi)*b**3) - exp(-b**2*x**2)*erfi(b*x)/(2*b**4), Ne(b, 0)), (0, True
))
```

3.272 $\int e^{-b^2x^2}x\textbf{erfi}(bx)\,dx$

Optimal. Leaf size=32

$$\frac{x}{\sqrt{\pi}\,b}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2b^2}$$

```
[Out] -1/2*erfi(b*x)/b^2/exp(b^2*x^2)+x/b/Pi^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 32, 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 = {6384, 8}

$$\frac{x}{\sqrt{\pi}\,b}-\frac{e^{-b^2x^2}\text{Erfi}(bx)}{2b^2}$$

Antiderivative was successfully verified.

```
[In] Int[(x*Erfi[b*x])/E^(b^2*x^2),x]
```

```
[Out] x/(b*Sqrt[Pi]) - Erfi[b*x]/(2*b^2*E^(b^2*x^2))
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}x\text{erfi}(bx)\,dx &= -\frac{e^{-b^2x^2}\text{erfi}(bx)}{2b^2}+\frac{\int 1\,dx}{b\sqrt{\pi}}\\ &= \frac{x}{b\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.02, size = 32, normalized size = 1.00

$$\frac{x}{\sqrt{\pi}\,b}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*Erfi[b*x])/E^(b^2*x^2),x]
```

```
[Out] x/(b*Sqrt[Pi]) - Erfi[b*x]/(2*b^2*E^(b^2*x^2))
```

fricas [A] time = 0.51, size = 40, normalized size = 1.25

$$\frac{\left(2\sqrt{\pi}\,bxe^{\left(b^2x^2\right)} - \pi\,\mathrm{erfi}\,(bx)\right)e^{\left(-b^2x^2\right)}}{2\,\pi b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] 1/2*(2*sqrt(pi)*b*x*e^(b^2*x^2) - pi*erfi(b*x))*e^(-b^2*x^2)/(pi*b^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x*erfi(b*x)*e^(-b^2*x^2), x)
```

maple [A] time = 0.03, size = 41, normalized size = 1.28

$$\frac{\left(2\,\mathrm{e}^{b^2x^2}bx - \sqrt{\pi}\;\;\mathrm{erfi}\,(bx)\right)\mathrm{e}^{-b^2x^2}}{2\sqrt{\pi}\;b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfi(b*x)/exp(b^2*x^2),x)
```

```
[Out] 1/2*(2*exp(b^2*x^2)*b*x-Pi^(1/2)*erfi(b*x))/Pi^(1/2)/b^2/exp(b^2*x^2)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x*erfi(b*x)*e^(-b^2*x^2), x)
```

mupad [B] time = 0.05, size = 27, normalized size = 0.84

$$\frac{x}{b\,\sqrt{\pi}} - \frac{\mathrm{e}^{-b^2\,x^2}\,\mathrm{erfi}\left(b\,x\right)}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(-b^2*x^2)*erfi(b*x),x)
```

```
[Out] x/(b*pi^(1/2)) - (exp(-b^2*x^2)*erfi(b*x))/(2*b^2)
```

sympy [A] time = 16.49, size = 27, normalized size = 0.84

$$\begin{cases} \frac{x}{\sqrt{\pi}b} - \frac{e^{-b^2x^2}\operatorname{erfi}\left(bx\right)}{2b^2} & \text{for}\ b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*erfi(b*x)/exp(b**2*x**2),x)
```

```
[Out] Piecewise((x/(sqrt(pi)*b) - exp(-b**2*x**2)*erfi(b*x)/(2*b**2), Ne(b, 0)),
(0, True))
```

3.273 $\int \frac{e^{-b^2x^2}\mathbf{erfi}(bx)}{x}\,dx$

Optimal. Leaf size=30

$$\frac{2bx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

```
[Out] 2*b*x*HypergeometricPFQ([1/2, 1],[3/2, 3/2],-b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.04, antiderivative size = 30, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.056, Rules used = {6390}

$$\frac{2bx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/(E^(b^2*x^2)*x),x]
```

```
[Out] (2*b*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi]
```

Rule 6390

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*
b*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi], x] /
; FreeQ[{b, c, d}, x] && EqQ[d, -b^2]
```

Rubi steps

$$\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x}\,dx = \frac{2bx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

Mathematica [A] time = 0.02, size = 30, normalized size = 1.00

$$\frac{2bx\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/(E^(b^2*x^2)*x),x]
```

```
[Out] (2*b*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi]
```

fricas [F] time = 0.44, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x,x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(-b^2*x^2)/x, x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x, x)
```

maple [F] time = 0.04, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,\mathrm{e}^{-b^2x^2}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/exp(b^2*x^2)/x,x)
[Out] int(erfi(b*x)/exp(b^2*x^2)/x,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x,x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.03

$$\int \frac{e^{-b^2 x^2} \operatorname{erfi}(b x)}{x} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfi(b*x))/x,x)
[Out] int((exp(-b^2*x^2)*erfi(b*x))/x, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b**2*x**2)/x,x)
[Out] Exception raised: AttributeError
```

3.274 $\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x^3}\,dx$

Optimal. Leaf size=65

$$-\frac{2b^3x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2x^2}-\frac{b}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*erfi(b*x)/exp(b^2*x^2)/x^2-b/x/Pi^(1/2)-2*b^3*x*HypergeometricPFQ([1/2
, 1],[3/2, 3/2],-b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.07, antiderivative size = 65, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6393, 6390, 30}

$$-\frac{2b^3x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{Erfi}(bx)}{2x^2}-\frac{b}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/(E^(b^2*x^2)*x^3),x]
```

```
[Out] -(b/(Sqrt[Pi]*x)) - Erfi[b*x]/(2*E^(b^2*x^2)*x^2) - (2*b^3*x*Hypergeometric
PFQ[{1/2, 1}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6390

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*
b*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi], x] /
; FreeQ[{b, c, d}, x] && EqQ[d, -b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x^3}\,dx = -\frac{e^{-b^2x^2}\text{erfi}(bx)}{2x^2} - b^2\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x}\,dx + \frac{b\int \frac{1}{x^2}\,dx}{\sqrt{\pi}}$$
$$= -\frac{b}{\sqrt{\pi}\,x} - \frac{e^{-b^2x^2}\text{erfi}(bx)}{2x^2} - \frac{2b^3x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}$$

Mathematica [A] time = 0.02, size = 32, normalized size = 0.49

$$-\frac{2b\,{}_2F_2\left(-\frac{1}{2},1;\frac{1}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/(E^(b^2*x^2)*x^3),x]
```

```
[Out] (-2*b*HypergeometricPFQ[{-1/2, 1}, {1/2, 3/2}, -(b^2*x^2)])/(Sqrt[Pi]*x)
```

fricas [F] time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^3,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x)*e^(-b^2*x^2)/x^3, x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^3,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^3, x)
```

maple [F] time = 0.16, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(bx\right) \mathrm{e}^{-b^{2} x^{2}}}{x^{3}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/exp(b^2*x^2)/x^3,x)
[Out] int(erfi(b*x)/exp(b^2*x^2)/x^3,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(bx\right) e^{\left(-b^{2} x^{2}\right)}}{x^{3}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^3,x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^3, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\mathrm{erfi}\left(b\,x\right)}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfi(b*x))/x^3,x)
[Out] int((exp(-b^2*x^2)*erfi(b*x))/x^3, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b**2*x**2)/x**3,x)
[Out] Exception raised: AttributeError
```

3.275 $\int \frac{e^{-b^2x^2}\mathbf{erfi}(bx)}{x^5}\,dx$

Optimal. Leaf size=105

$$\frac{b^5x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}+\frac{b^3}{2\sqrt{\pi}\,x}+\frac{b^2e^{-b^2x^2}\text{erfi}(bx)}{4x^2}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{4x^4}-\frac{b}{6\sqrt{\pi}\,x^3}$$

```
[Out] -1/4*erfi(b*x)/exp(b^2*x^2)/x^4+1/4*b^2*erfi(b*x)/exp(b^2*x^2)/x^2-1/6*b/x^
3/Pi^(1/2)+1/2*b^3/x/Pi^(1/2)+b^5*x*HypergeometricPFQ([1/2, 1],[3/2, 3/2],-
b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.11, antiderivative size = 105, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6393, 6390, 30}

$$\frac{b^5x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}+\frac{b^2e^{-b^2x^2}\text{Erfi}(bx)}{4x^2}-\frac{e^{-b^2x^2}\text{Erfi}(bx)}{4x^4}+\frac{b^3}{2\sqrt{\pi}\,x}-\frac{b}{6\sqrt{\pi}\,x^3}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/(E^(b^2*x^2)*x^5),x]
```

```
[Out] -b/(6*Sqrt[Pi]*x^3) + b^3/(2*Sqrt[Pi]*x) - Erfi[b*x]/(4*E^(b^2*x^2)*x^4) +
(b^2*Erfi[b*x])/(4*E^(b^2*x^2)*x^2) + (b^5*x*HypergeometricPFQ[{1/2, 1}, {3
/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6390

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*
b*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi], x] /
; FreeQ[{b, c, d}, x] && EqQ[d, -b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
```

```
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x^5}\,dx &= -\frac{e^{-b^2x^2}\text{erfi}(bx)}{4x^4}-\frac{1}{2}b^2\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x^3}\,dx+\frac{b\int \frac{1}{x^4}\,dx}{2\sqrt{\pi}}\\ &= -\frac{b}{6\sqrt{\pi}\,x^3}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{4x^4}+\frac{b^2e^{-b^2x^2}\text{erfi}(bx)}{4x^2}+\frac{1}{2}b^4\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x}\,dx-\frac{b^3\int \frac{1}{x^2}\,dx}{2\sqrt{\pi}}\\ &= -\frac{b}{6\sqrt{\pi}\,x^3}+\frac{b^3}{2\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{4x^4}+\frac{b^2e^{-b^2x^2}\text{erfi}(bx)}{4x^2}+\frac{b^5x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.03, size = 34, normalized size = 0.32

$$-\frac{2b\,{}_2F_2\left(-\frac{3}{2},1;-\frac{1}{2},\frac{3}{2};-b^2x^2\right)}{3\sqrt{\pi}\,x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/(E^(b^2*x^2)*x^5),x]
```

```
[Out] (-2*b*HypergeometricPFQ[{-3/2, 1}, {-1/2, 3/2}, -(b^2*x^2)])/(3*Sqrt[Pi]*x^
3)
```

fricas [F] time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^5},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^5,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x)*e^(-b^2*x^2)/x^5, x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^5,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^5, x)
```

maple [F] time = 0.61, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\,\mathrm{e}^{-b^2x^2}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/exp(b^2*x^2)/x^5,x)
```

```
[Out] int(erfi(b*x)/exp(b^2*x^2)/x^5,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\,e^{\left(-b^2x^2\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^5,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^5, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\operatorname{erfi}(b\,x)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfi(b*x))/x^5,x)
```

```
[Out] int((exp(-b^2*x^2)*erfi(b*x))/x^5, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b**2*x**2)/x**5,x)
```

```
[Out] Exception raised: AttributeError
```

3.276 $\int e^{-b^2x^2}x^6\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=148

$$\frac{15x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{8\sqrt{\pi}\,b^5}+\frac{15x^2}{8\sqrt{\pi}\,b^5}+\frac{5x^4}{8\sqrt{\pi}\,b^3}-\frac{x^5e^{-b^2x^2}\text{erfi}(bx)}{2b^2}-\frac{15xe^{-b^2x^2}\text{erfi}(bx)}{8b^6}-\frac{5x^3e^{-b^2x^2}\text{erfi}(bx)}{4b^4}+\frac{x^6}{6\sqrt{\pi}\,b}$$

```
[Out] -15/8*x*erfi(b*x)/b^6/exp(b^2*x^2)-5/4*x^3*erfi(b*x)/b^4/exp(b^2*x^2)-1/2*x
^5*erfi(b*x)/b^2/exp(b^2*x^2)+15/8*x^2/b^5/Pi^(1/2)+5/8*x^4/b^3/Pi^(1/2)+1/
6*x^6/b/Pi^(1/2)+15/8*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/b^5/P
i^(1/2)
```

Rubi [A] time = 0.14, antiderivative size = 148, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 3, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6387, 6378, 30}

$$\frac{15x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{8\sqrt{\pi}\,b^5}-\frac{x^5e^{-b^2x^2}\text{Erfi}(bx)}{2b^2}-\frac{5x^3e^{-b^2x^2}\text{Erfi}(bx)}{4b^4}-\frac{15xe^{-b^2x^2}\text{Erfi}(bx)}{8b^6}+\frac{5x^4}{8\sqrt{\pi}\,b^3}+\frac{15x^2}{8\sqrt{\pi}\,b^5}+\frac{x^6}{6\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[(x^6*Erfi[b*x])/E^(b^2*x^2),x]
```

```
[Out] (15*x^2)/(8*b^5*Sqrt[Pi]) + (5*x^4)/(8*b^3*Sqrt[Pi]) + x^6/(6*b*Sqrt[Pi]) -
 (15*x*Erfi[b*x])/(8*b^6*E^(b^2*x^2)) - (5*x^3*Erfi[b*x])/(4*b^4*E^(b^2*x^2
)) - (x^5*Erfi[b*x])/(2*b^2*E^(b^2*x^2)) + (15*x^2*HypergeometricPFQ[{1, 1}
, {3/2, 2}, -(b^2*x^2)])/(8*b^5*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
```

```
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{-b^2x^2}x^6\text{erfi}(bx)\,dx &= -\frac{e^{-b^2x^2}x^5\text{erfi}(bx)}{2b^2}+\frac{5\int e^{-b^2x^2}x^4\text{erfi}(bx)\,dx}{2b^2}+\frac{\int x^5\,dx}{b\sqrt{\pi}}\\ &= \frac{x^6}{6b\sqrt{\pi}}-\frac{5e^{-b^2x^2}x^3\text{erfi}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^5\text{erfi}(bx)}{2b^2}+\frac{15\int e^{-b^2x^2}x^2\text{erfi}(bx)\,dx}{4b^4}+\frac{5\int x^3\,dx}{2b^3\sqrt{\pi}}\\ &= \frac{5x^4}{8b^3\sqrt{\pi}}+\frac{x^6}{6b\sqrt{\pi}}-\frac{15e^{-b^2x^2}x\text{erfi}(bx)}{8b^6}-\frac{5e^{-b^2x^2}x^3\text{erfi}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^5\text{erfi}(bx)}{2b^2}+\frac{15\int e^{-b}\ldots}{}\\ &= \frac{15x^2}{8b^5\sqrt{\pi}}+\frac{5x^4}{8b^3\sqrt{\pi}}+\frac{x^6}{6b\sqrt{\pi}}-\frac{15e^{-b^2x^2}x\text{erfi}(bx)}{8b^6}-\frac{5e^{-b^2x^2}x^3\text{erfi}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^5\text{erfi}(bx)}{2b^2}\end{aligned}$$

Mathematica [A] time = 0.03, size = 52, normalized size = 0.35

$$\frac{x^2\left(-9\,{}_2F_2\left(1,1;-\frac{3}{2},2;-b^2x^2\right)+4b^4x^4+3b^2x^2+9\right)}{24\sqrt{\pi}\,b^5}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^6*Erfi[b*x])/E^(b^2*x^2),x]
```

```
[Out] (x^2*(9 + 3*b^2*x^2 + 4*b^4*x^4 - 9*HypergeometricPFQ[{1, 1}, {-3/2, 2}, -(
b^2*x^2)]))/(24*b^5*Sqrt[Pi])
```

fricas [F] time = 0.41, size = 0, normalized size = 0.00

$$\text{integral}\left(x^6\,\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erfi(b*x)/exp(b^2*x^2),x, algorithm="fricas")
```

```
[Out] integral(x^6*erfi(b*x)*e^(-b^2*x^2), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^6\,\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erfi(b*x)/exp(b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(x^6*erfi(b*x)*e^(-b^2*x^2), x)
```

maple [F] time = 0.39, size = 0, normalized size = 0.00

$$\int x^6 \operatorname{erfi}(bx) e^{-b^2x^2} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*erfi(b*x)/exp(b^2*x^2),x)
```

```
[Out] int(x^6*erfi(b*x)/exp(b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^6 \operatorname{erfi}(bx) e^{\left(-b^2x^2\right)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*erfi(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x^6*erfi(b*x)*e^(-b^2*x^2), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^6 \, e^{-b^2 x^2} \operatorname{erfi}(b\,x) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*exp(-b^2*x^2)*erfi(b*x),x)
```

```
[Out] int(x^6*exp(-b^2*x^2)*erfi(b*x), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**6*erfi(b*x)/exp(b**2*x**2),x)
```

```
[Out] Timed out
```

3.277 $\int e^{-b^2x^2}x^4\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=109

$$\frac{3x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{4\sqrt{\pi}\,b^3}+\frac{3x^2}{4\sqrt{\pi}\,b^3}-\frac{x^3e^{-b^2x^2}\text{erfi}(bx)}{2b^2}-\frac{3xe^{-b^2x^2}\text{erfi}(bx)}{4b^4}+\frac{x^4}{4\sqrt{\pi}\,b}$$

```
[Out] -3/4*x*erfi(b*x)/b^4/exp(b^2*x^2)-1/2*x^3*erfi(b*x)/b^2/exp(b^2*x^2)+3/4*x^
2/b^3/Pi^(1/2)+1/4*x^4/b/Pi^(1/2)+3/4*x^2*HypergeometricPFQ([1, 1],[3/2, 2]
,-b^2*x^2)/b^3/Pi^(1/2)
```

Rubi [A] time = 0.10, antiderivative size = 109, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6387, 6378, 30}

$$\frac{3x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{4\sqrt{\pi}\,b^3}-\frac{x^3e^{-b^2x^2}\text{Erfi}(bx)}{2b^2}-\frac{3xe^{-b^2x^2}\text{Erfi}(bx)}{4b^4}+\frac{3x^2}{4\sqrt{\pi}\,b^3}+\frac{x^4}{4\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[(x^4*Erfi[b*x])/E^(b^2*x^2),x]
```

```
[Out] (3*x^2)/(4*b^3*Sqrt[Pi]) + x^4/(4*b*Sqrt[Pi]) - (3*x*Erfi[b*x])/(4*b^4*E^(b
^2*x^2)) - (x^3*Erfi[b*x])/(2*b^2*E^(b^2*x^2)) + (3*x^2*HypergeometricPFQ[{
1, 1}, {3/2, 2}, -(b^2*x^2)])/(4*b^3*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
```

```
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$
\begin{aligned}
\int e^{-b^2x^2}x^4\text{erfi}(bx)\,dx &= -\frac{e^{-b^2x^2}x^3\text{erfi}(bx)}{2b^2}+\frac{3\int e^{-b^2x^2}x^2\text{erfi}(bx)\,dx}{2b^2}+\frac{\int x^3\,dx}{b\sqrt{\pi}}\\
&= \frac{x^4}{4b\sqrt{\pi}}-\frac{3e^{-b^2x^2}x\text{erfi}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^3\text{erfi}(bx)}{2b^2}+\frac{3\int e^{-b^2x^2}\text{erfi}(bx)\,dx}{4b^4}+\frac{3\int x\,dx}{2b^3\sqrt{\pi}}\\
&= \frac{3x^2}{4b^3\sqrt{\pi}}+\frac{x^4}{4b\sqrt{\pi}}-\frac{3e^{-b^2x^2}x\text{erfi}(bx)}{4b^4}-\frac{e^{-b^2x^2}x^3\text{erfi}(bx)}{2b^2}+\frac{3x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{4b^3\sqrt{\pi}}
\end{aligned}
$$

Mathematica [A] time = 0.03, size = 43, normalized size = 0.39

$$\frac{x^2\left(-{}_2F_2\left(1,1;-\frac{1}{2},2;-b^2x^2\right)+b^2x^2+1\right)}{4\sqrt{\pi}\,b^3}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^4*Erfi[b*x])/E^(b^2*x^2),x]
[Out] (x^2*(1 + b^2*x^2 - HypergeometricPFQ[{1, 1}, {-1/2, 2}, -(b^2*x^2)]))/(4*b
^3*Sqrt[Pi])
```

fricas [F] time = 0.45, size = 0, normalized size = 0.00

$$\text{integral}\left(x^4\,\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfi(b*x)/exp(b^2*x^2),x, algorithm="fricas")
[Out] integral(x^4*erfi(b*x)*e^(-b^2*x^2), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\,\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfi(b*x)/exp(b^2*x^2),x, algorithm="giac")
[Out] integrate(x^4*erfi(b*x)*e^(-b^2*x^2), x)
```

maple [F] time = 0.22, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erfi}(bx) e^{-b^2x^2} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfi(b*x)/exp(b^2*x^2),x)
[Out] int(x^4*erfi(b*x)/exp(b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erfi}(bx) e^{\left(-b^2x^2\right)} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*erfi(b*x)/exp(b^2*x^2),x, algorithm="maxima")
[Out] integrate(x^4*erfi(b*x)*e^(-b^2*x^2), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^4 e^{-b^2 x^2} \operatorname{erfi}(b x) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*exp(-b^2*x^2)*erfi(b*x),x)
[Out] int(x^4*exp(-b^2*x^2)*erfi(b*x), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*erfi(b*x)/exp(b**2*x**2),x)
[Out] Timed out
```

3.278 $\int e^{-b^2x^2}x^2\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=70

$$\frac{x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}\,b}-\frac{xe^{-b^2x^2}\operatorname{erfi}(bx)}{2b^2}+\frac{x^2}{2\sqrt{\pi}\,b}$$

```
[Out] -1/2*x*erfi(b*x)/b^2/exp(b^2*x^2)+1/2*x^2/b/Pi^(1/2)+1/2*x^2*Hypergeometric
PFQ([1, 1],[3/2, 2],-b^2*x^2)/b/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 70, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6387, 6378, 30}

$$\frac{x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}\,b}-\frac{xe^{-b^2x^2}\operatorname{Erfi}(bx)}{2b^2}+\frac{x^2}{2\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*Erfi[b*x])/E^(b^2*x^2),x]
```

```
[Out] x^2/(2*b*Sqrt[Pi]) - (x*Erfi[b*x])/(2*b^2*E^(b^2*x^2)) + (x^2*Hypergeometri
cPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/(2*b*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{-b^2x^2}x^2\text{erfi}(bx)\,dx = -\frac{e^{-b^2x^2}x\text{erfi}(bx)}{2b^2} + \frac{\int e^{-b^2x^2}\text{erfi}(bx)\,dx}{2b^2} + \frac{\int x\,dx}{b\sqrt{\pi}}$$
$$= \frac{x^2}{2b\sqrt{\pi}} - \frac{e^{-b^2x^2}x\text{erfi}(bx)}{2b^2} + \frac{x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2b\sqrt{\pi}}$$

Mathematica [A] time = 0.02, size = 36, normalized size = 0.51

$$\frac{x^2\left(1-{}_2F_2\left(1,1;\frac{1}{2},2;-b^2x^2\right)\right)}{2\sqrt{\pi}\,b}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^2*Erfi[b*x])/E^(b^2*x^2),x]
[Out] (x^2*(1 - HypergeometricPFQ[{1, 1}, {1/2, 2}, -(b^2*x^2)]))/(2*b*Sqrt[Pi])
```

fricas [F] time = 0.40, size = 0, normalized size = 0.00

$$\text{integral}\left(x^2\,\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(b*x)/exp(b^2*x^2),x, algorithm="fricas")
[Out] integral(x^2*erfi(b*x)*e^(-b^2*x^2), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(b*x)/exp(b^2*x^2),x, algorithm="giac")
[Out] integrate(x^2*erfi(b*x)*e^(-b^2*x^2), x)
```

maple [F] time = 0.06, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfi}\,(bx)\,\mathrm{e}^{-b^2x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfi(b*x)/exp(b^2*x^2),x)
```

```
[Out] int(x^2*erfi(b*x)/exp(b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfi}(bx)e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*erfi(b*x)/exp(b^2*x^2),x, algorithm="maxima")
```

```
[Out] integrate(x^2*erfi(b*x)*e^(-b^2*x^2), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,\mathrm{e}^{-b^2\,x^2}\,\operatorname{erfi}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(-b^2*x^2)*erfi(b*x),x)
```

```
[Out] int(x^2*exp(-b^2*x^2)*erfi(b*x), x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*erfi(b*x)/exp(b**2*x**2),x)
```

```
[Out] Exception raised: AttributeError
```

3.279 $\int e^{-b^2x^2}\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=27

$$\frac{bx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{\sqrt{\pi}}$$

```
[Out] b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/Pi^(1/2)
```

Rubi [A] time = 0.02, antiderivative size = 27, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.067, Rules used = {6378}

$$\frac{bx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/E^(b^2*x^2),x]
```

```
[Out] (b*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rubi steps

$$\int e^{-b^2x^2}\text{erfi}(bx)\,dx = \frac{bx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{\sqrt{\pi}}$$

Mathematica [A] time = 0.01, size = 27, normalized size = 1.00

$$\frac{bx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/E^(b^2*x^2),x]
```

```
[Out] (b*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi]
```

fricas [F] time = 0.47, size = 0, normalized size = 0.00

$$\text{integral}\left(\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2),x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(-b^2*x^2), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2),x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(-b^2*x^2), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int \text{erfi}\,(bx)\,\mathrm{e}^{-b^2x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/exp(b^2*x^2),x)
[Out] int(erfi(b*x)/exp(b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2),x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(-b^2*x^2), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.04

$$\int \mathrm{e}^{-b^2\,x^2}\,\text{erfi}\,(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b^2*x^2)*erfi(b*x),x)
```

```
[Out] int(exp(-b^2*x^2)*erfi(b*x), x)
```

sympy [**F(-2)**] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b**2*x**2),x)
```

```
[Out] Exception raised: AttributeError
```

3.280 $\int \frac{e^{-b^2x^2}\mathbf{erfi}(bx)}{x^2}\,dx$

Optimal. Leaf size=60

$$-\frac{2b^3x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{x}+\frac{2b\log(x)}{\sqrt{\pi}}$$

```
[Out] -erfi(b*x)/exp(b^2*x^2)/x-2*b^3*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*
x^2)/Pi^(1/2)+2*b*ln(x)/Pi^(1/2)
```

Rubi [A] time = 0.06, antiderivative size = 60, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6393, 6378, 29}

$$-\frac{2b^3x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{\sqrt{\pi}}-\frac{e^{-b^2x^2}\text{Erfi}(bx)}{x}+\frac{2b\log(x)}{\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/(E^(b^2*x^2)*x^2),x]
```

```
[Out] -(Erfi[b*x]/(E^(b^2*x^2)*x)) - (2*b^3*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2
}, -(b^2*x^2)])/Sqrt[Pi] + (2*b*Log[x])/Sqrt[Pi]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{e^{-b^2x^2}\operatorname{erfi}(bx)}{x^2}\,dx = -\frac{e^{-b^2x^2}\operatorname{erfi}(bx)}{x} - \left(2b^2\right)\int e^{-b^2x^2}\operatorname{erfi}(bx)\,dx + \frac{(2b)\int \frac{1}{x}\,dx}{\sqrt{\pi}}$$
$$= -\frac{e^{-b^2x^2}\operatorname{erfi}(bx)}{x} - \frac{2b^3x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{\sqrt{\pi}} + \frac{2b\log(x)}{\sqrt{\pi}}$$

Mathematica [C] time = 0.02, size = 26, normalized size = 0.43

$$-\frac{1}{2}bG_{2,3}^{2,1}\left(b^2x^2|\begin{array}{c} 0,1 \\ 0,0,-\frac{1}{2} \end{array}\right)$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Erfi[b*x]/(E^(b^2*x^2)*x^2),x]
```

```
[Out] -1/2*(b*MeijerG[{{0}, {1}}, {{0, 0}, {-1/2}}, b^2*x^2])
```

fricas [F] time = 0.44, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\operatorname{erfi}(bx)\,e^{\left(-b^2x^2\right)}}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^2,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x)*e^(-b^2*x^2)/x^2, x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\,e^{\left(-b^2x^2\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^2,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^2, x)
```

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\,\mathrm{e}^{-b^2x^2}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/exp(b^2*x^2)/x^2,x)
```

```
[Out] int(erfi(b*x)/exp(b^2*x^2)/x^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\, e^{\left(-b^2x^2\right)}}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^2,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\operatorname{erfi}(b\,x)}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfi(b*x))/x^2,x)
```

```
[Out] int((exp(-b^2*x^2)*erfi(b*x))/x^2, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b**2*x**2)/x**2,x)
```

```
[Out] Exception raised: AttributeError
```

3.281 $\int \frac{e^{-b^2x^2}\mathbf{erfi}(bx)}{x^4}\,dx$

Optimal. Leaf size=105

$$\frac{4b^5x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{3\sqrt{\pi}}-\frac{4b^3\log(x)}{3\sqrt{\pi}}+\frac{2b^2e^{-b^2x^2}\mathrm{erfi}(bx)}{3x}-\frac{e^{-b^2x^2}\mathrm{erfi}(bx)}{3x^3}-\frac{b}{3\sqrt{\pi}\,x^2}$$

```
[Out] -1/3*erfi(b*x)/exp(b^2*x^2)/x^3+2/3*b^2*erfi(b*x)/exp(b^2*x^2)/x-1/3*b/x^2/
Pi^(1/2)+4/3*b^5*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/Pi^(1/2)-4
/3*b^3*ln(x)/Pi^(1/2)
```

Rubi [A] time = 0.10, antiderivative size = 105, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6393, 6378, 29, 30}

$$\frac{4b^5x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{3\sqrt{\pi}}+\frac{2b^2e^{-b^2x^2}\mathrm{Erfi}(bx)}{3x}-\frac{e^{-b^2x^2}\mathrm{Erfi}(bx)}{3x^3}-\frac{4b^3\log(x)}{3\sqrt{\pi}}-\frac{b}{3\sqrt{\pi}\,x^2}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/(E^(b^2*x^2)*x^4),x]
```

```
[Out] -b/(3*Sqrt[Pi]*x^2) - Erfi[b*x]/(3*E^(b^2*x^2)*x^3) + (2*b^2*Erfi[b*x])/(3*
E^(b^2*x^2)*x) + (4*b^5*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)]
)/(3*Sqrt[Pi]) - (4*b^3*Log[x])/(3*Sqrt[Pi])
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x^4}\,dx = -\frac{e^{-b^2x^2}\text{erfi}(bx)}{3x^3} - \frac{1}{3}\left(2b^2\right)\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x^2}\,dx + \frac{(2b)\int \frac{1}{x^3}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{b}{3\sqrt{\pi}\,x^2} - \frac{e^{-b^2x^2}\text{erfi}(bx)}{3x^3} + \frac{2b^2e^{-b^2x^2}\text{erfi}(bx)}{3x} + \frac{1}{3}\left(4b^4\right)\int e^{-b^2x^2}\text{erfi}(bx)\,dx - \frac{\left(4b^3\right)\int \frac{1}{x}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{b}{3\sqrt{\pi}\,x^2} - \frac{e^{-b^2x^2}\text{erfi}(bx)}{3x^3} + \frac{2b^2e^{-b^2x^2}\text{erfi}(bx)}{3x} + \frac{4b^5x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{3\sqrt{\pi}} - \frac{4b^3\log(x)}{3\sqrt{\pi}}$$

Mathematica [C] time = 0.02, size = 29, normalized size = 0.28

$$-\frac{bG_{2,3}^{2,1}\left(b^2x^2\middle|\begin{array}{c}0,2\\0,1,-\frac{1}{2}\end{array}\right)}{2x^2}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Erfi[b*x]/(E^(b^2*x^2)*x^4),x]
```

```
[Out] -1/2*(b*MeijerG[{{0}, {2}}, {{0, 1}, {-1/2}}, b^2*x^2])/x^2
```

fricas [F] time = 0.54, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^4}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^4,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x)*e^(-b^2*x^2)/x^4, x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\, e^{\left(-b^2x^2\right)}}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^4,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^4, x)
```

maple [F] time = 0.30, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\, \mathrm{e}^{-b^2x^2}}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/exp(b^2*x^2)/x^4,x)
[Out] int(erfi(b*x)/exp(b^2*x^2)/x^4,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\, e^{\left(-b^2x^2\right)}}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^4,x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^4, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\operatorname{erfi}(b\,x)}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfi(b*x))/x^4,x)
[Out] int((exp(-b^2*x^2)*erfi(b*x))/x^4, x)
```

sympy [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b**2*x**2)/x**4,x)
```

```
[Out] Exception raised: AttributeError
```

3.282 $\int \frac{e^{-b^2x^2}\mathbf{erfi}(bx)}{x^6}\,dx$

Optimal. Leaf size=144

$$-\frac{8b^7x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{15\sqrt{\pi}}+\frac{8b^5\log(x)}{15\sqrt{\pi}}+\frac{2b^3}{15\sqrt{\pi}\,x^2}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{5x^5}+\frac{2b^2e^{-b^2x^2}\text{erfi}(bx)}{15x^3}-\frac{4b^4e^{-b^2x^2}\text{erfi}(bx)}{15x}-\frac{b}{10\sqrt{\ }}$$

```
[Out] -1/5*erfi(b*x)/exp(b^2*x^2)/x^5+2/15*b^2*erfi(b*x)/exp(b^2*x^2)/x^3-4/15*b^
4*erfi(b*x)/exp(b^2*x^2)/x-1/10*b/x^4/Pi^(1/2)+2/15*b^3/x^2/Pi^(1/2)-8/15*b
^7*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/Pi^(1/2)+8/15*b^5*ln(x)/
Pi^(1/2)
```

Rubi [A] time = 0.14, antiderivative size = 144, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6393, 6378, 29, 30}

$$-\frac{8b^7x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{15\sqrt{\pi}}-\frac{4b^4e^{-b^2x^2}\text{Erfi}(bx)}{15x}+\frac{2b^2e^{-b^2x^2}\text{Erfi}(bx)}{15x^3}-\frac{e^{-b^2x^2}\text{Erfi}(bx)}{5x^5}+\frac{2b^3}{15\sqrt{\pi}\,x^2}+\frac{8b^5\log(x)}{15\sqrt{\pi}}-\frac{}{10\sqrt{\ }}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/(E^(b^2*x^2)*x^6),x]
```

```
[Out] -b/(10*Sqrt[Pi]*x^4) + (2*b^3)/(15*Sqrt[Pi]*x^2) - Erfi[b*x]/(5*E^(b^2*x^2)
*x^5) + (2*b^2*Erfi[b*x])/(15*E^(b^2*x^2)*x^3) - (4*b^4*Erfi[b*x])/(15*E^(b
^2*x^2)*x) - (8*b^7*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/(1
5*Sqrt[Pi]) + (8*b^5*Log[x])/(15*Sqrt[Pi])
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x^6}\,dx = -\frac{e^{-b^2x^2}\text{erfi}(bx)}{5x^5} - \frac{1}{5}\left(2b^2\right)\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x^4}\,dx + \frac{(2b)\int \frac{1}{x^5}\,dx}{5\sqrt{\pi}}$$

$$= -\frac{b}{10\sqrt{\pi}\,x^4} - \frac{e^{-b^2x^2}\text{erfi}(bx)}{5x^5} + \frac{2b^2e^{-b^2x^2}\text{erfi}(bx)}{15x^3} + \frac{1}{15}\left(4b^4\right)\int \frac{e^{-b^2x^2}\text{erfi}(bx)}{x^2}\,dx - \frac{\left(4b^3\right)\int \frac{1}{x}}{15\sqrt{\pi}}$$

$$= -\frac{b}{10\sqrt{\pi}\,x^4} + \frac{2b^3}{15\sqrt{\pi}\,x^2} - \frac{e^{-b^2x^2}\text{erfi}(bx)}{5x^5} + \frac{2b^2e^{-b^2x^2}\text{erfi}(bx)}{15x^3} - \frac{4b^4e^{-b^2x^2}\text{erfi}(bx)}{15x} - \frac{1}{15}\left(8b^6\right)$$

$$= -\frac{b}{10\sqrt{\pi}\,x^4} + \frac{2b^3}{15\sqrt{\pi}\,x^2} - \frac{e^{-b^2x^2}\text{erfi}(bx)}{5x^5} + \frac{2b^2e^{-b^2x^2}\text{erfi}(bx)}{15x^3} - \frac{4b^4e^{-b^2x^2}\text{erfi}(bx)}{15x} - \frac{8b^7x^2\,{}_2F}{}$$

Mathematica [C] time = 0.03, size = 29, normalized size = 0.20

$$-\frac{bG_{2,3}^{2,1}\left(b^2x^2\middle|\begin{array}{c}0,3\\0,2,-\frac{1}{2}\end{array}\right)}{2x^4}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Erfi[b*x]/(E^(b^2*x^2)*x^6),x]
```

```
[Out] -1/2*(b*MeijerG[{{0}, {3}}, {{0, 2}, {-1/2}}, b^2*x^2])/x^4
```

fricas [F] time = 0.44, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^6}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^6,x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(-b^2*x^2)/x^6, x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)e^{(-b^2x^2)}}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^6,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^6, x)
```

maple [F] time = 0.54, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\,\mathrm{e}^{-b^2x^2}}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/exp(b^2*x^2)/x^6,x)
[Out] int(erfi(b*x)/exp(b^2*x^2)/x^6,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)e^{(-b^2x^2)}}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^6,x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(-b^2*x^2)/x^6, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{-b^2\,x^2}\,\operatorname{erfi}(b\,x)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfi(b*x))/x^6,x)
[Out] int((exp(-b^2*x^2)*erfi(b*x))/x^6, x)
```

sympy [**F(-1)**] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b**2*x**2)/x**6,x)
```

```
[Out] Timed out
```

3.283 $\int e^{c+b^2x^2}x^5\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=144

$$-\frac{43e^c\text{erfi}\left(\sqrt{2}\,bx\right)}{32\sqrt{2}\,b^6}+\frac{x^4e^{b^2x^2+c}\text{erfi}(bx)}{2b^2}+\frac{e^{b^2x^2+c}\text{erfi}(bx)}{b^6}+\frac{11xe^{2b^2x^2+c}}{16\sqrt{\pi}\,b^5}-\frac{x^2e^{b^2x^2+c}\text{erfi}(bx)}{b^4}-\frac{x^3e^{2b^2x^2+c}}{4\sqrt{\pi}\,b^3}$$

```
[Out] exp(b^2*x^2+c)*erfi(b*x)/b^6-exp(b^2*x^2+c)*x^2*erfi(b*x)/b^4+1/2*exp(b^2*x
^2+c)*x^4*erfi(b*x)/b^2-43/64*exp(c)*erfi(b*x*2^(1/2))/b^6*2^(1/2)+11/16*ex
p(2*b^2*x^2+c)*x/b^5/Pi^(1/2)-1/4*exp(2*b^2*x^2+c)*x^3/b^3/Pi^(1/2)
```

Rubi [A] time = 0.23, antiderivative size = 144, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.210, Rules used = {6387, 6384, 2204, 2212}

$$\frac{x^4e^{b^2x^2+c}\text{Erfi}(bx)}{2b^2}-\frac{x^2e^{b^2x^2+c}\text{Erfi}(bx)}{b^4}+\frac{e^{b^2x^2+c}\text{Erfi}(bx)}{b^6}-\frac{43e^c\text{Erfi}\left(\sqrt{2}\,bx\right)}{32\sqrt{2}\,b^6}-\frac{x^3e^{2b^2x^2+c}}{4\sqrt{\pi}\,b^3}+\frac{11xe^{2b^2x^2+c}}{16\sqrt{\pi}\,b^5}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^5*Erfi[b*x],x]
```

```
[Out] (11*E^(c + 2*b^2*x^2)*x)/(16*b^5*Sqrt[Pi]) - (E^(c + 2*b^2*x^2)*x^3)/(4*b^3
*Sqrt[Pi]) + (E^(c + b^2*x^2)*Erfi[b*x])/b^6 - (E^(c + b^2*x^2)*x^2*Erfi[b*
x])/b^4 + (E^(c + b^2*x^2)*x^4*Erfi[b*x])/(2*b^2) - (43*E^c*Erfi[Sqrt[2]*b*
x])/(32*Sqrt[2]*b^6)
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
```

```
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{c+b^2x^2}x^5\text{erfi}(bx)\,dx = \frac{e^{c+b^2x^2}x^4\text{erfi}(bx)}{2b^2} - \frac{2\int e^{c+b^2x^2}x^3\text{erfi}(bx)\,dx}{b^2} - \frac{\int e^{c+2b^2x^2}x^4\,dx}{b\sqrt{\pi}}$$

$$= -\frac{e^{c+2b^2x^2}x^3}{4b^3\sqrt{\pi}} - \frac{e^{c+b^2x^2}x^2\text{erfi}(bx)}{b^4} + \frac{e^{c+b^2x^2}x^4\text{erfi}(bx)}{2b^2} + \frac{2\int e^{c+b^2x^2}x\text{erfi}(bx)\,dx}{b^4} + \frac{3\int e^{c+2b}}{4b^3}$$

$$= \frac{11e^{c+2b^2x^2}x}{16b^5\sqrt{\pi}} - \frac{e^{c+2b^2x^2}x^3}{4b^3\sqrt{\pi}} + \frac{e^{c+b^2x^2}\text{erfi}(bx)}{b^6} - \frac{e^{c+b^2x^2}x^2\text{erfi}(bx)}{b^4} + \frac{e^{c+b^2x^2}x^4\text{erfi}(bx)}{2b^2} - \frac{3\int}{1}$$

$$= \frac{11e^{c+2b^2x^2}x}{16b^5\sqrt{\pi}} - \frac{e^{c+2b^2x^2}x^3}{4b^3\sqrt{\pi}} + \frac{e^{c+b^2x^2}\text{erfi}(bx)}{b^6} - \frac{e^{c+b^2x^2}x^2\text{erfi}(bx)}{b^4} + \frac{e^{c+b^2x^2}x^4\text{erfi}(bx)}{2b^2} - \frac{43e^{c}}{}$$

Mathematica [A] time = 0.08, size = 95, normalized size = 0.66

$$\frac{e^c\left(-4bxe^{2b^2x^2}\left(4b^2x^2-11\right)+32\sqrt{\pi}\,e^{b^2x^2}\left(b^4x^4-2b^2x^2+2\right)\text{erfi}(bx)-43\sqrt{2\pi}\,\text{erfi}\left(\sqrt{2}\,bx\right)\right)}{64\sqrt{\pi}\,b^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x^5*Erfi[b*x],x]
```

```
[Out] (E^c*(-4*b*E^(2*b^2*x^2)*x*(-11 + 4*b^2*x^2) + 32*E^(b^2*x^2)*Sqrt[Pi]*(2 -
 2*b^2*x^2 + b^4*x^4)*Erfi[b*x] - 43*Sqrt[2*Pi]*Erfi[Sqrt[2]*b*x]))/(64*b^6
*Sqrt[Pi])
```

fricas [A] time = 0.43, size = 102, normalized size = 0.71

$$-\frac{43\sqrt{2}\,\pi\sqrt{b^2}\,\text{erfi}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)e^c - 32\left(\pi b^5x^4 - 2\,\pi b^3x^2 + 2\,\pi b\right)\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)} + 4\sqrt{\pi}\left(4\,b^4x^3 - 11\,b^2x\right)e^{\left(2\,b^2x^2+\right.}}{64\,\pi b^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^5*erfi(b*x),x, algorithm="fricas")
```

```
[Out] -1/64*(43*sqrt(2)*pi*sqrt(b^2)*erfi(sqrt(2)*sqrt(b^2)*x)*e^c - 32*(pi*b^5*x
^4 - 2*pi*b^3*x^2 + 2*pi*b)*erfi(b*x)*e^(b^2*x^2 + c) + 4*sqrt(pi)*(4*b^4*x
^3 - 11*b^2*x)*e^(2*b^2*x^2 + c))/(pi*b^7)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5 \operatorname{erfi}(bx) e^{(b^2x^2+c)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^5*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^5*erfi(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.06, size = 0, normalized size = 0.00

$$\int e^{b^2x^2+c} x^5 \operatorname{erfi}(bx) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^5*erfi(b*x),x)
```

```
[Out] int(exp(b^2*x^2+c)*x^5*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5 \operatorname{erfi}(bx) e^{(b^2x^2+c)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^5*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x^5*erfi(b*x)*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.56, size = 206, normalized size = 1.43

$$\operatorname{erfi}(b\,x)\left(\frac{e^{b^2\,x^2+c}}{b^6}+\frac{x^4\,e^{b^2\,x^2+c}}{2\,b^2}-\frac{x^2\,e^{b^2\,x^2+c}}{b^4}\right)-\frac{3\,x^5\,e^c}{8\,b\,{\left(-2\,b^2\,x^2\right)}^{5/2}}+\frac{11\,x\,e^{2\,b^2\,x^2+c}}{16\,b^5\,\sqrt{\pi}}-\frac{x^3\,e^{2\,b^2\,x^2+c}}{4\,b^3\,\sqrt{\pi}}-\frac{\sqrt{2}\,e^c\,\operatorname{erfi}\left(\sqrt{2}\,x\,\sqrt{b}\right.}{8\,b^3\,{\left(b^2\right)}^{3/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*exp(c + b^2*x^2)*erfi(b*x),x)
```

```
[Out] erfi(b*x)*(exp(c + b^2*x^2)/b^6 + (x^4*exp(c + b^2*x^2))/(2*b^2) - (x^2*exp
(c + b^2*x^2))/b^4) - (3*x^5*exp(c))/(8*b*(-2*b^2*x^2)^(5/2)) + (11*x*exp(c
 + 2*b^2*x^2))/(16*b^5*pi^(1/2)) - (x^3*exp(c + 2*b^2*x^2))/(4*b^3*pi^(1/2)
) - (2^(1/2)*exp(c)*erfi(2^(1/2)*x*(b^2)^(1/2)))/(8*b^3*(b^2)^(3/2)) + (3*x
^5*exp(c)*erfc((-2*b^2*x^2)^(1/2)))/(8*b*(-2*b^2*x^2)^(5/2)) - (2^(1/2)*erf
(2^(1/2)*x*(-b^2)^(1/2))*exp(c))/(2*b*(-b^2)^(5/2))
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int x^{5}e^{b^{2}x^{2}}\operatorname{erfi}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**5*erfi(b*x),x)
```

```
[Out] exp(c)*Integral(x**5*exp(b**2*x**2)*erfi(b*x), x)
```

3.284 $\int e^{c+b^2x^2}x^3\,\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=97

$$\frac{5e^c\text{erfi}\left(\sqrt{2}\,bx\right)}{8\sqrt{2}\,b^4}+\frac{x^2e^{b^2x^2+c}\text{erfi}(bx)}{2b^2}-\frac{e^{b^2x^2+c}\text{erfi}(bx)}{2b^4}-\frac{xe^{2b^2x^2+c}}{4\sqrt{\pi}\,b^3}$$

```
[Out] -1/2*exp(b^2*x^2+c)*erfi(b*x)/b^4+1/2*exp(b^2*x^2+c)*x^2*erfi(b*x)/b^2+5/16
*exp(c)*erfi(b*x*2^(1/2))/b^4*2^(1/2)-1/4*exp(2*b^2*x^2+c)*x/b^3/Pi^(1/2)
```

Rubi [A] time = 0.11, antiderivative size = 97, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.210, Rules used = {6387, 6384, 2204, 2212}

$$\frac{x^2e^{b^2x^2+c}\text{Erfi}(bx)}{2b^2}-\frac{e^{b^2x^2+c}\text{Erfi}(bx)}{2b^4}+\frac{5e^c\text{Erfi}\left(\sqrt{2}\,bx\right)}{8\sqrt{2}\,b^4}-\frac{xe^{2b^2x^2+c}}{4\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^3*Erfi[b*x],x]
```

```
[Out] -(E^(c + 2*b^2*x^2)*x)/(4*b^3*Sqrt[Pi]) - (E^(c + b^2*x^2)*Erfi[b*x])/(2*b^
4) + (E^(c + b^2*x^2)*x^2*Erfi[b*x])/(2*b^2) + (5*E^c*Erfi[Sqrt[2]*b*x])/(8
*Sqrt[2]*b^4)
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
 0])
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
```

```
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x^3\text{erfi}(bx)\,dx &= \frac{e^{c+b^2x^2}x^2\text{erfi}(bx)}{2b^2}-\frac{\int e^{c+b^2x^2}x\text{erfi}(bx)\,dx}{b^2}-\frac{\int e^{c+2b^2x^2}x^2\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^{c+2b^2x^2}x}{4b^3\sqrt{\pi}}-\frac{e^{c+b^2x^2}\text{erfi}(bx)}{2b^4}+\frac{e^{c+b^2x^2}x^2\text{erfi}(bx)}{2b^2}+\frac{\int e^{c+2b^2x^2}\,dx}{4b^3\sqrt{\pi}}+\frac{\int e^{c+2b^2x^2}\,dx}{b^3\sqrt{\pi}}\\ &= -\frac{e^{c+2b^2x^2}x}{4b^3\sqrt{\pi}}-\frac{e^{c+b^2x^2}\text{erfi}(bx)}{2b^4}+\frac{e^{c+b^2x^2}x^2\text{erfi}(bx)}{2b^2}+\frac{5e^c\text{erfi}\left(\sqrt{2}\,bx\right)}{8\sqrt{2}\,b^4}\end{aligned}$$

Mathematica [A] time = 0.05, size = 77, normalized size = 0.79

$$\frac{e^c\left(8\sqrt{\pi}\,e^{b^2x^2}\left(b^2x^2-1\right)\text{erfi}(bx)-4bxe^{2b^2x^2}+5\sqrt{2\pi}\,\text{erfi}\left(\sqrt{2}\,bx\right)\right)}{16\sqrt{\pi}\,b^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x^3*Erfi[b*x],x]
```

```
[Out] (E^c*(-4*b*E^(2*b^2*x^2)*x + 8*E^(b^2*x^2)*Sqrt[Pi]*(-1 + b^2*x^2)*Erfi[b*x
] + 5*Sqrt[2*Pi]*Erfi[Sqrt[2]*b*x]))/(16*b^4*Sqrt[Pi])
```

fricas [A] time = 0.47, size = 82, normalized size = 0.85

$$-\frac{4\sqrt{\pi}\,b^2xe^{\left(2\,b^2x^2+c\right)}-5\sqrt{2}\,\pi\sqrt{b^2}\,\text{erfi}\left(\sqrt{2}\sqrt{b^2}\,x\right)e^c-8\left(\pi b^3x^2-\pi b\right)\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}}{16\,\pi b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^3*erfi(b*x),x, algorithm="fricas")
```

```
[Out] -1/16*(4*sqrt(pi)*b^2*x*e^(2*b^2*x^2 + c) - 5*sqrt(2)*pi*sqrt(b^2)*erfi(sqr
t(2)*sqrt(b^2)*x)*e^c - 8*(pi*b^3*x^2 - pi*b)*erfi(b*x)*e^(b^2*x^2 + c))/(p
i*b^5)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{erfi}(bx)e^{(b^2x^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^3*erfi(b*x),x, algorithm="giac")
[Out] integrate(x^3*erfi(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.19, size = 0, normalized size = 0.00

$$\int e^{b^2x^2+c}x^3 \operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^3*erfi(b*x),x)
[Out] int(exp(b^2*x^2+c)*x^3*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{erfi}(bx)e^{(b^2x^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^3*erfi(b*x),x, algorithm="maxima")
[Out] integrate(x^3*erfi(b*x)*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.44, size = 117, normalized size = 1.21

$$\frac{\sqrt{2}\,e^c \operatorname{erfi}\left(\sqrt{2}\,x\,\sqrt{b^2}\right)}{16\,b\left(b^2\right)^{3/2}}-\frac{x\,e^{2\,b^2\,x^2+c}}{4\,b^3\,\sqrt{\pi}}-\operatorname{erfi}(b\,x)\left(\frac{e^{b^2\,x^2+c}}{2\,b^4}-\frac{x^2\,e^{b^2\,x^2+c}}{2\,b^2}\right)-\frac{\sqrt{2}\,\operatorname{erf}\left(\sqrt{2}\,x\,\sqrt{-b^2}\right)\,e^c}{4\,b\left(-b^2\right)^{3/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*exp(c + b^2*x^2)*erfi(b*x),x)
[Out] (2^(1/2)*exp(c)*erfi(2^(1/2)*x*(b^2)^(1/2)))/(16*b*(b^2)^(3/2)) - (x*exp(c
+ 2*b^2*x^2))/(4*b^3*pi^(1/2)) - erfi(b*x)*(exp(c + b^2*x^2)/(2*b^4) - (x^2
```

```
*exp(c + b^2*x^2))/(2*b^2)) - (2^(1/2)*erf(2^(1/2)*x*(-b^2)^(1/2))*exp(c))/
(4*b*(-b^2)^(3/2))
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int x^{3}e^{b^{2}x^{2}}\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**3*erfi(b*x),x)
```

```
[Out] exp(c)*Integral(x**3*exp(b**2*x**2)*erfi(b*x), x)
```

3.285 $\int e^{c+b^2x^2} x\,\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=47

$$\frac{e^{b^2x^2+c}\text{erfi}(bx)}{2b^2}-\frac{e^c\text{erfi}\left(\sqrt{2}\,bx\right)}{2\sqrt{2}\,b^2}$$

```
[Out] 1/2*exp(b^2*x^2+c)*erfi(b*x)/b^2-1/4*exp(c)*erfi(b*x*2^(1/2))/b^2*2^(1/2)
```

Rubi [A] time = 0.04, antiderivative size = 47, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {6384, 2204}

$$\frac{e^{b^2x^2+c}\text{Erfi}(bx)}{2b^2}-\frac{e^c\text{Erfi}\left(\sqrt{2}\,bx\right)}{2\sqrt{2}\,b^2}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x*Erfi[b*x],x]
```

```
[Out] (E^(c + b^2*x^2)*Erfi[b*x])/(2*b^2) - (E^c*Erfi[Sqrt[2]*b*x])/(2*Sqrt[2]*b^
2)
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x\text{erfi}(bx)\,dx&=\frac{e^{c+b^2x^2}\text{erfi}(bx)}{2b^2}-\frac{\int e^{c+2b^2x^2}\,dx}{b\sqrt{\pi}}\\&=\frac{e^{c+b^2x^2}\text{erfi}(bx)}{2b^2}-\frac{e^c\text{erfi}\left(\sqrt{2}\,bx\right)}{2\sqrt{2}\,b^2}\end{aligned}$$

Mathematica [A] time = 0.01, size = 42, normalized size = 0.89

$$\frac{e^c\left(2e^{b^2x^2}\operatorname{erfi}(bx)-\sqrt{2}\operatorname{erfi}\left(\sqrt{2}\,bx\right)\right)}{4b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x*Erfi[b*x],x]
```

```
[Out] (E^c*(2*E^(b^2*x^2)*Erfi[b*x] - Sqrt[2]*Erfi[Sqrt[2]*b*x]))/(4*b^2)
```

fricas [A] time = 1.22, size = 46, normalized size = 0.98

$$\frac{2\,b\operatorname{erfi}(bx)\,e^{\left(b^2x^2+c\right)}-\sqrt{2}\,\sqrt{b^2}\,\operatorname{erfi}\left(\sqrt{2}\,\sqrt{b^2}\,x\right)e^c}{4\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x*erfi(b*x),x, algorithm="fricas")
```

```
[Out] 1/4*(2*b*erfi(b*x)*e^(b^2*x^2 + c) - sqrt(2)*sqrt(b^2)*erfi(sqrt(2)*sqrt(b^
2)*x)*e^c)/b^3
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\operatorname{erfi}(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x*erfi(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.20, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{b^2x^2+c}x\operatorname{erfi}(bx)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x*erfi(b*x),x)
```

```
[Out] int(exp(b^2*x^2+c)*x*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\operatorname{erfi}(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x*erfi(b*x)*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.28, size = 50, normalized size = 1.06

$$\frac{e^{b^2 x^2} e^c \operatorname{erfi}(b x)}{2 b^2} - \frac{\sqrt{2} \operatorname{erf}\left(\sqrt{2}\, x \sqrt{-b^2}\right) e^c}{4 b \sqrt{-b^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(c + b^2*x^2)*erfi(b*x),x)
```

```
[Out] (exp(b^2*x^2)*exp(c)*erfi(b*x))/(2*b^2) - (2^(1/2)*erf(2^(1/2)*x*(-b^2)^(1/
2))*exp(c))/(4*b*(-b^2)^(1/2))
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$e^c \int x e^{b^2 x^2} \operatorname{erfi}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x*erfi(b*x),x)
```

```
[Out] exp(c)*Integral(x*exp(b**2*x**2)*erfi(b*x), x)
```

3.286 $\int \frac{e^{c+b^2x^2}\,\mathbf{erfi}(bx)}{x}\,dx$

Optimal. Leaf size=22

$$\mathrm{Int}\left(\frac{e^{b^2x^2+c}\mathrm{erfi}(bx)}{x},x\right)$$

```
[Out] Unintegrable(exp(b^2*x^2+c)*erfi(b*x)/x,x)
```

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+b^2x^2}\mathrm{Erfi}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + b^2*x^2)*Erfi[b*x])/x,x]
```

```
[Out] Defer[Int][(E^(c + b^2*x^2)*Erfi[b*x])/x, x]
```

Rubi steps

$$\int \frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{x}\,dx = \int \frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{x}\,dx$$

Mathematica [A] time = 0.09, size = 0, normalized size = 0.00

$$\int \frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + b^2*x^2)*Erfi[b*x])/x,x]
```

```
[Out] Integrate[(E^(c + b^2*x^2)*Erfi[b*x])/x, x]
```

fricas [A] time = 0.43, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x,x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(b^2*x^2 + c)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\, e^{(b^2x^2+c)}}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x, x)
```

maple [A] time = 0.04, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^2x^2+c} \operatorname{erfi}(bx)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfi(b*x)/x,x)
[Out] int(exp(b^2*x^2+c)*erfi(b*x)/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}(bx)\, e^{(b^2x^2+c)}}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x,x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\mathrm{e}^{b^2\,x^2+c} \operatorname{erfi}(b\,x)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfi(b*x))/x,x)
[Out] int((exp(c + b^2*x^2)*erfi(b*x))/x, x)
```

<u>**sympy**</u> **[A]** time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{b^{2}x^{2}}\operatorname{erfi}\left(bx\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfi(b*x)/x,x)
```

```
[Out] exp(c)*Integral(exp(b**2*x**2)*erfi(b*x)/x, x)
```

3.287 $\int \frac{e^{c+b^2x^2}\mathbf{erfi}(bx)}{x^3}\,dx$

Optimal. Leaf size=93

$$b^2\text{Int}\left(\frac{e^{b^2x^2+c}\text{erfi}(bx)}{x},x\right)-\frac{e^{b^2x^2+c}\text{erfi}(bx)}{2x^2}+\sqrt{2}\,b^2e^c\text{erfi}\left(\sqrt{2}\,bx\right)-\frac{be^{2b^2x^2+c}}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*exp(b^2*x^2+c)*erfi(b*x)/x^2+b^2*exp(c)*erfi(b*x*2^(1/2))*2^(1/2)-b*ex
p(2*b^2*x^2+c)/x/Pi^(1/2)+b^2*Unintegrable(exp(b^2*x^2+c)*erfi(b*x)/x,x)
```

Rubi [A] time = 0.11, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+b^2x^2}\text{Erfi}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + b^2*x^2)*Erfi[b*x])/x^3,x]
```

```
[Out] -((b*E^(c + 2*b^2*x^2))/(Sqrt[Pi]*x)) - (E^(c + b^2*x^2)*Erfi[b*x])/(2*x^2)
 + Sqrt[2]*b^2*E^c*Erfi[Sqrt[2]*b*x] + b^2*Defer[Int][(E^(c + b^2*x^2)*Erfi
[b*x])/x, x]
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{c+b^2x^2}\text{erfi}(bx)}{x^3}\,dx &= -\frac{e^{c+b^2x^2}\text{erfi}(bx)}{2x^2}+b^2\int \frac{e^{c+b^2x^2}\text{erfi}(bx)}{x}\,dx+\frac{b\int \frac{e^{c+2b^2x^2}}{x^2}\,dx}{\sqrt{\pi}}\\
&= -\frac{be^{c+2b^2x^2}}{\sqrt{\pi}\,x}-\frac{e^{c+b^2x^2}\text{erfi}(bx)}{2x^2}+b^2\int \frac{e^{c+b^2x^2}\text{erfi}(bx)}{x}\,dx+\frac{\left(4b^3\right)\int e^{c+2b^2x^2}\,dx}{\sqrt{\pi}}\\
&= -\frac{be^{c+2b^2x^2}}{\sqrt{\pi}\,x}-\frac{e^{c+b^2x^2}\text{erfi}(bx)}{2x^2}+\sqrt{2}\,b^2e^c\text{erfi}\left(\sqrt{2}\,bx\right)+b^2\int \frac{e^{c+b^2x^2}\text{erfi}(bx)}{x}\,dx
\end{aligned}$$

Mathematica [A] time = 0.17, size = 0, normalized size = 0.00

$$\int \frac{e^{c+b^2x^2}\text{erfi}(bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + b^2*x^2)*Erfi[b*x])/x^3,x]
[Out] Integrate[(E^(c + b^2*x^2)*Erfi[b*x])/x^3, x]
```

fricas [A] time = 0.48, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^3,x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(b^2*x^2 + c)/x^3, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^3,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x^3, x)
```

maple [A] time = 0.21, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^2x^2+c}\,\text{erfi}\,(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfi(b*x)/x^3,x)
[Out] int(exp(b^2*x^2+c)*erfi(b*x)/x^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^3,x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x^3, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{b^2\,x^2+c}\,\mathrm{erfi}\left(b\,x\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfi(b*x))/x^3,x)
[Out] int((exp(c + b^2*x^2)*erfi(b*x))/x^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^c \int \frac{e^{b^2x^2}\,\mathrm{erfi}\,(bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfi(b*x)/x**3,x)
[Out] exp(c)*Integral(exp(b**2*x**2)*erfi(b*x)/x**3, x)
```

3.288 $\int \frac{e^{c+b^2x^2}\,\mathbf{erfi}(bx)}{x^5}\,dx$

Optimal. Leaf size=174

$$\frac{1}{2}b^4\mathrm{Int}\left(\frac{e^{b^2x^2+c}\mathrm{erfi}(bx)}{x},x\right)+\frac{2}{3}\sqrt{2}\,b^4e^c\mathrm{erfi}\left(\sqrt{2}\,bx\right)+\frac{b^4e^c\mathrm{erfi}\left(\sqrt{2}\,bx\right)}{\sqrt{2}}-\frac{b^2e^{b^2x^2+c}\mathrm{erfi}(bx)}{4x^2}-\frac{e^{b^2x^2+c}\mathrm{erfi}(bx)}{4x^4}-\frac{be^{2b^2x^2+c}}{6\sqrt{\pi}\,x^3}$$

```
[Out] -1/4*exp(b^2*x^2+c)*erfi(b*x)/x^4-1/4*b^2*exp(b^2*x^2+c)*erfi(b*x)/x^2+7/6*
b^4*exp(c)*erfi(b*x*2^(1/2))*2^(1/2)-1/6*b*exp(2*b^2*x^2+c)/x^3/Pi^(1/2)-7/
6*b^3*exp(2*b^2*x^2+c)/x/Pi^(1/2)+1/2*b^4*Unintegrable(exp(b^2*x^2+c)*erfi(
b*x)/x,x)
```

Rubi [A] time = 0.22, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+b^2x^2}\mathrm{Erfi}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + b^2*x^2)*Erfi[b*x])/x^5,x]
```

```
[Out] -(b*E^(c + 2*b^2*x^2))/(6*Sqrt[Pi]*x^3) - (7*b^3*E^(c + 2*b^2*x^2))/(6*Sqrt
[Pi]*x) - (E^(c + b^2*x^2)*Erfi[b*x])/(4*x^4) - (b^2*E^(c + b^2*x^2)*Erfi[b
*x])/(4*x^2) + (b^4*E^c*Erfi[Sqrt[2]*b*x])/Sqrt[2] + (2*Sqrt[2]*b^4*E^c*Erf
i[Sqrt[2]*b*x])/3 + (b^4*Defer[Int][(E^(c + b^2*x^2)*Erfi[b*x])/x, x])/2
```

Rubi steps

$$\begin{aligned}
\int \frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{x^5}\,dx &= -\frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{4x^4}+\frac{1}{2}b^2\int \frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{x^3}\,dx+\frac{b\int \frac{e^{c+2b^2x^2}}{x^4}\,dx}{2\sqrt{\pi}}\\
&= -\frac{be^{c+2b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{4x^4}-\frac{b^2e^{c+b^2x^2}\mathrm{erfi}(bx)}{4x^2}+\frac{1}{2}b^4\int \frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{x}\,dx+\frac{b^3\int \frac{e^{c+2b^2x^2}}{x^2}}{2\sqrt{\pi}}\\
&= -\frac{be^{c+2b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{7b^3e^{c+2b^2x^2}}{6\sqrt{\pi}\,x}-\frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{4x^4}-\frac{b^2e^{c+b^2x^2}\mathrm{erfi}(bx)}{4x^2}+\frac{1}{2}b^4\int \frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{x}\,dx\\
&= -\frac{be^{c+2b^2x^2}}{6\sqrt{\pi}\,x^3}-\frac{7b^3e^{c+2b^2x^2}}{6\sqrt{\pi}\,x}-\frac{e^{c+b^2x^2}\mathrm{erfi}(bx)}{4x^4}-\frac{b^2e^{c+b^2x^2}\mathrm{erfi}(bx)}{4x^2}+\frac{b^4e^c\mathrm{erfi}\left(\sqrt{2}\,bx\right)}{\sqrt{2}}+\frac{2}{3}\sqrt{2}\,b
\end{aligned}$$

Mathematica [A] time = 0.22, size = 0, normalized size = 0.00

$$\int \frac{e^{c+b^2x^2}\text{erfi}(bx)}{x^5}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + b^2*x^2)*Erfi[b*x])/x^5,x]
[Out] Integrate[(E^(c + b^2*x^2)*Erfi[b*x])/x^5, x]
```

fricas [A] time = 0.57, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x^5},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^5,x, algorithm="fricas")
[Out] integral(erfi(b*x)*e^(b^2*x^2 + c)/x^5, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^5,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x^5, x)
```

maple [A] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{e^{b^2x^2+c}\,\text{erfi}\,(bx)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfi(b*x)/x^5,x)
[Out] int(exp(b^2*x^2+c)*erfi(b*x)/x^5,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^5,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x^5, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{e^{b^2 x^2+c} \operatorname{erfi}(b x)}{x^5} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfi(b*x))/x^5,x)
```

```
[Out] int((exp(c + b^2*x^2)*erfi(b*x))/x^5, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c} \int \frac{e^{b^{2} x^{2}} \operatorname{erfi}(bx)}{x^{5}} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfi(b*x)/x**5,x)
```

```
[Out] exp(c)*Integral(exp(b**2*x**2)*erfi(b*x)/x**5, x)
```

3.289 $\int e^{c+b^2x^2} x^4 \mathbf{erfi}(bx)\, dx$

Optimal. Leaf size=121

$$\frac{3\sqrt{\pi}\, e^c \text{erfi}(bx)^2}{16b^5} + \frac{x^3 e^{b^2x^2+c} \text{erfi}(bx)}{2b^2} + \frac{e^{2b^2x^2+c}}{2\sqrt{\pi}\, b^5} - \frac{3x e^{b^2x^2+c} \text{erfi}(bx)}{4b^4} - \frac{x^2 e^{2b^2x^2+c}}{4\sqrt{\pi}\, b^3}$$

```
[Out] -3/4*exp(b^2*x^2+c)*x*erfi(b*x)/b^4+1/2*exp(b^2*x^2+c)*x^3*erfi(b*x)/b^2+1/
2*exp(2*b^2*x^2+c)/b^5/Pi^(1/2)-1/4*exp(2*b^2*x^2+c)*x^2/b^3/Pi^(1/2)+3/16*
exp(c)*erfi(b*x)^2*Pi^(1/2)/b^5
```

Rubi [A] time = 0.16, antiderivative size = 121, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {6387, 6375, 30, 2209, 2212}

$$\frac{x^3 e^{b^2x^2+c} \text{Erfi}(bx)}{2b^2} - \frac{3x e^{b^2x^2+c} \text{Erfi}(bx)}{4b^4} + \frac{3\sqrt{\pi}\, e^c \text{Erfi}(bx)^2}{16b^5} - \frac{x^2 e^{2b^2x^2+c}}{4\sqrt{\pi}\, b^3} + \frac{e^{2b^2x^2+c}}{2\sqrt{\pi}\, b^5}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^4*Erfi[b*x],x]
```

```
[Out] E^(c + 2*b^2*x^2)/(2*b^5*Sqrt[Pi]) - (E^(c + 2*b^2*x^2)*x^2)/(4*b^3*Sqrt[Pi
]) - (3*E^(c + b^2*x^2)*x*Erfi[b*x])/(4*b^4) + (E^(c + b^2*x^2)*x^3*Erfi[b*
x])/(2*b^2) + (3*E^c*Sqrt[Pi]*Erfi[b*x]^2)/(16*b^5)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 2212

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m - n + 1)*F^(a + b*(c + d*x)^n))/(b*d*n*
Log[F]), x] - Dist[(m - n + 1)/(b*n*Log[F]), Int[(c + d*x)^(m - n)*F^(a + b
*(c + d*x)^n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/
n] && LtQ[0, (m + 1)/n, 5] && IntegerQ[n] && (LtQ[0, n, m + 1] || LtQ[m, n,
```

```
0])
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{c+b^2x^2}x^4\text{erfi}(bx)\,dx = \frac{e^{c+b^2x^2}x^3\text{erfi}(bx)}{2b^2} - \frac{3\int e^{c+b^2x^2}x^2\text{erfi}(bx)\,dx}{2b^2} - \frac{\int e^{c+2b^2x^2}x^3\,dx}{b\sqrt{\pi}}$$

$$= -\frac{e^{c+2b^2x^2}x^2}{4b^3\sqrt{\pi}} - \frac{3e^{c+b^2x^2}x\text{erfi}(bx)}{4b^4} + \frac{e^{c+b^2x^2}x^3\text{erfi}(bx)}{2b^2} + \frac{3\int e^{c+b^2x^2}\text{erfi}(bx)\,dx}{4b^4} + \frac{\int e^{c+2b^2x^2}}{2b^3\sqrt{}}$$

$$= \frac{e^{c+2b^2x^2}}{2b^5\sqrt{\pi}} - \frac{e^{c+2b^2x^2}x^2}{4b^3\sqrt{\pi}} - \frac{3e^{c+b^2x^2}x\text{erfi}(bx)}{4b^4} + \frac{e^{c+b^2x^2}x^3\text{erfi}(bx)}{2b^2} + \frac{\left(3e^c\sqrt{\pi}\right)\text{Subst}(\int x\,dx, x}{8b^5}$$

$$= \frac{e^{c+2b^2x^2}}{2b^5\sqrt{\pi}} - \frac{e^{c+2b^2x^2}x^2}{4b^3\sqrt{\pi}} - \frac{3e^{c+b^2x^2}x\text{erfi}(bx)}{4b^4} + \frac{e^{c+b^2x^2}x^3\text{erfi}(bx)}{2b^2} + \frac{3e^c\sqrt{\pi}\,\text{erfi}(bx)^2}{16b^5}$$

Mathematica [A] time = 0.05, size = 78, normalized size = 0.64

$$\frac{e^c\left(4\sqrt{\pi}\,bxe^{b^2x^2}\left(2b^2x^2-3\right)\text{erfi}(bx)-4e^{2b^2x^2}\left(b^2x^2-2\right)+3\pi\text{erfi}(bx)^2\right)}{16\sqrt{\pi}\,b^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x^4*Erfi[b*x],x]
```

```
[Out] (E^c*(-4*E^(2*b^2*x^2)*(-2 + b^2*x^2) + 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*(-3 + 2*
b^2*x^2)*Erfi[b*x] + 3*Pi*Erfi[b*x]^2))/(16*b^5*Sqrt[Pi])
```

fricas [A] time = 0.54, size = 74, normalized size = 0.61

$$\frac{\left(4\left(2\,\pi b^{3}x^{3}-3\,\pi bx\right)\operatorname{erfi}\left(bx\right)e^{\left(b^{2}x^{2}\right)}+\sqrt{\pi}\left(3\,\pi\operatorname{erfi}\left(bx\right)^{2}-4\left(b^{2}x^{2}-2\right)e^{\left(2\,b^{2}x^{2}\right)}\right)\right)e^{c}}{16\,\pi b^{5}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^4*erfi(b*x),x, algorithm="fricas")
```

```
[Out] 1/16*(4*(2*pi*b^3*x^3 - 3*pi*b*x)*erfi(b*x)*e^(b^2*x^2) + sqrt(pi)*(3*pi*er
fi(b*x)^2 - 4*(b^2*x^2 - 2)*e^(2*b^2*x^2)))*e^c/(pi*b^5)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^{4}\operatorname{erfi}\left(bx\right)e^{\left(b^{2}x^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^4*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^4*erfi(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.06, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{b^{2}x^{2}+c}x^{4}\operatorname{erfi}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^4*erfi(b*x),x)
```

```
[Out] int(exp(b^2*x^2+c)*x^4*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^{4}\operatorname{erfi}\left(bx\right)e^{\left(b^{2}x^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^4*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x^4*erfi(b*x)*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.50, size = 126, normalized size = 1.04

$$\operatorname{erfi}\left(b\,x\right)\left(\frac{x^{3}\,\mathrm{e}^{b^{2}\,x^{2}+c}}{2\,b^{2}}-\frac{3\,x\,\mathrm{e}^{b^{2}\,x^{2}+c}}{4\,b^{4}}+\frac{3\,\sqrt{\pi}\,\operatorname{erfi}\left(\frac{b^{2}\,x}{\sqrt{b^{2}}}\right)\,\mathrm{e}^{c}}{8\,{\left(b^{2}\right)}^{5/2}}\right)+\frac{8\,\mathrm{e}^{2\,b^{2}\,x^{2}+c}-3\,\pi\,\operatorname{erfi}{\left(\frac{b^{2}\,x}{\sqrt{b^{2}}}\right)}^{2}\,\mathrm{e}^{c}}{16\,b^{5}\,\sqrt{\pi}}-\frac{x^{2}\,\mathrm{e}^{2\,b^{2}\,x^{2}+c}}{4\,b^{3}\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*exp(c + b^2*x^2)*erfi(b*x),x)
```

```
[Out] erfi(b*x)*((x^3*exp(c + b^2*x^2))/(2*b^2) - (3*x*exp(c + b^2*x^2))/(4*b^4)
+ (3*pi^(1/2)*erfi((b^2*x)/(b^2)^(1/2))*exp(c))/(8*(b^2)^(5/2))) + (8*exp(c
 + 2*b^2*x^2) - 3*pi*erfi((b^2*x)/(b^2)^(1/2))^2*exp(c))/(16*b^5*pi^(1/2))
- (x^2*exp(c + 2*b^2*x^2))/(4*b^3*pi^(1/2))
```

sympy [A] time = 19.83, size = 124, normalized size = 1.02

$$\begin{cases} \frac{x^3e^ce^{b^2x^2}\operatorname{erfi}(bx)}{2b^2} - \frac{x^2e^ce^{2b^2x^2}}{4\sqrt{\pi}\,b^3} - \frac{3xe^ce^{b^2x^2}\operatorname{erfi}(bx)}{4b^4} + \frac{e^ce^{2b^2x^2}}{2\sqrt{\pi}\,b^5} + \frac{3\sqrt{\pi}\,e^c\operatorname{erfi}^2(bx)}{16b^5} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**4*erfi(b*x),x)
```

```
[Out] Piecewise((x**3*exp(c)*exp(b**2*x**2)*erfi(b*x)/(2*b**2) - x**2*exp(c)*exp(
2*b**2*x**2)/(4*sqrt(pi)*b**3) - 3*x*exp(c)*exp(b**2*x**2)*erfi(b*x)/(4*b**
4) + exp(c)*exp(2*b**2*x**2)/(2*sqrt(pi)*b**5) + 3*sqrt(pi)*exp(c)*erfi(b*x
)**2/(16*b**5), Ne(b, 0)), (0, True))
```

3.290 $\int e^{c+b^2x^2}x^2\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=69

$$-\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)^2}{8b^3}+\frac{xe^{b^2x^2+c}\text{erfi}(bx)}{2b^2}-\frac{e^{2b^2x^2+c}}{4\sqrt{\pi}\,b^3}$$

```
[Out] 1/2*exp(b^2*x^2+c)*x*erfi(b*x)/b^2-1/4*exp(2*b^2*x^2+c)/b^3/Pi^(1/2)-1/8*ex
p(c)*erfi(b*x)^2*Pi^(1/2)/b^3
```

Rubi [A] time = 0.08, antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.210, Rules used = {6387, 6375, 30, 2209}

$$\frac{xe^{b^2x^2+c}\text{Erfi}(bx)}{2b^2}-\frac{\sqrt{\pi}\,e^c\text{Erfi}(bx)^2}{8b^3}-\frac{e^{2b^2x^2+c}}{4\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*x^2*Erfi[b*x],x]
```

```
[Out] -E^(c + 2*b^2*x^2)/(4*b^3*Sqrt[Pi]) + (E^(c + b^2*x^2)*x*Erfi[b*x])/(2*b^2)
 - (E^c*Sqrt[Pi]*Erfi[b*x]^2)/(8*b^3)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2209

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^n*F^(a + b*(c + d*x)^n))/(b*f*n*(c + d*x)^
n*Log[F]), x] /; FreeQ[{F, a, b, c, d, e, f, n}, x] && EqQ[m, n - 1] && EqQ
[d*e - c*f, 0]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
```

```
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}x^2\text{erfi}(bx)\,dx &= \frac{e^{c+b^2x^2}x\text{erfi}(bx)}{2b^2}-\frac{\int e^{c+b^2x^2}\text{erfi}(bx)\,dx}{2b^2}-\frac{\int e^{c+2b^2x^2}x\,dx}{b\sqrt{\pi}}\\ &= -\frac{e^{c+2b^2x^2}}{4b^3\sqrt{\pi}}+\frac{e^{c+b^2x^2}x\text{erfi}(bx)}{2b^2}-\frac{\left(e^c\sqrt{\pi}\right)\text{Subst}(\int x\,dx,x,\text{erfi}(bx))}{4b^3}\\ &= -\frac{e^{c+2b^2x^2}}{4b^3\sqrt{\pi}}+\frac{e^{c+b^2x^2}x\text{erfi}(bx)}{2b^2}-\frac{e^c\sqrt{\pi}\,\text{erfi}(bx)^2}{8b^3}\end{aligned}$$

Mathematica [A] time = 0.02, size = 58, normalized size = 0.84

$$-\frac{e^c\left(-4\sqrt{\pi}\,bxe^{b^2x^2}\text{erfi}(bx)+2e^{2b^2x^2}+\pi\text{erfi}(bx)^2\right)}{8\sqrt{\pi}\,b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*x^2*Erfi[b*x],x]
```

```
[Out] -1/8*(E^c*(2*E^(2*b^2*x^2) - 4*b*E^(b^2*x^2)*Sqrt[Pi]*x*Erfi[b*x] + Pi*Erfi
[b*x]^2))/(b^3*Sqrt[Pi])
```

fricas [A] time = 0.58, size = 53, normalized size = 0.77

$$\frac{\left(4\,\pi bx\,\text{erfi}\,(bx)\,e^{\left(b^2x^2\right)}-\sqrt{\pi}\left(\pi\,\text{erfi}\,(bx)^2+2\,e^{\left(2\,b^2x^2\right)}\right)\right)e^c}{8\,\pi b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^2*erfi(b*x),x, algorithm="fricas")
```

```
[Out] 1/8*(4*pi*b*x*erfi(b*x)*e^(b^2*x^2) - sqrt(pi)*(pi*erfi(b*x)^2 + 2*e^(2*b^2
*x^2)))*e^c/(pi*b^3)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^2*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(x^2*erfi(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.18, size = 0, normalized size = 0.00

$$\int e^{b^2x^2+c}x^2 \operatorname{erfi}(bx)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*x^2*erfi(b*x),x)
```

```
[Out] int(exp(b^2*x^2+c)*x^2*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{erfi}(bx)\, e^{\left(b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*x^2*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(x^2*erfi(b*x)*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.32, size = 86, normalized size = 1.25

$$\operatorname{erfi}(b\,x)\left(\frac{x\,e^{b^2\,x^2+c}}{2\,b^2}-\frac{\sqrt{\pi}\,\operatorname{erfi}\left(\frac{b^2\,x}{\sqrt{b^2}}\right)\,e^c}{4\,{\left(b^2\right)}^{3/2}}\right)-\frac{2\,e^{2\,b^2\,x^2+c}-\pi\,{\operatorname{erfi}\left(\frac{b^2\,x}{\sqrt{b^2}}\right)}^2\,e^c}{8\,b^3\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(c + b^2*x^2)*erfi(b*x),x)
```

```
[Out] erfi(b*x)*((x*exp(c + b^2*x^2))/(2*b^2) - (pi^(1/2)*erfi((b^2*x)/(b^2)^(1/2
))*exp(c))/(4*(b^2)^(3/2))) - (2*exp(c + 2*b^2*x^2) - pi*erfi((b^2*x)/(b^2)
^(1/2))^2*exp(c))/(8*b^3*pi^(1/2))
```

sympy [A] time = 3.79, size = 68, normalized size = 0.99

$$\begin{cases} \frac{xe^{c}e^{b^{2}x^{2}}\operatorname{erfi}{\left(bx \right)}}{2b^{2}} - \frac{e^{c}e^{2b^{2}x^{2}}}{4\sqrt{\pi}b^{3}} - \frac{\sqrt{\pi}e^{c}\operatorname{erfi}^{2}{\left(bx \right)}}{8b^{3}} & \text{for}\: b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*x**2*erfi(b*x),x)
```

```
[Out] Piecewise((x*exp(c)*exp(b**2*x**2)*erfi(b*x)/(2*b**2) - exp(c)*exp(2*b**2*x
**2)/(4*sqrt(pi)*b**3) - sqrt(pi)*exp(c)*erfi(b*x)**2/(8*b**3), Ne(b, 0)),
(0, True))
```

3.291 $\int e^{c+b^2x^2}\,\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=21

$$\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)^2}{4b}$$

```
[Out] 1/4*exp(c)*erfi(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.02, antiderivative size = 21, 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 = {6375, 30}

$$\frac{\sqrt{\pi}\,e^c\text{Erfi}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + b^2*x^2)*Erfi[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^2)/(4*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rubi steps

$$\begin{aligned}\int e^{c+b^2x^2}\text{erfi}(bx)\,dx &= \frac{\left(e^c\sqrt{\pi}\right)\text{Subst}\left(\int x\,dx, x, \text{erfi}(bx)\right)}{2b}\\ &= \frac{e^c\sqrt{\pi}\,\text{erfi}(bx)^2}{4b}\end{aligned}$$

Mathematica [A] time = 0.00, size = 21, normalized size = 1.00

$$\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)^2}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + b^2*x^2)*Erfi[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^2)/(4*b)
```

fricas [A] time = 0.42, size = 16, normalized size = 0.76

$$\frac{\sqrt{\pi}\ \operatorname{erfi}(bx)^2 e^c}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x),x, algorithm="fricas")
```

```
[Out] 1/4*sqrt(pi)*erfi(b*x)^2*e^c/b
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\, e^{\left(b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c), x)
```

maple [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{b^2x^2+c} \operatorname{erfi}(bx)\ dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfi(b*x),x)
```

```
[Out] int(exp(b^2*x^2+c)*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\, e^{\left(b^2x^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c), x)
```

mupad [B] time = 0.31, size = 91, normalized size = 4.33

$$\frac{\sqrt{\pi}\ \mathrm{erfi}\left(\frac{b^2\,x}{\sqrt{b^2}}\right)\,\mathrm{e}^c\,\mathrm{erfi}\left(b\,x\right)}{2\,\sqrt{b^2}}-\frac{\sqrt{\pi}\ \mathrm{e}^c\,\mathrm{erf}\left(x\,\sqrt{-b^2}\right)^2}{4\,b}-\frac{b\,\sqrt{\pi}\ \mathrm{erfi}\left(\frac{b^2\,x}{\sqrt{b^2}}\right)\,\mathrm{e}^c\,\mathrm{erf}\left(x\,\sqrt{-b^2}\right)}{2\,\sqrt{b^2}\,\sqrt{-b^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c + b^2*x^2)*erfi(b*x),x)
```

```
[Out] (pi^(1/2)*erfi((b^2*x)/(b^2)^(1/2))*exp(c)*erfi(b*x))/(2*(b^2)^(1/2)) - (pi
^(1/2)*exp(c)*erf(x*(-b^2)^(1/2))^2)/(4*b) - (b*pi^(1/2)*erfi((b^2*x)/(b^2)
^(1/2))*exp(c)*erf(x*(-b^2)^(1/2)))/(2*(b^2)^(1/2)*(-b^2)^(1/2))
```

sympy [A] time = 0.54, size = 19, normalized size = 0.90

$$\begin{cases} \frac{\sqrt{\pi} e^{c} \operatorname{erfi}^{2}{\left(b x \right)}}{4 b} & \text{for}\: b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfi(b*x),x)
```

```
[Out] Piecewise((sqrt(pi)*exp(c)*erfi(b*x)**2/(4*b), Ne(b, 0)), (0, True))
```

3.292 $\int \frac{e^{c+b^2x^2}\,\mathbf{erfi}(bx)}{x^2}\,dx$

Optimal. Leaf size=59

$$-\frac{e^{b^2x^2+c}\text{erfi}(bx)}{x}+\frac{be^c\text{Ei}\left(2b^2x^2\right)}{\sqrt{\pi}}+\frac{1}{2}\sqrt{\pi}\,be^c\text{erfi}(bx)^2$$

```
[Out] -exp(b^2*x^2+c)*erfi(b*x)/x+b*exp(c)*Ei(2*b^2*x^2)/Pi^(1/2)+1/2*b*exp(c)*er
fi(b*x)^2*Pi^(1/2)
```

Rubi [A] time = 0.08, antiderivative size = 59, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.210, Rules used = {6393, 6375, 30, 2210}

$$-\frac{e^{b^2x^2+c}\text{Erfi}(bx)}{x}+\frac{be^c\text{Ei}\left(2b^2x^2\right)}{\sqrt{\pi}}+\frac{1}{2}\sqrt{\pi}\,be^c\text{Erfi}(bx)^2$$

Antiderivative was successfully verified.

```
[In] Int[(E^(c + b^2*x^2)*Erfi[b*x])/x^2,x]
```

```
[Out] -((E^(c + b^2*x^2)*Erfi[b*x])/x) + (b*E^c*Sqrt[Pi]*Erfi[b*x]^2)/2 + (b*E^c*
ExpIntegralEi[2*b^2*x^2])/Sqrt[Pi]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
```

```
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{e^{c+b^2x^2}\text{erfi}(bx)}{x^2}\,dx &= -\frac{e^{c+b^2x^2}\text{erfi}(bx)}{x}+\left(2b^2\right)\int e^{c+b^2x^2}\text{erfi}(bx)\,dx+\frac{(2b)\int \frac{e^{c+2b^2x^2}}{x}\,dx}{\sqrt{\pi}}\\ &= -\frac{e^{c+b^2x^2}\text{erfi}(bx)}{x}+\frac{be^c\text{Ei}\left(2b^2x^2\right)}{\sqrt{\pi}}+\left(be^c\sqrt{\pi}\right)\text{Subst}(\int x\,dx,x,\text{erfi}(bx))\\ &= -\frac{e^{c+b^2x^2}\text{erfi}(bx)}{x}+\frac{1}{2}be^c\sqrt{\pi}\,\text{erfi}(bx)^2+\frac{be^c\text{Ei}\left(2b^2x^2\right)}{\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 0.03, size = 56, normalized size = 0.95

$$\frac{1}{2}e^c\left(-\frac{2e^{b^2x^2}\text{erfi}(bx)}{x}+\frac{2b\text{Ei}\left(2b^2x^2\right)}{\sqrt{\pi}}+\sqrt{\pi}\,b\text{erfi}(bx)^2\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(E^(c + b^2*x^2)*Erfi[b*x])/x^2,x]
```

```
[Out] (E^c*((-2*E^(b^2*x^2)*Erfi[b*x])/x + b*Sqrt[Pi]*Erfi[b*x]^2 + (2*b*ExpInteg
ralEi[2*b^2*x^2])/Sqrt[Pi]))/2
```

fricas [A] time = 0.44, size = 55, normalized size = 0.93

$$-\frac{\left(2\,\pi\,\text{erfi}\,(bx)\,e^{\left(b^2x^2\right)}-\sqrt{\pi}\left(\pi bx\,\text{erfi}\,(bx)^2+2\,bx\text{Ei}\left(2\,b^2x^2\right)\right)\right)e^c}{2\,\pi x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^2,x, algorithm="fricas")
```

```
[Out] -1/2*(2*pi*erfi(b*x)*e^(b^2*x^2) - sqrt(pi)*(pi*b*x*erfi(b*x)^2 + 2*b*x*Ei(
2*b^2*x^2)))*e^c/(pi*x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx)\,e^{\left(b^2x^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^2,x, algorithm="giac")
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x^2, x)
```

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^{2} x^{2}+c} \operatorname{erfi}\left(b x\right)}{x^{2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfi(b*x)/x^2,x)
[Out] int(exp(b^2*x^2+c)*erfi(b*x)/x^2,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(b x\right) e^{\left(b^{2} x^{2} + c\right)}}{x^{2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^2,x, algorithm="maxima")
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x^2, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{{\mathrm{e}}^{b^2\,x^2+c}\,\mathrm{erfi}\left(b\,x\right)}{x^2} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfi(b*x))/x^2,x)
[Out] int((exp(c + b^2*x^2)*erfi(b*x))/x^2, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$e^{c} \int \frac{e^{b^{2} x^{2}} \operatorname{erfi}{\left(b x \right)}}{x^{2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfi(b*x)/x**2,x)
[Out] exp(c)*Integral(exp(b**2*x**2)*erfi(b*x)/x**2, x)
```

3.293 $\int \frac{e^{c+b^2x^2}\mathbf{erfi}(bx)}{x^4}\,dx$

Optimal. Leaf size=118

$$\frac{1}{3}\sqrt{\pi}\,b^3e^c\mathrm{erfi}(bx)^2-\frac{2b^2e^{b^2x^2+c}\mathrm{erfi}(bx)}{3x}-\frac{e^{b^2x^2+c}\mathrm{erfi}(bx)}{3x^3}-\frac{be^{2b^2x^2+c}}{3\sqrt{\pi}\,x^2}+\frac{4b^3e^c\mathrm{Ei}\left(2b^2x^2\right)}{3\sqrt{\pi}}$$

```
[Out] -1/3*exp(b^2*x^2+c)*erfi(b*x)/x^3-2/3*b^2*exp(b^2*x^2+c)*erfi(b*x)/x-1/3*b*
exp(2*b^2*x^2+c)/x^2/Pi^(1/2)+4/3*b^3*exp(c)*Ei(2*b^2*x^2)/Pi^(1/2)+1/3*b^3
*exp(c)*erfi(b*x)^2*Pi^(1/2)
```

Rubi [A] time = 0.17, antiderivative size = 118, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {6393, 6375, 30, 2210, 2214}

$$-\frac{2b^2e^{b^2x^2+c}\mathrm{Erfi}(bx)}{3x}-\frac{e^{b^2x^2+c}\mathrm{Erfi}(bx)}{3x^3}+\frac{1}{3}\sqrt{\pi}\,b^3e^c\mathrm{Erfi}(bx)^2+\frac{4b^3e^c\mathrm{Ei}\left(2b^2x^2\right)}{3\sqrt{\pi}}-\frac{be^{2b^2x^2+c}}{3\sqrt{\pi}\,x^2}$$

Antiderivative was successfully verified.

```
[In] Int[(E^(c + b^2*x^2)*Erfi[b*x])/x^4,x]
```

```
[Out] -(b*E^(c + 2*b^2*x^2))/(3*Sqrt[Pi]*x^2) - (E^(c + b^2*x^2)*Erfi[b*x])/(3*x^
3) - (2*b^2*E^(c + b^2*x^2)*Erfi[b*x])/(3*x) + (b^3*E^c*Sqrt[Pi]*Erfi[b*x]^
2)/3 + (4*b^3*E^c*ExpIntegralEi[2*b^2*x^2])/(3*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2210

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x_)), x_
Symbol] :> Simp[(F^a*ExpIntegralEi[b*(c + d*x)^n*Log[F]])/(f*n), x] /; Free
Q[{F, a, b, c, d, e, f, n}, x] && EqQ[d*e - c*f, 0]
```

Rule 2214

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^(n_))*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Simp[((c + d*x)^(m + 1)*F^(a + b*(c + d*x)^n))/(d*(m + 1))
, x] - Dist[(b*n*Log[F])/(m + 1), Int[(c + d*x)^(m + n)*F^(a + b*(c + d*x)^
n), x], x] /; FreeQ[{F, a, b, c, d}, x] && IntegerQ[(2*(m + 1))/n] && LtQ[-
4, (m + 1)/n, 5] && IntegerQ[n] && ((GtQ[n, 0] && LtQ[m, -1]) || (GtQ[-n, 0
```

```
] && LeQ[-n, m + 1]))
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{e^{c+b^2x^2}\text{erfi}(bx)}{x^4}\,dx = -\frac{e^{c+b^2x^2}\text{erfi}(bx)}{3x^3}+\frac{1}{3}\left(2b^2\right)\int \frac{e^{c+b^2x^2}\text{erfi}(bx)}{x^2}\,dx+\frac{(2b)\int \frac{e^{c+2b^2x^2}}{x^3}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{be^{c+2b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+b^2x^2}\text{erfi}(bx)}{3x^3}-\frac{2b^2e^{c+b^2x^2}\text{erfi}(bx)}{3x}+\frac{1}{3}\left(4b^4\right)\int e^{c+b^2x^2}\text{erfi}(bx)\,dx+2\frac{\left(4b^3\right)}{}$$

$$= -\frac{be^{c+2b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+b^2x^2}\text{erfi}(bx)}{3x^3}-\frac{2b^2e^{c+b^2x^2}\text{erfi}(bx)}{3x}+\frac{4b^3e^c\text{Ei}\left(2b^2x^2\right)}{3\sqrt{\pi}}+\frac{1}{3}\left(2b^3e^c\sqrt{\pi}\right)\text{Subs}$$

$$= -\frac{be^{c+2b^2x^2}}{3\sqrt{\pi}\,x^2}-\frac{e^{c+b^2x^2}\text{erfi}(bx)}{3x^3}-\frac{2b^2e^{c+b^2x^2}\text{erfi}(bx)}{3x}+\frac{1}{3}b^3e^c\sqrt{\pi}\,\text{erfi}(bx)^2+\frac{4b^3e^c\text{Ei}\left(2b^2x^2\right)}{3\sqrt{\pi}}$$

Mathematica [A] time = 0.04, size = 91, normalized size = 0.77

$$-\frac{e^c\left(\pi\left(-b^3\right)x^3\text{erfi}(bx)^2+\sqrt{\pi}\,e^{b^2x^2}\left(2b^2x^2+1\right)\text{erfi}(bx)+bx\left(e^{2b^2x^2}-4b^2x^2\text{Ei}\left(2b^2x^2\right)\right)\right)}{3\sqrt{\pi}\,x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(E^(c + b^2*x^2)*Erfi[b*x])/x^4,x]
```

```
[Out] -1/3*(E^c*(E^(b^2*x^2)*Sqrt[Pi]*(1 + 2*b^2*x^2)*Erfi[b*x] - b^3*Pi*x^3*Erfi
[b*x]^2 + b*x*(E^(2*b^2*x^2) - 4*b^2*x^2*ExpIntegralEi[2*b^2*x^2])))/(Sqrt[
Pi]*x^3)
```

fricas [A] time = 0.43, size = 85, normalized size = 0.72

$$-\frac{\left(\left(\pi+2\,\pi b^{2}x^{2}\right)\operatorname{erfi}\left(bx\right)e^{\left(b^{2}x^{2}\right)}-\sqrt{\pi}\left(\pi b^{3}x^{3}\operatorname{erfi}\left(bx\right)^{2}+4\,b^{3}x^{3}\operatorname{Ei}\left(2\,b^{2}x^{2}\right)-bxe^{\left(2\,b^{2}x^{2}\right)}\right)\right)e^{c}}{3\,\pi x^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^4,x, algorithm="fricas")
```

```
[Out] -1/3*((pi + 2*pi*b^2*x^2)*erfi(b*x)*e^(b^2*x^2) - sqrt(pi)*(pi*b^3*x^3*erfi
(b*x)^2 + 4*b^3*x^3*Ei(2*b^2*x^2) - b*x*e^(2*b^2*x^2)))*e^c/(pi*x^3)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(bx\right)e^{\left(b^{2}x^{2}+c\right)}}{x^{4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^4,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x^4, x)
```

maple [F] time = 0.23, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{b^{2}x^{2}+c}\operatorname{erfi}\left(bx\right)}{x^{4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(b^2*x^2+c)*erfi(b*x)/x^4,x)
```

```
[Out] int(exp(b^2*x^2+c)*erfi(b*x)/x^4,x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(bx\right)e^{\left(b^{2}x^{2}+c\right)}}{x^{4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b^2*x^2+c)*erfi(b*x)/x^4,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x)*e^(b^2*x^2 + c)/x^4, x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{e}^{b^{2}\,x^{2}+c}\,\operatorname{erfi}\left(b\,x\right)}{x^{4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(c + b^2*x^2)*erfi(b*x))/x^4,x)
```

```
[Out] int((exp(c + b^2*x^2)*erfi(b*x))/x^4, x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{b^{2}x^{2}} \operatorname{erfi}\left(bx\right)}{x^{4}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b**2*x**2+c)*erfi(b*x)/x**4,x)
```

```
[Out] exp(c)*Integral(exp(b**2*x**2)*erfi(b*x)/x**4, x)
```

3.294 $\int e^{c+dx^2} x^3 \mathbf{erfi}(a+bx)\,dx$

Optimal. Leaf size=304

$$\frac{be^{\frac{a^2d}{b^2+d}+c}\operatorname{erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{2d^2\sqrt{b^2+d}}+\frac{be^{\frac{a^2d}{b^2+d}+c}\operatorname{erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{4d\left(b^2+d\right)^{3/2}}+\frac{ab^2e^{a^2+2abx+x^2(b^2+d)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)^2}-\frac{bxe^{a^2+2abx+x^2(b^2+d)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)}-\frac{a^2b^3e^{\frac{a^2d}{b^2+d}+c}\operatorname{erf}}{2d\left(b^2\right.}$$

```
[Out] -1/2*exp(d*x^2+c)*erfi(b*x+a)/d^2+1/2*exp(d*x^2+c)*x^2*erfi(b*x+a)/d-1/2*a^
2*b^3*exp(c+a^2*d/(b^2+d))*erfi((a*b+(b^2+d)*x)/(b^2+d)^(1/2))/d/(b^2+d)^(5
/2)+1/4*b*exp(c+a^2*d/(b^2+d))*erfi((a*b+(b^2+d)*x)/(b^2+d)^(1/2))/d/(b^2+d
)^(3/2)+1/2*b*exp(c+a^2*d/(b^2+d))*erfi((a*b+(b^2+d)*x)/(b^2+d)^(1/2))/d^2/
(b^2+d)^(1/2)+1/2*a*b^2*exp(a^2+c+2*a*b*x+(b^2+d)*x^2)/d/(b^2+d)^2/Pi^(1/2)
-1/2*b*exp(a^2+c+2*a*b*x+(b^2+d)*x^2)*x/d/(b^2+d)/Pi^(1/2)
```

Rubi [A] time = 0.47, antiderivative size = 304, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6387, 6384, 2234, 2204, 2241, 2240}

$$\frac{be^{\frac{a^2d}{b^2+d}+c}\text{Erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{2d^2\sqrt{b^2+d}}-\frac{a^2b^3e^{\frac{a^2d}{b^2+d}+c}\text{Erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{2d\left(b^2+d\right)^{5/2}}+\frac{be^{\frac{a^2d}{b^2+d}+c}\text{Erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{4d\left(b^2+d\right)^{3/2}}+\frac{ab^2e^{a^2+2abx+x^2(b^2+d)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)^2}-\frac{bxe^{a^2+}}{2\sqrt{}}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x^3*Erfi[a + b*x],x]
```

```
[Out] (a*b^2*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2))/(2*d*(b^2 + d)^2*Sqrt[Pi]) -
(b*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2)*x)/(2*d*(b^2 + d)*Sqrt[Pi]) - (E^(
c + d*x^2)*Erfi[a + b*x])/(2*d^2) + (E^(c + d*x^2)*x^2*Erfi[a + b*x])/(2*d)
 - (a^2*b^3*E^(c + (a^2*d)/(b^2 + d))*Erfi[(a*b + (b^2 + d)*x)/Sqrt[b^2 + d
]])/(2*d*(b^2 + d)^(5/2)) + (b*E^(c + (a^2*d)/(b^2 + d))*Erfi[(a*b + (b^2 +
 d)*x)/Sqrt[b^2 + d]])/(4*d*(b^2 + d)^(3/2)) + (b*E^(c + (a^2*d)/(b^2 + d))
*Erfi[(a*b + (b^2 + d)*x)/Sqrt[b^2 + d]])/(2*d^2*Sqrt[b^2 + d])
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 2240

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)*((d_.) + (e_.)*(x_)), x_Symbol
] :> Simp[(e*F^(a + b*x + c*x^2))/(2*c*Log[F]), x] - Dist[(b*e - 2*c*d)/(2*
c), Int[F^(a + b*x + c*x^2), x], x] /; FreeQ[{F, a, b, c, d, e}, x] && NeQ[
b*e - 2*c*d, 0]
```

Rule 2241

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)*((d_.) + (e_.)*(x_))^(m_), x_S
ymbol] :> Simp[(e*(d + e*x)^(m - 1)*F^(a + b*x + c*x^2))/(2*c*Log[F]), x] +
 (-Dist[(b*e - 2*c*d)/(2*c), Int[(d + e*x)^(m - 1)*F^(a + b*x + c*x^2), x],
 x] - Dist[((m - 1)*e^2)/(2*c*Log[F]), Int[(d + e*x)^(m - 2)*F^(a + b*x + c
*x^2), x], x]) /; FreeQ[{F, a, b, c, d, e}, x] && NeQ[b*e - 2*c*d, 0] && Gt
Q[m, 1]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rule 6387

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m - 1)*E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] + (-Dist[(m - 1)/
(2*d), Int[x^(m - 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[b/(d*Sqrt[P
i]), Int[x^(m - 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x]) /; FreeQ[
{a, b, c, d}, x] && IGtQ[m, 1]
```

Rubi steps

$$\int e^{c+dx^2}x^3\text{erfi}(a+bx)\,dx = \frac{e^{c+dx^2}x^2\text{erfi}(a+bx)}{2d} - \frac{\int e^{c+dx^2}x\text{erfi}(a+bx)\,dx}{d} - \frac{b\int e^{a^2+c+2abx+\left(b^2+d\right)x^2}x^2\,dx}{d\sqrt{\pi}}$$

$$= -\frac{be^{a^2+c+2abx+\left(b^2+d\right)x^2}x}{2d\left(b^2+d\right)\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erfi}(a+bx)}{2d} + \frac{b\int e^{a^2+c+2abx+\cdots}}{d^2\sqrt{\pi}\cdots}$$

$$= \frac{ab^2e^{a^2+c+2abx+\left(b^2+d\right)x^2}}{2d\left(b^2+d\right)^2\sqrt{\pi}} - \frac{be^{a^2+c+2abx+\left(b^2+d\right)x^2}x}{2d\left(b^2+d\right)\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erfi}(a\cdots}{2d}$$

$$= \frac{ab^2e^{a^2+c+2abx+\left(b^2+d\right)x^2}}{2d\left(b^2+d\right)^2\sqrt{\pi}} - \frac{be^{a^2+c+2abx+\left(b^2+d\right)x^2}x}{2d\left(b^2+d\right)\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erfi}(a\cdots}{2d}$$

$$= \frac{ab^2e^{a^2+c+2abx+\left(b^2+d\right)x^2}}{2d\left(b^2+d\right)^2\sqrt{\pi}} - \frac{be^{a^2+c+2abx+\left(b^2+d\right)x^2}x}{2d\left(b^2+d\right)\sqrt{\pi}} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2d^2} + \frac{e^{c+dx^2}x^2\text{erfi}(a\cdots}{2d}$$

Mathematica [A] time = 2.55, size = 206, normalized size = 0.68

$$\frac{e^c\left(\frac{2be^{\frac{a^2d}{b^2+d}}\text{erfi}\left(\frac{ab+x\left(b^2+d\right)}{\sqrt{b^2+d}}\right)}{\sqrt{b^2+d}} - \frac{bde^{\frac{a^2d}{b^2+d}}\left(\sqrt{\pi}\sqrt{b^2+d}\left(\left(2a^2-1\right)b^2-d\right)\text{erfi}\left(\frac{ab+x\left(b^2+d\right)}{\sqrt{b^2+d}}\right)+2\left(b^2+d\right)e^{\frac{\left(ab+x\left(b^2+d\right)\right)^2}{b^2+d}}\left(x\left(b^2+d\right)-ab\right)\right)}{\sqrt{\pi}\left(b^2+d\right)^3} + 2e^{dx^2}\left(dx^2-1\cdots\right.\right.}{4d^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x^3*Erfi[a + b*x],x]
```

```
[Out] (E^c*(2*E^(d*x^2)*(-1 + d*x^2)*Erfi[a + b*x] + (2*b*E^((a^2*d)/(b^2 + d))*E
rfi[(a*b + (b^2 + d)*x)/Sqrt[b^2 + d]])/Sqrt[b^2 + d] - (b*d*E^((a^2*d)/(b^
2 + d))*(2*(b^2 + d)*E^((a*b + (b^2 + d)*x)^2/(b^2 + d))*(-(a*b) + (b^2 + d
)*x) + ((-1 + 2*a^2)*b^2 - d)*Sqrt[b^2 + d]*Sqrt[Pi]*Erfi[(a*b + (b^2 + d)*
x)/Sqrt[b^2 + d]]))/((b^2 + d)^3*Sqrt[Pi])))/(4*d^2)
```

fricas [A] time = 0.49, size = 262, normalized size = 0.86

$$-\frac{\pi\left(2\,b^{5}-\left(2\,a^{2}-5\right)b^{3}d+3\,bd^{2}\right)\sqrt{-b^{2}-d}\,\operatorname{erf}\left(\frac{\left(ab+\left(b^{2}+d\right)x\right)\sqrt{-b^{2}-d}}{b^{2}+d}\right)e^{\left(\frac{b^{2}c+\left(a^{2}+c\right)d}{b^{2}+d}\right)}-2\left(\pi\left(b^{6}d+3\,b^{4}d^{2}+3\,b^{2}d^{3}+d^{4}\right)\right.}{4\,\pi\left(b^{6}d^{2}+\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfi(b*x+a),x, algorithm="fricas")
```

```
[Out] -1/4*(pi*(2*b^5 - (2*a^2 - 5)*b^3*d + 3*b*d^2)*sqrt(-b^2 - d)*erf((a*b + (b
^2 + d)*x)*sqrt(-b^2 - d)/(b^2 + d))*e^((b^2*c + (a^2 + c)*d)/(b^2 + d)) -
2*(pi*(b^6*d + 3*b^4*d^2 + 3*b^2*d^3 + d^4)*x^2 - pi*(b^6 + 3*b^4*d + 3*b^2
*d^2 + d^3))*erfi(b*x + a)*e^(d*x^2 + c) - 2*sqrt(pi)*(a*b^4*d + a*b^2*d^2
- (b^5*d + 2*b^3*d^2 + b*d^3)*x)*e^(b^2*x^2 + 2*a*b*x + d*x^2 + a^2 + c))/(
pi*(b^6*d^2 + 3*b^4*d^3 + 3*b^2*d^4 + d^5))
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^{3}\operatorname{erfi}\left(bx+a\right)e^{\left(dx^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfi(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(x^3*erfi(b*x + a)*e^(d*x^2 + c), x)
```

maple [F] time = 0.24, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^{2}+c}x^{3}\operatorname{erfi}\left(bx+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^3*erfi(b*x+a),x)
```

```
[Out] int(exp(d*x^2+c)*x^3*erfi(b*x+a),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^{3}\operatorname{erfi}\left(bx+a\right)e^{\left(dx^{2}+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^3*erfi(b*x+a),x, algorithm="maxima")
```

```
[Out] integrate(x^3*erfi(b*x + a)*e^(d*x^2 + c), x)
```

mupad [B] time = 1.13, size = 336, normalized size = 1.11

$$\frac{\operatorname{erfi}\left(\frac{a\,b+x\,\left(b^2+d\right)}{\sqrt{b^2+d}}\right)\,\left(b^3\,\mathrm{e}^{\frac{c\,d}{b^2+d}+\frac{a^2\,d}{b^2+d}+\frac{b^2\,c}{b^2+d}}-2\,a^2\,b^3\,\mathrm{e}^{\frac{c\,d}{b^2+d}+\frac{a^2\,d}{b^2+d}+\frac{b^2\,c}{b^2+d}}+b\,d\,\mathrm{e}^{\frac{c\,d}{b^2+d}+\frac{a^2\,d}{b^2+d}+\frac{b^2\,c}{b^2+d}}\right)}{4\,d\,\left(b^2+d\right)^{5/2}}-\frac{\frac{b\,x\,\mathrm{e}^{a^2+2\,a\,b\,x+b^2\,x^2+d\,x^2+c}}{2\,\left(b^2+d\right)}-\frac{a\,b^2\,\mathrm{e}^{\cdots}}{\cdots}}{d\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*erfi(a + b*x)*exp(c + d*x^2),x)
```

```
[Out] (erfi((a*b + x*(d + b^2))/(d + b^2)^(1/2))*(b^3*exp((c*d)/(d + b^2) + (a^2*
d)/(d + b^2) + (b^2*c)/(d + b^2)) - 2*a^2*b^3*exp((c*d)/(d + b^2) + (a^2*d)
/(d + b^2) + (b^2*c)/(d + b^2)) + b*d*exp((c*d)/(d + b^2) + (a^2*d)/(d + b^
2) + (b^2*c)/(d + b^2))))/(4*d*(d + b^2)^(5/2)) - ((b*x*exp(c + d*x^2 + a^2
 + b^2*x^2 + 2*a*b*x))/(2*(d + b^2)) - (a*b^2*exp(c + d*x^2 + a^2 + b^2*x^2
 + 2*a*b*x))/(2*(d + b^2)^2))/(d*pi^(1/2)) - erfi(a + b*x)*(exp(c + d*x^2)/
(2*d^2) - (x^2*exp(c + d*x^2))/(2*d)) - (b*exp(c + a^2 - (a^2*b^2)/(d + b^2
))*erf((a*b*1i + x*(d + b^2)*1i)/(d + b^2)^(1/2))*1i)/(2*d^2*(d + b^2)^(1/2
))
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**3*erfi(b*x+a),x)
```

```
[Out] Timed out
```

3.295 $\int e^{c+dx^2} x \mathbf{erfi}(a + bx) \, dx$

Optimal. Leaf size=78

$$\frac{e^{c+dx^2}\text{erfi}(a+bx)}{2d} - \frac{be^{\frac{a^2d}{b^2+d}+c}\text{erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{2d\sqrt{b^2+d}}$$

```
[Out] 1/2*exp(d*x^2+c)*erfi(b*x+a)/d-1/2*b*exp(c+a^2*d/(b^2+d))*erfi((a*b+(b^2+d)
*x)/(b^2+d)^(1/2))/d/(b^2+d)^(1/2)
```

Rubi [A] time = 0.05, antiderivative size = 78, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.176, Rules used = {6384, 2234, 2204}

$$\frac{e^{c+dx^2}\text{Erfi}(a+bx)}{2d} - \frac{be^{\frac{a^2d}{b^2+d}+c}\text{Erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{2d\sqrt{b^2+d}}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c + d*x^2)*x*Erfi[a + b*x],x]
```

```
[Out] (E^(c + d*x^2)*Erfi[a + b*x])/(2*d) - (b*E^(c + (a^2*d)/(b^2 + d))*Erfi[(a*
b + (b^2 + d)*x)/Sqrt[b^2 + d]])/(2*d*Sqrt[b^2 + d])
```

Rule 2204

```
Int[(F_)^((a_.) + (b_.)*((c_.) + (d_.)*(x_))^2), x_Symbol] :> Simp[(F^a*Sqr
t[Pi]*Erfi[(c + d*x)*Rt[b*Log[F], 2]])/(2*d*Rt[b*Log[F], 2]), x] /; FreeQ[{
F, a, b, c, d}, x] && PosQ[b]
```

Rule 2234

```
Int[(F_)^((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> Dist[F^(a - b^2/
(4*c)), Int[F^((b + 2*c*x)^2/(4*c)), x], x] /; FreeQ[{F, a, b, c}, x]
```

Rule 6384

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_), x_Symbol] :> Si
mp[(E^(c + d*x^2)*Erfi[a + b*x])/(2*d), x] - Dist[b/(d*Sqrt[Pi]), Int[E^(a^
2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x] /; FreeQ[{a, b, c, d}, x]
```

Rubi steps

$$\int e^{c+dx^2}x\text{erfi}(a+bx)\,dx = \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2d} - \frac{b\int e^{a^2+c+2abx+(b^2+d)x^2}\,dx}{d\sqrt{\pi}}$$
$$= \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2d} - \frac{\left(be^{c+\frac{a^2d}{b^2+d}}\right)\int e^{\frac{(2ab+2(b^2+d)x)^2}{4(b^2+d)}}\,dx}{d\sqrt{\pi}}$$
$$= \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2d} - \frac{be^{c+\frac{a^2d}{b^2+d}}\text{erfi}\left(\frac{ab+(b^2+d)x}{\sqrt{b^2+d}}\right)}{2d\sqrt{b^2+d}}$$

Mathematica [A] time = 0.07, size = 73, normalized size = 0.94

$$\frac{e^c\left(e^{dx^2}\text{erfi}(a+bx) - \frac{be^{\frac{a^2d}{b^2+d}}\text{erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{\sqrt{b^2+d}}\right)}{2d}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(c + d*x^2)*x*Erfi[a + b*x],x]
```

```
[Out] (E^c*(E^(d*x^2)*Erfi[a + b*x] - (b*E^((a^2*d)/(b^2 + d))*Erfi[(a*b + (b^2 +
 d)*x)/Sqrt[b^2 + d]])/Sqrt[b^2 + d]))/(2*d)
```

fricas [A] time = 0.51, size = 100, normalized size = 1.28

$$\frac{\sqrt{-b^2-d}\,b\,\text{erf}\left(\frac{(ab+(b^2+d)x)\sqrt{-b^2-d}}{b^2+d}\right)e^{\left(\frac{b^2c+(a^2+c)d}{b^2+d}\right)} + (b^2+d)\,\text{erfi}\,(bx+a)\,e^{(dx^2+c)}}{2\,(b^2d+d^2)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfi(b*x+a),x, algorithm="fricas")
```

```
[Out] 1/2*(sqrt(-b^2 - d)*b*erf((a*b + (b^2 + d)*x)*sqrt(-b^2 - d)/(b^2 + d))*e^(
(b^2*c + (a^2 + c)*d)/(b^2 + d)) + (b^2 + d)*erfi(b*x + a)*e^(d*x^2 + c))/(
b^2*d + d^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{erfi}\,(bx+a)\,e^{(dx^2+c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfi(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(x*erfi(b*x + a)*e^(d*x^2 + c), x)
```

maple [F] time = 0.22, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c} x \,\mathrm{erfi}\,(bx+a)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x*erfi(b*x+a),x)
```

```
[Out] int(exp(d*x^2+c)*x*erfi(b*x+a),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x \,\mathrm{erfi}\,(bx+a)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x*erfi(b*x+a),x, algorithm="maxima")
```

```
[Out] integrate(x*erfi(b*x + a)*e^(d*x^2 + c), x)
```

mupad [B] time = 0.25, size = 79, normalized size = 1.01

$$\frac{\mathrm{erfi}\,(a+b\,x)\;e^{d\,x^2+c}}{2\,d}+\frac{b\,e^{c+a^2-\frac{a^2\,b^2}{b^2+d}}\;\mathrm{erf}\left(\frac{a\,b\,1\mathrm{i}+x\,\left(b^2+d\right)\,1\mathrm{i}}{\sqrt{b^2+d}}\right)\,1\mathrm{i}}{2\,d\,\sqrt{b^2+d}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*erfi(a + b*x)*exp(c + d*x^2),x)
```

```
[Out] (erfi(a + b*x)*exp(c + d*x^2))/(2*d) + (b*exp(c + a^2 - (a^2*b^2)/(d + b^2)
)*erf((a*b*1i + x*(d + b^2)*1i)/(d + b^2)^(1/2))*1i)/(2*d*(d + b^2)^(1/2))
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$e^{c} \int x e^{d x^{2}} \operatorname{erfi}{\left(a + b x \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x*erfi(b*x+a),x)
```

```
[Out] exp(c)*Integral(x*exp(d*x**2)*erfi(a + b*x), x)
```

3.296 $\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x}\,dx$

Optimal. Leaf size=22

$$\text{Int}\left(\frac{e^{c+dx^2}\text{erfi}(a+bx)}{x},x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erfi(b*x+a)/x,x)
```

Rubi [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfi}(a+bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfi[a + b*x])/x,x]
```

```
[Out] Defer[Int][(E^(c + d*x^2)*Erfi[a + b*x])/x, x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x}\,dx = \int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x}\,dx$$

Mathematica [A] time = 0.20, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfi[a + b*x])/x,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erfi[a + b*x])/x, x]
```

fricas [A] time = 0.48, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x,x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x + a)*e^(d*x^2 + c)/x, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(bx+a\right)e^{\left(dx^2+c\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c)/x, x)
```

maple [A] time = 0.04, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c}\operatorname{erfi}\left(bx+a\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x+a)/x,x)
```

```
[Out] int(exp(d*x^2+c)*erfi(b*x+a)/x,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{erfi}\left(bx+a\right)e^{\left(dx^2+c\right)}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c)/x, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{erfi}\left(a+b\,x\right)\,\mathrm{e}^{d\,x^2+c}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erfi(a + b*x)*exp(c + d*x^2))/x,x)
```

```
[Out] int((erfi(a + b*x)*exp(c + d*x^2))/x, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^c \int \frac{e^{dx^2} \operatorname{erfi}(a+bx)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x+a)/x,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfi(a + b*x)/x, x)
```

3.297 $\int \frac{e^{c+dx^2}\mathbf{erfi}(a+bx)}{x^3}\,dx$

Optimal. Leaf size=167

$$\frac{2ab^2\mathrm{Int}\left(\frac{e^{a^2+2abx+x^2\left(b^2+d\right)+c}}{x},x\right)}{\sqrt{\pi}}+d\mathrm{Int}\left(\frac{e^{c+dx^2}\mathrm{erfi}(a+bx)}{x},x\right)+b\sqrt{b^2+d}\,e^{\frac{a^2d}{b^2+d}+c}\mathrm{erfi}\left(\frac{ab+x\left(b^2+d\right)}{\sqrt{b^2+d}}\right)-\frac{be^{a^2+2abx+x^2\left(b^2\right.}}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*exp(d*x^2+c)*erfi(b*x+a)/x^2+b*exp(c+a^2*d/(b^2+d))*erfi((a*b+(b^2+d)*
x)/(b^2+d)^(1/2))*(b^2+d)^(1/2)-b*exp(a^2+c+2*a*b*x+(b^2+d)*x^2)/x/Pi^(1/2)
+2*a*b^2*Unintegrable(exp(a^2+c+2*a*b*x+(b^2+d)*x^2)/x,x)/Pi^(1/2)+d*Uninte
grable(exp(d*x^2+c)*erfi(b*x+a)/x,x)
```

Rubi [A] time = 0.39, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\mathrm{Erfi}(a+bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfi[a + b*x])/x^3,x]
```

```
[Out] -((b*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2))/(Sqrt[Pi]*x)) - (E^(c + d*x^2)*
Erfi[a + b*x])/(2*x^2) + b*Sqrt[b^2 + d]*E^(c + (a^2*d)/(b^2 + d))*Erfi[(a*
b + (b^2 + d)*x)/Sqrt[b^2 + d]] + (2*a*b^2*Defer[Int][E^(a^2 + c + 2*a*b*x
+ (b^2 + d)*x^2)/x, x])/Sqrt[Pi] + d*Defer[Int][(E^(c + d*x^2)*Erfi[a + b*x
])/x, x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x^3}\,dx = -\frac{e^{c+dx^2}\text{erfi}(a+bx)}{2x^2} + d\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x}\,dx + \frac{b\int \frac{e^{a^2+c+2abx+\left(b^2+d\right)x^2}}{x^2}\,dx}{\sqrt{\pi}}$$

$$= -\frac{be^{a^2+c+2abx+\left(b^2+d\right)x^2}}{\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2x^2} + d\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x}\,dx + \frac{\left(2ab^2\right)\int \frac{e^{a^2\cdots}}{}}{}$$

$$= -\frac{be^{a^2+c+2abx+\left(b^2+d\right)x^2}}{\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2x^2} + d\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x}\,dx + \frac{\left(2ab^2\right)\int \frac{e^{a^2\cdots}}{}}{}$$

$$= -\frac{be^{a^2+c+2abx+\left(b^2+d\right)x^2}}{\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{2x^2} + b\sqrt{b^2+d}\,e^{c+\frac{a^2d}{b^2+d}}\text{erfi}\left(\frac{ab+\left(b^2+d\right)x}{\sqrt{b^2+d}}\right) + \cdots$$

Mathematica [A] time = 0.37, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfi[a + b*x])/x^3,x]
[Out] Integrate[(E^(c + d*x^2)*Erfi[a + b*x])/x^3, x]
```

fricas [A] time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x^3,x, algorithm="fricas")
[Out] integral(erfi(b*x + a)*e^(d*x^2 + c)/x^3, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x^3,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c)/x^3, x)
```

maple [A] time = 0.29, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{e}^{d\,x^2+c}\,\mathrm{erfi}\,(bx+a)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x+a)/x^3,x)
```

```
[Out] int(exp(d*x^2+c)*erfi(b*x+a)/x^3,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x^3,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c)/x^3, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{erfi}\,(a+b\,x)\,\,\mathrm{e}^{d\,x^2+c}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erfi(a + b*x)*exp(c + d*x^2))/x^3,x)
```

```
[Out] int((erfi(a + b*x)*exp(c + d*x^2))/x^3, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^2}\,\mathrm{erfi}\,(a+bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x+a)/x**3,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfi(a + b*x)/x**3, x)
```

3.298 $\int e^{c+dx^2} x^4 \mathbf{erfi}(a+bx)\,dx$

Optimal. Leaf size=468

$$\frac{3\text{Int}\left(e^{c+dx^2}\text{erfi}(a+bx),x\right)}{4d^2}-\frac{3ab^2e^{\frac{a^2d}{b^2+d}+c}\text{erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{4d^2\left(b^2+d\right)^{3/2}}+\frac{3be^{a^2+2abx+x^2(b^2+d)+c}}{4\sqrt{\pi}\,d^2\left(b^2+d\right)}-\frac{3ab^2e^{\frac{a^2d}{b^2+d}+c}\text{erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{4d\left(b^2+d\right)^{5/2}}+\frac{ab}{}$$

```
[Out] -3/4*exp(d*x^2+c)*x*erfi(b*x+a)/d^2+1/2*exp(d*x^2+c)*x^3*erfi(b*x+a)/d+1/2*
a^3*b^4*exp(c+a^2*d/(b^2+d))*erfi((a*b+(b^2+d)*x)/(b^2+d)^(1/2))/d/(b^2+d)^
(7/2)-3/4*a*b^2*exp(c+a^2*d/(b^2+d))*erfi((a*b+(b^2+d)*x)/(b^2+d)^(1/2))/d/
(b^2+d)^(5/2)-3/4*a*b^2*exp(c+a^2*d/(b^2+d))*erfi((a*b+(b^2+d)*x)/(b^2+d)^(
1/2))/d^2/(b^2+d)^(3/2)-1/2*a^2*b^3*exp(a^2+c+2*a*b*x+(b^2+d)*x^2)/d/(b^2+d
)^3/Pi^(1/2)+1/2*b*exp(a^2+c+2*a*b*x+(b^2+d)*x^2)/d/(b^2+d)^2/Pi^(1/2)+3/4*
b*exp(a^2+c+2*a*b*x+(b^2+d)*x^2)/d^2/(b^2+d)/Pi^(1/2)+1/2*a*b^2*exp(a^2+c+2
*a*b*x+(b^2+d)*x^2)*x/d/(b^2+d)^2/Pi^(1/2)-1/2*b*exp(a^2+c+2*a*b*x+(b^2+d)*
x^2)*x^2/d/(b^2+d)/Pi^(1/2)+3/4*Unintegrable(exp(d*x^2+c)*erfi(b*x+a),x)/d^
2
```

Rubi [A] time = 0.89, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}x^4\text{Erfi}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^4*Erfi[a + b*x],x]
```

```
[Out] -(a^2*b^3*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2))/(2*d*(b^2 + d)^3*Sqrt[Pi])
 + (b*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2))/(2*d*(b^2 + d)^2*Sqrt[Pi]) + (
3*b*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2))/(4*d^2*(b^2 + d)*Sqrt[Pi]) + (a*
b^2*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2)*x)/(2*d*(b^2 + d)^2*Sqrt[Pi]) - (
b*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2)*x^2)/(2*d*(b^2 + d)*Sqrt[Pi]) - (3*
E^(c + d*x^2)*x*Erfi[a + b*x])/(4*d^2) + (E^(c + d*x^2)*x^3*Erfi[a + b*x])/
(2*d) + (a^3*b^4*E^(c + (a^2*d)/(b^2 + d))*Erfi[(a*b + (b^2 + d)*x)/Sqrt[b^
2 + d]])/(2*d*(b^2 + d)^(7/2)) - (3*a*b^2*E^(c + (a^2*d)/(b^2 + d))*Erfi[(a
*b + (b^2 + d)*x)/Sqrt[b^2 + d]])/(4*d*(b^2 + d)^(5/2)) - (3*a*b^2*E^(c + (
a^2*d)/(b^2 + d))*Erfi[(a*b + (b^2 + d)*x)/Sqrt[b^2 + d]])/(4*d^2*(b^2 + d)
^(3/2)) + (3*Defer[Int][E^(c + d*x^2)*Erfi[a + b*x], x])/(4*d^2)
```

Rubi steps

$$\int e^{c+dx^2}x^4\text{erfi}(a+bx)\,dx = \frac{e^{c+dx^2}x^3\text{erfi}(a+bx)}{2d} - \frac{3\int e^{c+dx^2}x^2\text{erfi}(a+bx)\,dx}{2d} - \frac{b\int e^{a^2+c+2abx+(b^2+d)x^2}x^3\,dx}{d\sqrt{\pi}}$$

$$= -\frac{be^{a^2+c+2abx+(b^2+d)x^2}x^2}{2d(b^2+d)\sqrt{\pi}} - \frac{3e^{c+dx^2}x\text{erfi}(a+bx)}{4d^2} + \frac{e^{c+dx^2}x^3\text{erfi}(a+bx)}{2d} + \frac{3\int e^{c+dx^2}\text{erf}}{4d}$$

$$= \frac{be^{a^2+c+2abx+(b^2+d)x^2}}{2d(b^2+d)^2\sqrt{\pi}} + \frac{3be^{a^2+c+2abx+(b^2+d)x^2}}{4d^2(b^2+d)\sqrt{\pi}} + \frac{ab^2e^{a^2+c+2abx+(b^2+d)x^2}x}{2d(b^2+d)^2\sqrt{\pi}} - \frac{be^{a^2+c+2abx+(b}}{2d(b^2+d}$$

$$= -\frac{a^2b^3e^{a^2+c+2abx+(b^2+d)x^2}}{2d(b^2+d)^3\sqrt{\pi}} + \frac{be^{a^2+c+2abx+(b^2+d)x^2}}{2d(b^2+d)^2\sqrt{\pi}} + \frac{3be^{a^2+c+2abx+(b^2+d)x^2}}{4d^2(b^2+d)\sqrt{\pi}} + \frac{ab^2e^{a^2+c+2ab}}{2d(b^2+}$$

$$= -\frac{a^2b^3e^{a^2+c+2abx+(b^2+d)x^2}}{2d(b^2+d)^3\sqrt{\pi}} + \frac{be^{a^2+c+2abx+(b^2+d)x^2}}{2d(b^2+d)^2\sqrt{\pi}} + \frac{3be^{a^2+c+2abx+(b^2+d)x^2}}{4d^2(b^2+d)\sqrt{\pi}} + \frac{ab^2e^{a^2+c+2ab}}{2d(b^2+}$$

$$= -\frac{a^2b^3e^{a^2+c+2abx+(b^2+d)x^2}}{2d(b^2+d)^3\sqrt{\pi}} + \frac{be^{a^2+c+2abx+(b^2+d)x^2}}{2d(b^2+d)^2\sqrt{\pi}} + \frac{3be^{a^2+c+2abx+(b^2+d)x^2}}{4d^2(b^2+d)\sqrt{\pi}} + \frac{ab^2e^{a^2+c+2ab}}{2d(b^2+}$$

Mathematica [A] time = 0.58, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}x^4\text{erfi}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^4*Erfi[a + b*x],x]
```

```
[Out] Integrate[E^(c + d*x^2)*x^4*Erfi[a + b*x], x]
```

fricas [A] time = 0.39, size = 0, normalized size = 0.00

$$\text{integral}\left(x^4\,\text{erfi}\,(bx+a)\,e^{(dx^2+c)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfi(b*x+a),x, algorithm="fricas")
```

```
[Out] integral(x^4*erfi(b*x + a)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erfi}(bx+a)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfi(b*x+a),x, algorithm="giac")
[Out] integrate(x^4*erfi(b*x + a)*e^(d*x^2 + c), x)
```

maple [A] time = 0.06, size = 0, normalized size = 0.00

$$\int \mathrm{e}^{d\,x^2+c} x^4 \operatorname{erfi}(bx+a)\; dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^4*erfi(b*x+a),x)
[Out] int(exp(d*x^2+c)*x^4*erfi(b*x+a),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{erfi}(bx+a)\, e^{\left(dx^2+c\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^4*erfi(b*x+a),x, algorithm="maxima")
[Out] integrate(x^4*erfi(b*x + a)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.00

$$\int x^4 \operatorname{erfi}(a+b\,x)\; \mathrm{e}^{d\,x^2+c}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*erfi(a + b*x)*exp(c + d*x^2),x)
[Out] int(x^4*erfi(a + b*x)*exp(c + d*x^2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**4*erfi(b*x+a),x)
```

```
[Out] Timed out
```

3.299 $\int e^{c+dx^2}x^2\mathbf{erfi}(a+bx)\,dx$

Optimal. Leaf size=149

$$-\frac{\text{Int}\left(e^{c+dx^2}\text{erfi}(a+bx),x\right)}{2d}+\frac{ab^2e^{\frac{a^2d}{b^2+d}+c}\text{erfi}\left(\frac{ab+x(b^2+d)}{\sqrt{b^2+d}}\right)}{2d\left(b^2+d\right)^{3/2}}-\frac{be^{a^2+2abx+x^2(b^2+d)+c}}{2\sqrt{\pi}\,d\left(b^2+d\right)}+\frac{xe^{c+dx^2}\text{erfi}(a+bx)}{2d}$$

```
[Out] 1/2*exp(d*x^2+c)*x*erfi(b*x+a)/d+1/2*a*b^2*exp(c+a^2*d/(b^2+d))*erfi((a*b+(
b^2+d)*x)/(b^2+d)^(1/2))/d/(b^2+d)^(3/2)-1/2*b*exp(a^2+c+2*a*b*x+(b^2+d)*x^
2)/d/(b^2+d)/Pi^(1/2)-1/2*Unintegrable(exp(d*x^2+c)*erfi(b*x+a),x)/d
```

Rubi [A] time = 0.17, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}x^2\text{Erfi}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*x^2*Erfi[a + b*x],x]
```

```
[Out] -(b*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2))/(2*d*(b^2 + d)*Sqrt[Pi]) + (E^(c
 + d*x^2)*x*Erfi[a + b*x])/(2*d) + (a*b^2*E^(c + (a^2*d)/(b^2 + d))*Erfi[(a
*b + (b^2 + d)*x)/Sqrt[b^2 + d]])/(2*d*(b^2 + d)^(3/2)) - Defer[Int][E^(c +
 d*x^2)*Erfi[a + b*x], x]/(2*d)
```

Rubi steps

$$\int e^{c+dx^2}x^2\text{erfi}(a+bx)\,dx=\frac{e^{c+dx^2}x\text{erfi}(a+bx)}{2d}-\frac{\int e^{c+dx^2}\text{erfi}(a+bx)\,dx}{2d}-\frac{b\int e^{a^2+c+2abx+(b^2+d)x^2}x\,dx}{d\sqrt{\pi}}$$

$$=-\frac{be^{a^2+c+2abx+(b^2+d)x^2}}{2d\left(b^2+d\right)\sqrt{\pi}}+\frac{e^{c+dx^2}x\text{erfi}(a+bx)}{2d}-\frac{\int e^{c+dx^2}\text{erfi}(a+bx)\,dx}{2d}+\frac{\left(ab^2\right)\int e^{a^2+\cdots}}{d\left(b^2\cdots\right.}$$

$$=-\frac{be^{a^2+c+2abx+(b^2+d)x^2}}{2d\left(b^2+d\right)\sqrt{\pi}}+\frac{e^{c+dx^2}x\text{erfi}(a+bx)}{2d}-\frac{\int e^{c+dx^2}\text{erfi}(a+bx)\,dx}{2d}+\frac{\left(ab^2e^{c+\frac{a^2d}{b^2+d}}\cdots\right.}{d\left(b\cdots\right.}$$

$$=-\frac{be^{a^2+c+2abx+(b^2+d)x^2}}{2d\left(b^2+d\right)\sqrt{\pi}}+\frac{e^{c+dx^2}x\text{erfi}(a+bx)}{2d}+\frac{ab^2e^{c+\frac{a^2d}{b^2+d}}\text{erfi}\left(\frac{ab+(b^2+d)x}{\sqrt{b^2+d}}\right)}{2d\left(b^2+d\right)^{3/2}}-\frac{\int e^{c+dx^2}\cdots}{\cdots}$$

Mathematica [A] time = 0.42, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}x^2\text{erfi}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*x^2*Erfi[a + b*x],x]
[Out] Integrate[E^(c + d*x^2)*x^2*Erfi[a + b*x], x]
```

fricas [A] time = 0.41, size = 0, normalized size = 0.00

$$\text{integral}\left(x^2\,\text{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfi(b*x+a),x, algorithm="fricas")
[Out] integral(x^2*erfi(b*x + a)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfi(b*x+a),x, algorithm="giac")
[Out] integrate(x^2*erfi(b*x + a)*e^(d*x^2 + c), x)
```

maple [A] time = 0.25, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c}x^2\,\text{erfi}\,(bx+a)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*x^2*erfi(b*x+a),x)
[Out] int(exp(d*x^2+c)*x^2*erfi(b*x+a),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\text{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*x^2*erfi(b*x+a),x, algorithm="maxima")
```

```
[Out] integrate(x^2*erfi(b*x + a)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,\mathrm{erfi}\left(a+b\,x\right)\,\mathrm{e}^{d\,x^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*erfi(a + b*x)*exp(c + d*x^2),x)
```

```
[Out] int(x^2*erfi(a + b*x)*exp(c + d*x^2), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int x^{2}e^{dx^{2}}\,\mathrm{erfi}\left(a+bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*x**2*erfi(b*x+a),x)
```

```
[Out] exp(c)*Integral(x**2*exp(d*x**2)*erfi(a + b*x), x)
```

3.300 $\int e^{c+dx^2}\,\mathbf{erfi}(a+bx)\,dx$

Optimal. Leaf size=19

$$\mathrm{Int}\left(e^{c+dx^2}\mathrm{erfi}(a+bx),x\right)$$

```
[Out] Unintegrable(exp(d*x^2+c)*erfi(b*x+a),x)
```

Rubi [A] time = 0.01, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int e^{c+dx^2}\mathrm{Erfi}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[E^(c + d*x^2)*Erfi[a + b*x],x]
```

```
[Out] Defer[Int][E^(c + d*x^2)*Erfi[a + b*x], x]
```

Rubi steps

$$\int e^{c+dx^2}\mathrm{erfi}(a+bx)\,dx = \int e^{c+dx^2}\mathrm{erfi}(a+bx)\,dx$$

Mathematica [A] time = 0.04, size = 0, normalized size = 0.00

$$\int e^{c+dx^2}\mathrm{erfi}(a+bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[E^(c + d*x^2)*Erfi[a + b*x],x]
```

```
[Out] Integrate[E^(c + d*x^2)*Erfi[a + b*x], x]
```

fricas [A] time = 0.49, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\mathrm{erfi}\left(bx+a\right)e^{\left(dx^2+c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a),x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x + a)*e^(d*x^2 + c), x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx+a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a),x, algorithm="giac")
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c), x)
```

maple [A] time = 0.07, size = 0, normalized size = 0.00

$$\int e^{d\,x^2+c}\operatorname{erfi}(bx+a)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x+a),x)
[Out] int(exp(d*x^2+c)*erfi(b*x+a),x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx+a)\,e^{\left(dx^2+c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a),x, algorithm="maxima")
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c), x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \operatorname{erfi}(a+b\,x)\;e^{d\,x^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(a + b*x)*exp(c + d*x^2),x)
[Out] int(erfi(a + b*x)*exp(c + d*x^2), x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^c\int e^{dx^2}\operatorname{erfi}(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x+a),x)
[Out] exp(c)*Integral(exp(d*x**2)*erfi(a + b*x), x)
```

3.301 $\int \frac{e^{c+dx^2}\mathbf{erfi}(a+bx)}{x^2}\,dx$

Optimal. Leaf size=79

$$\frac{2b\mathrm{Int}\left(\frac{e^{a^2+2abx+x^2(b^2+d)+c}}{x},x\right)}{\sqrt{\pi}}+2d\mathrm{Int}\left(e^{c+dx^2}\mathrm{erfi}(a+bx),x\right)-\frac{e^{c+dx^2}\mathrm{erfi}(a+bx)}{x}$$

```
[Out] -exp(d*x^2+c)*erfi(b*x+a)/x+2*b*Unintegrable(exp(a^2+c+2*a*b*x+(b^2+d)*x^2)
/x,x)/Pi^(1/2)+2*d*Unintegrable(exp(d*x^2+c)*erfi(b*x+a),x)
```

Rubi [A] time = 0.20, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\mathrm{Erfi}(a+bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfi[a + b*x])/x^2,x]
```

```
[Out] -((E^(c + d*x^2)*Erfi[a + b*x])/x) + (2*b*Defer[Int][E^(a^2 + c + 2*a*b*x +
 (b^2 + d)*x^2)/x, x])/Sqrt[Pi] + 2*d*Defer[Int][E^(c + d*x^2)*Erfi[a + b*x
], x]
```

Rubi steps

$$\int \frac{e^{c+dx^2}\mathrm{erfi}(a+bx)}{x^2}\,dx=-\frac{e^{c+dx^2}\mathrm{erfi}(a+bx)}{x}+(2d)\int e^{c+dx^2}\mathrm{erfi}(a+bx)\,dx+\frac{(2b)\int \frac{e^{a^2+c+2abx+(b^2+d)x^2}}{x}\,dx}{\sqrt{\pi}}$$

Mathematica [A] time = 0.40, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\mathrm{erfi}(a+bx)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfi[a + b*x])/x^2,x]
```

```
[Out] Integrate[(E^(c + d*x^2)*Erfi[a + b*x])/x^2, x]
```

fricas [A] time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x^2,x, algorithm="fricas")
[Out] integral(erfi(b*x + a)*e^(d*x^2 + c)/x^2, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x^2,x, algorithm="giac")
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c)/x^2, x)
```

maple [A] time = 0.11, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\,\text{erfi}\,(bx+a)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x+a)/x^2,x)
[Out] int(exp(d*x^2+c)*erfi(b*x+a)/x^2,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x^2,x, algorithm="maxima")
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c)/x^2, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\text{erfi}\,(a+b\,x)\,e^{d\,x^2+c}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erfi(a + b*x)*exp(c + d*x^2))/x^2,x)
```

```
[Out] int((erfi(a + b*x)*exp(c + d*x^2))/x^2, x)
```

sympy [**A**] time = 0.00, size = 0, normalized size = 0.00

$$e^{c}\int \frac{e^{dx^{2}}\operatorname{erfi}\left(a+bx\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x+a)/x**2,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfi(a + b*x)/x**2, x)
```

3.302 $\int \frac{e^{c+dx^2}\,\mathbf{erfi}(a+bx)}{x^4}\,dx$

Optimal. Leaf size=323

$$\frac{4bd\text{Int}\left(\frac{e^{a^2+2abx+x^2\left(b^2+d\right)+c}}{x},x\right)}{3\sqrt{\pi}}+\frac{2b\left(b^2+d\right)\text{Int}\left(\frac{e^{a^2+2abx+x^2\left(b^2+d\right)+c}}{x},x\right)}{3\sqrt{\pi}}+\frac{4a^2b^3\text{Int}\left(\frac{e^{a^2+2abx+x^2\left(b^2+d\right)+c}}{x},x\right)}{3\sqrt{\pi}}+\frac{4}{3}d^2\text{Int}\left(e^{c+dx^2}\right.$$

```
[Out] -1/3*exp(d*x^2+c)*erfi(b*x+a)/x^3-2/3*d*exp(d*x^2+c)*erfi(b*x+a)/x+2/3*a*b^
2*exp(c+a^2*d/(b^2+d))*erfi((a*b+(b^2+d)*x)/(b^2+d)^(1/2))*(b^2+d)^(1/2)-1/
3*b*exp(a^2+c+2*a*b*x+(b^2+d)*x^2)/x^2/Pi^(1/2)-2/3*a*b^2*exp(a^2+c+2*a*b*x
+(b^2+d)*x^2)/x/Pi^(1/2)+4/3*a^2*b^3*Unintegrable(exp(a^2+c+2*a*b*x+(b^2+d)
*x^2)/x,x)/Pi^(1/2)+4/3*b*d*Unintegrable(exp(a^2+c+2*a*b*x+(b^2+d)*x^2)/x,x
)/Pi^(1/2)+2/3*b*(b^2+d)*Unintegrable(exp(a^2+c+2*a*b*x+(b^2+d)*x^2)/x,x)/P
i^(1/2)+4/3*d^2*Unintegrable(exp(d*x^2+c)*erfi(b*x+a),x)
```

Rubi [A] time = 0.85, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{e^{c+dx^2}\text{Erfi}(a+bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(E^(c + d*x^2)*Erfi[a + b*x])/x^4,x]
```

```
[Out] -(b*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2))/(3*Sqrt[Pi]*x^2) - (2*a*b^2*E^(a
^2 + c + 2*a*b*x + (b^2 + d)*x^2))/(3*Sqrt[Pi]*x) - (E^(c + d*x^2)*Erfi[a +
 b*x])/(3*x^3) - (2*d*E^(c + d*x^2)*Erfi[a + b*x])/(3*x) + (2*a*b^2*Sqrt[b^
2 + d]*E^(c + (a^2*d)/(b^2 + d))*Erfi[(a*b + (b^2 + d)*x)/Sqrt[b^2 + d]])/3
 + (4*a^2*b^3*Defer[Int][E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2)/x, x])/(3*Sq
rt[Pi]) + (4*b*d*Defer[Int][E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2)/x, x])/(3
*Sqrt[Pi]) + (2*b*(b^2 + d)*Defer[Int][E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2
)/x, x])/(3*Sqrt[Pi]) + (4*d^2*Defer[Int][E^(c + d*x^2)*Erfi[a + b*x], x])/
3
```

Rubi steps

$$\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x^4}\,dx = -\frac{e^{c+dx^2}\text{erfi}(a+bx)}{3x^3} + \frac{1}{3}(2d)\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x^2}\,dx + \frac{(2b)\int \frac{e^{a^2+c+2abx+(b^2+d)x^2}}{x^3}\,dx}{3\sqrt{\pi}}$$

$$= -\frac{be^{a^2+c+2abx+(b^2+d)x^2}}{3\sqrt{\pi}\,x^2} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{3x^3} - \frac{2de^{c+dx^2}\text{erfi}(a+bx)}{3x} + \frac{1}{3}\left(4d^2\right)\int e^{c+dx^2}\text{er}$$

$$= -\frac{be^{a^2+c+2abx+(b^2+d)x^2}}{3\sqrt{\pi}\,x^2} - \frac{2ab^2e^{a^2+c+2abx+(b^2+d)x^2}}{3\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{3x^3} - \frac{2de^{c+dx^2}\text{erfi}(a+}{3x}$$

$$= -\frac{be^{a^2+c+2abx+(b^2+d)x^2}}{3\sqrt{\pi}\,x^2} - \frac{2ab^2e^{a^2+c+2abx+(b^2+d)x^2}}{3\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{3x^3} - \frac{2de^{c+dx^2}\text{erfi}(a+}{3x}$$

$$= -\frac{be^{a^2+c+2abx+(b^2+d)x^2}}{3\sqrt{\pi}\,x^2} - \frac{2ab^2e^{a^2+c+2abx+(b^2+d)x^2}}{3\sqrt{\pi}\,x} - \frac{e^{c+dx^2}\text{erfi}(a+bx)}{3x^3} - \frac{2de^{c+dx^2}\text{erfi}(a+}{3x}$$

Mathematica [A] time = 0.58, size = 0, normalized size = 0.00

$$\int \frac{e^{c+dx^2}\text{erfi}(a+bx)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(E^(c + d*x^2)*Erfi[a + b*x])/x^4,x]
[Out] Integrate[(E^(c + d*x^2)*Erfi[a + b*x])/x^4, x]
```

fricas [A] time = 0.47, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{erfi}\,(bx+a)\,e^{(dx^2+c)}}{x^4}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x^4,x, algorithm="fricas")
[Out] integral(erfi(b*x + a)*e^(d*x^2 + c)/x^4, x)
```

giac [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{erfi}\,(bx+a)\,e^{(dx^2+c)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x^4,x, algorithm="giac")
```

```
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c)/x^4, x)
```

maple [A] time = 0.29, size = 0, normalized size = 0.00

$$\int \frac{e^{d\,x^2+c}\,\mathrm{erfi}\,(bx+a)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(d*x^2+c)*erfi(b*x+a)/x^4,x)
```

```
[Out] int(exp(d*x^2+c)*erfi(b*x+a)/x^4,x)
```

maxima [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{erfi}\,(bx+a)\,e^{\left(dx^2+c\right)}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x^2+c)*erfi(b*x+a)/x^4,x, algorithm="maxima")
```

```
[Out] integrate(erfi(b*x + a)*e^(d*x^2 + c)/x^4, x)
```

mupad [A] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\mathrm{erfi}\,(a+b\,x)\,\,e^{d\,x^2+c}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((erfi(a + b*x)*exp(c + d*x^2))/x^4,x)
```

```
[Out] int((erfi(a + b*x)*exp(c + d*x^2))/x^4, x)
```

sympy [A] time = 0.00, size = 0, normalized size = 0.00

$$e^c \int \frac{e^{dx^2}\,\mathrm{erfi}\,(a+bx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(d*x**2+c)*erfi(b*x+a)/x**4,x)
```

```
[Out] exp(c)*Integral(exp(d*x**2)*erfi(a + b*x)/x**4, x)
```

3.303 $\int \left(\frac{e^{-b^2x^2}\mathbf{erfi}(bx)}{x^3} + \frac{b^2e^{-b^2x^2}\mathbf{erfi}(bx)}{x} \right) dx$

Optimal. Leaf size=33

$$-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2x^2} - \frac{b}{\sqrt{\pi}\,x}$$

```
[Out] -1/2*erfi(b*x)/exp(b^2*x^2)/x^2-b/x/Pi^(1/2)
```

Rubi [A] time = 0.12, antiderivative size = 33, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 40, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.075, Rules used = {6393, 6390, 30}

$$-\frac{e^{-b^2x^2}\text{Erfi}(bx)}{2x^2} - \frac{b}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]/(E^(b^2*x^2)*x^3) + (b^2*Erfi[b*x])/(E^(b^2*x^2)*x),x]
```

```
[Out] -(b/(Sqrt[Pi]*x)) - Erfi[b*x]/(2*E^(b^2*x^2)*x^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6390

```
Int[(E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)])/(x_), x_Symbol] :> Simp[(2*
b*E^c*x*HypergeometricPFQ[{1/2, 1}, {3/2, 3/2}, -(b^2*x^2)])/Sqrt[Pi], x] /
; FreeQ[{b, c, d}, x] && EqQ[d, -b^2]
```

Rule 6393

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(a_.) + (b_.)*(x_)]*(x_)^(m_), x_Symbol]
:> Simp[(x^(m + 1)*E^(c + d*x^2)*Erfi[a + b*x])/(m + 1), x] + (-Dist[(2*d)/
(m + 1), Int[x^(m + 2)*E^(c + d*x^2)*Erfi[a + b*x], x], x] - Dist[(2*b)/((m
 + 1)*Sqrt[Pi]), Int[x^(m + 1)*E^(a^2 + c + 2*a*b*x + (b^2 + d)*x^2), x], x
]) /; FreeQ[{a, b, c, d}, x] && ILtQ[m, -1]
```

Rubi steps

$$\int\left(\frac{e^{-b^2x^2}\text{erfi}(bx)}{x^3}+\frac{b^2e^{-b^2x^2}\text{erfi}(bx)}{x}\right)dx=b^2\int\frac{e^{-b^2x^2}\text{erfi}(bx)}{x}\,dx+\int\frac{e^{-b^2x^2}\text{erfi}(bx)}{x^3}\,dx$$
$$=-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2x^2}+\frac{2b^3x\,{}_2F_2\left(\frac{1}{2},1;\frac{3}{2},\frac{3}{2};-b^2x^2\right)}{\sqrt{\pi}}-b^2\int\frac{e^{-b^2x^2}\text{erfi}(bx)}{x}$$
$$=-\frac{b}{\sqrt{\pi}\,x}-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2x^2}$$

Mathematica [A] time = 0.06, size = 33, normalized size = 1.00

$$-\frac{e^{-b^2x^2}\text{erfi}(bx)}{2x^2}-\frac{b}{\sqrt{\pi}\,x}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]/(E^(b^2*x^2)*x^3) + (b^2*Erfi[b*x])/(E^(b^2*x^2)*x),x]
```

```
[Out] -(b/(Sqrt[Pi]*x)) - Erfi[b*x]/(2*E^(b^2*x^2)*x^2)
```

fricas [A] time = 0.59, size = 39, normalized size = 1.18

$$-\frac{\left(2\sqrt{\pi}\,bxe^{\left(b^2x^2\right)}+\pi\,\text{erfi}\,(bx)\right)e^{\left(-b^2x^2\right)}}{2\,\pi x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^3+b^2*erfi(b*x)/exp(b^2*x^2)/x,x, algori
thm="fricas")
```

```
[Out] -1/2*(2*sqrt(pi)*b*x*e^(b^2*x^2) + pi*erfi(b*x))*e^(-b^2*x^2)/(pi*x^2)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{b^2\,\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x}+\frac{\text{erfi}\,(bx)\,e^{\left(-b^2x^2\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^3+b^2*erfi(b*x)/exp(b^2*x^2)/x,x, algori
thm="giac")
```

```
[Out] integrate(b^2*erfi(b*x)*e^(-b^2*x^2)/x + erfi(b*x)*e^(-b^2*x^2)/x^3, x)
```

maple [A] time = 0.18, size = 41, normalized size = 1.24

$$\frac{\left(-2\,\mathrm{e}^{b^2x^2}bx-\sqrt{\pi}\ \operatorname{erfi}(bx)\right)\mathrm{e}^{-b^2x^2}}{2\sqrt{\pi}\ x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)/exp(b^2*x^2)/x^3+b^2*erfi(b*x)/exp(b^2*x^2)/x,x)
```

```
[Out] 1/2*(-2*exp(b^2*x^2)*b*x-Pi^(1/2)*erfi(b*x))/Pi^(1/2)/x^2/exp(b^2*x^2)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{b^2\operatorname{erfi}(bx)\,e^{\left(-b^2x^2\right)}}{x}+\frac{\operatorname{erfi}(bx)\,e^{\left(-b^2x^2\right)}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b^2*x^2)/x^3+b^2*erfi(b*x)/exp(b^2*x^2)/x,x, algori
thm="maxima")
```

```
[Out] integrate(b^2*erfi(b*x)*e^(-b^2*x^2)/x + erfi(b*x)*e^(-b^2*x^2)/x^3, x)
```

mupad [B] time = 0.17, size = 28, normalized size = 0.85

$$-\frac{\mathrm{e}^{-b^2\,x^2}\operatorname{erfi}(b\,x)}{2\,x^2}-\frac{b}{x\,\sqrt{\pi}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(-b^2*x^2)*erfi(b*x))/x^3 + (b^2*exp(-b^2*x^2)*erfi(b*x))/x,x)
```

```
[Out] - (exp(-b^2*x^2)*erfi(b*x))/(2*x^2) - b/(x*pi^(1/2))
```

sympy [A] time = 31.16, size = 53, normalized size = 1.61

$$\frac{2b^3x\,{}_2F_2\left(\begin{matrix}\frac{1}{2},1\\ \frac{3}{2},\frac{3}{2}\end{matrix}\middle|-b^2x^2\right)}{\sqrt{\pi}}-\frac{2b\,{}_2F_2\left(\begin{matrix}-\frac{1}{2},1\\ \frac{1}{2},\frac{3}{2}\end{matrix}\middle|-b^2x^2\right)}{\sqrt{\pi}\,x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)/exp(b**2*x**2)/x**3+b**2*erfi(b*x)/exp(b**2*x**2)/x,x)
```

```
[Out] 2*b**3*x*hyper((1/2, 1), (3/2, 3/2), -b**2*x**2)/sqrt(pi) - 2*b*hyper((-1/2
, 1), (1/2, 3/2), -b**2*x**2)/(sqrt(pi)*x)
```

3.304 $\int \text{erfi}(bx) \sin\left(c + ib^2x^2\right) dx$

Optimal. Leaf size=67

$$\frac{i\sqrt{\pi}\, e^{-ic}\text{erfi}(bx)^2}{8b} - \frac{ibe^{ic}x^2\, {}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}$$

```
[Out] -1/2*I*b*exp(I*c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/Pi^(1/2)+
1/8*I*erfi(b*x)^2*Pi^(1/2)/b/exp(I*c)
```

Rubi [A] time = 0.06, antiderivative size = 67, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6406, 6375, 30, 6378}

$$\frac{i\sqrt{\pi}\, e^{-ic}\text{Erfi}(bx)^2}{8b} - \frac{ibe^{ic}x^2\, {}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]*Sin[c + I*b^2*x^2],x]
```

```
[Out] ((I/8)*Sqrt[Pi]*Erfi[b*x]^2)/(b*E^(I*c)) - ((I/2)*b*E^(I*c)*x^2*Hypergeomet
ricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi]
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6406

```
Int[Erfi[(b_.)*(x_)]*Sin[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[I/2, Int[
E^(-(I*c) - I*d*x^2)*Erfi[b*x], x], x] - Dist[I/2, Int[E^(I*c + I*d*x^2)*Er
fi[b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erfi}(bx)\sin\left(c+ib^2x^2\right)\,dx &= -\left(\frac{1}{2}i\int e^{ic-b^2x^2}\operatorname{erfi}(bx)\,dx\right)+\frac{1}{2}i\int e^{-ic+b^2x^2}\operatorname{erfi}(bx)\,dx\\ &= -\frac{ibe^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(ie^{-ic}\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erfi}(bx))}{4b}\\ &= \frac{ie^{-ic}\sqrt{\pi}\operatorname{erfi}(bx)^2}{8b}-\frac{ibe^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [F] time = 0.66, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\sin\left(c+ib^2x^2\right)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[b*x]*Sin[c + I*b^2*x^2],x]
[Out] Integrate[Erfi[b*x]*Sin[c + I*b^2*x^2], x]
```

fricas [F] time = 0.52, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{1}{2}\left(-i\operatorname{erfi}(bx)\,e^{\left(-2\,b^2x^2+2\,i\,c\right)}+i\operatorname{erfi}(bx)\right)e^{\left(b^2x^2-i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)*sin(c+I*b^2*x^2),x, algorithm="fricas")
[Out] integral(1/2*(-I*erfi(b*x)*e^(-2*b^2*x^2 + 2*I*c) + I*erfi(b*x))*e^(b^2*x^2
 - I*c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\sin\left(i\,b^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)*sin(c+I*b^2*x^2),x, algorithm="giac")
[Out] integrate(erfi(b*x)*sin(I*b^2*x^2 + c), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\sin\left(ib^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)*sin(c+I*b^2*x^2),x)
[Out] int(erfi(b*x)*sin(c+I*b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\frac{i\sqrt{\pi}\cos(c)\operatorname{erfi}(bx)^2}{8b}+\frac{\sqrt{\pi}\operatorname{erfi}(bx)^2\sin(c)}{8b}-\frac{1}{2}i\cos(c)\int\operatorname{erfi}(bx)e^{\left(-b^2x^2\right)}\,dx+\frac{1}{2}\int\operatorname{erfi}(bx)e^{\left(-b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)*sin(c+I*b^2*x^2),x, algorithm="maxima")
[Out] 1/8*I*sqrt(pi)*cos(c)*erfi(b*x)^2/b + 1/8*sqrt(pi)*erfi(b*x)^2*sin(c)/b - 1
/2*I*cos(c)*integrate(erfi(b*x)*e^(-b^2*x^2), x) + 1/2*integrate(erfi(b*x)*
e^(-b^2*x^2), x)*sin(c)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \sin\left(b^2\,x^2\,1\mathrm{i}+c\right)\,\operatorname{erfi}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sin(c + b^2*x^2*1i)*erfi(b*x),x)
[Out] int(sin(c + b^2*x^2*1i)*erfi(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \sin\left(ib^2x^2+c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)*sin(c+I*b**2*x**2),x)
[Out] Integral(sin(I*b**2*x**2 + c)*erfi(b*x), x)
```

3.305 $\int \mathbf{erfi}(bx)\sin\left(c - ib^2x^2\right)\,dx$

Optimal. Leaf size=67

$$\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}-\frac{i\sqrt{\pi}\,e^{ic}\text{erfi}(bx)^2}{8b}$$

```
[Out] 1/2*I*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/exp(I*c)/Pi^(1/2)-1
/8*I*exp(I*c)*erfi(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.06, antiderivative size = 67, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6406, 6378, 6375, 30}

$$\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}-\frac{i\sqrt{\pi}\,e^{ic}\text{Erfi}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]*Sin[c - I*b^2*x^2],x]
```

```
[Out] ((-I/8)*E^(I*c)*Sqrt[Pi]*Erfi[b*x]^2)/b + ((I/2)*b*x^2*HypergeometricPFQ[{1
, 1}, {3/2, 2}, -(b^2*x^2)])/(E^(I*c)*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6406

```
Int[Erfi[(b_.)*(x_)]*Sin[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[I/2, Int[
E^(-(I*c) - I*d*x^2)*Erfi[b*x], x], x] - Dist[I/2, Int[E^(I*c + I*d*x^2)*Er
fi[b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erfi}(bx)\sin\left(c-ib^2x^2\right)\,dx&=\frac{1}{2}i\int e^{-ic-b^2x^2}\operatorname{erfi}(bx)\,dx-\frac{1}{2}i\int e^{ic+b^2x^2}\operatorname{erfi}(bx)\,dx\\&=\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}-\frac{\left(ie^{ic}\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erfi}(bx))}{4b}\\&=-\frac{ie^{ic}\sqrt{\pi}\operatorname{erfi}(bx)^2}{8b}+\frac{ibe^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [F] time = 0.71, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\sin\left(c-ib^2x^2\right)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Erfi[b*x]*Sin[c - I*b^2*x^2],x]
[Out] Integrate[Erfi[b*x]*Sin[c - I*b^2*x^2], x]
```

fricas [F] time = 0.44, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{1}{2}\left(i\,\operatorname{erfi}(bx)\,e^{\left(-2\,b^2x^2-2i\,c\right)}-i\,\operatorname{erfi}(bx)\right)e^{\left(b^2x^2+i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfi(b*x)*sin(-c+I*b^2*x^2),x, algorithm="fricas")
[Out] integral(1/2*(I*erfi(b*x)*e^(-2*b^2*x^2 - 2*I*c) - I*erfi(b*x))*e^(b^2*x^2
+ I*c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int -\operatorname{erfi}(bx)\sin\left(i\,b^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfi(b*x)*sin(-c+I*b^2*x^2),x, algorithm="giac")
```

```
[Out] integrate(-erfi(b*x)*sin(I*b^2*x^2 - c), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int -\operatorname{erfi}(bx)\sin\left(ib^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-erfi(b*x)*sin(-c+I*b^2*x^2),x)
```

```
[Out] int(-erfi(b*x)*sin(-c+I*b^2*x^2),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$-\frac{i\sqrt{\pi}\cos(c)\operatorname{erfi}(bx)^2}{8b}+\frac{\sqrt{\pi}\operatorname{erfi}(bx)^2\sin(c)}{8b}+\frac{1}{2}i\cos(c)\int\operatorname{erfi}(bx)e^{\left(-b^2x^2\right)}\,dx+\frac{1}{2}\int\operatorname{erfi}(bx)e^{\left(-b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfi(b*x)*sin(-c+I*b^2*x^2),x, algorithm="maxima")
```

```
[Out] -1/8*I*sqrt(pi)*cos(c)*erfi(b*x)^2/b + 1/8*sqrt(pi)*erfi(b*x)^2*sin(c)/b +
1/2*I*cos(c)*integrate(erfi(b*x)*e^(-b^2*x^2), x) + 1/2*integrate(erfi(b*x)
*e^(-b^2*x^2), x)*sin(c)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.01

$$\int\sin\left(c-b^2\,x^2\,1\mathrm{i}\right)\,\operatorname{erfi}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sin(c - b^2*x^2*1i)*erfi(b*x),x)
```

```
[Out] int(sin(c - b^2*x^2*1i)*erfi(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$-\int\sin\left(ib^2x^2-c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfi(b*x)*sin(-c+I*b**2*x**2),x)
```

```
[Out] -Integral(sin(I*b**2*x**2 - c)*erfi(b*x), x)
```

3.306 $\int \cos\left(c+ib^2x^2\right)\mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=63

$$\frac{be^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{-ic}\text{erfi}(bx)^2}{8b}$$

```
[Out] 1/2*b*exp(I*c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/Pi^(1/2)+1/8
*erfi(b*x)^2*Pi^(1/2)/b/exp(I*c)
```

Rubi [A] time = 0.05, antiderivative size = 63, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6409, 6375, 30, 6378}

$$\frac{be^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{-ic}\text{Erfi}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Cos[c + I*b^2*x^2]*Erfi[b*x],x]
```

```
[Out] (Sqrt[Pi]*Erfi[b*x]^2)/(8*b*E^(I*c)) + (b*E^(I*c)*x^2*HypergeometricPFQ[{1,
 1}, {3/2, 2}, -(b^2*x^2)])/(2*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6409

```
Int[Cos[(c_.) + (d_.)*(x_)^2]*Erfi[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int[
E^(-(I*c) - I*d*x^2)*Erfi[b*x], x], x] + Dist[1/2, Int[E^(I*c + I*d*x^2)*Er
fi[b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\begin{aligned}\int \cos\left(c+ib^2x^2\right)\operatorname{erfi}(bx)\,dx &= \frac{1}{2}\int e^{ic-b^2x^2}\operatorname{erfi}(bx)\,dx+\frac{1}{2}\int e^{-ic+b^2x^2}\operatorname{erfi}(bx)\,dx\\ &= \frac{be^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(e^{-ic}\sqrt{\pi}\right)\operatorname{Subst}\left(\int x\,dx,x,\operatorname{erfi}(bx)\right)}{4b}\\ &= \frac{e^{-ic}\sqrt{\pi}\operatorname{erfi}(bx)^2}{8b}+\frac{be^{ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [F] time = 0.54, size = 0, normalized size = 0.00

$$\int \cos\left(c+ib^2x^2\right)\operatorname{erfi}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Cos[c + I*b^2*x^2]*Erfi[b*x],x]
[Out] Integrate[Cos[c + I*b^2*x^2]*Erfi[b*x], x]
```

fricas [F] time = 0.53, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{1}{2}\left(\operatorname{erfi}(bx)\,e^{\left(-2\,b^2x^2+2i\,c\right)}+\operatorname{erfi}(bx)\right)e^{\left(b^2x^2-i\,c\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b^2*x^2)*erfi(b*x),x, algorithm="fricas")
[Out] integral(1/2*(erfi(b*x)*e^(-2*b^2*x^2 + 2*I*c) + erfi(b*x))*e^(b^2*x^2 - I*
c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cos\left(i\,b^2x^2+c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b^2*x^2)*erfi(b*x),x, algorithm="giac")
[Out] integrate(cos(I*b^2*x^2 + c)*erfi(b*x), x)
```

maple [F] time = 0.04, size = 0, normalized size = 0.00

$$\int \cos\left(ib^2x^2+c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(c+I*b^2*x^2)*erfi(b*x),x)
[Out] int(cos(c+I*b^2*x^2)*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\frac{\sqrt{\pi}\,\cos(c)\operatorname{erfi}(bx)^2}{8\,b}-\frac{i\sqrt{\pi}\,\operatorname{erfi}(bx)^2\sin(c)}{8\,b}+\frac{1}{2}\,\cos(c)\int \operatorname{erfi}(bx)\,e^{\left(-b^2x^2\right)}\,dx+\frac{1}{2}i\int \operatorname{erfi}(bx)\,e^{\left(-b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b^2*x^2)*erfi(b*x),x, algorithm="maxima")
[Out] 1/8*sqrt(pi)*cos(c)*erfi(b*x)^2/b - 1/8*I*sqrt(pi)*erfi(b*x)^2*sin(c)/b + 1
/2*cos(c)*integrate(erfi(b*x)*e^(-b^2*x^2), x) + 1/2*I*integrate(erfi(b*x)*
e^(-b^2*x^2), x)*sin(c)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \cos\left(b^2\,x^2\,1\mathrm{i}+c\right)\,\operatorname{erfi}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(c + b^2*x^2*1i)*erfi(b*x),x)
[Out] int(cos(c + b^2*x^2*1i)*erfi(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cos\left(ib^2x^2+c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(c+I*b**2*x**2)*erfi(b*x),x)
[Out] Integral(cos(I*b**2*x**2 + c)*erfi(b*x), x)
```

3.307 $\int \cos\left(c - ib^2x^2\right) \mathbf{erfi}(bx)\, dx$

Optimal. Leaf size=63

$$\frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{ic}\mathrm{erfi}(bx)^2}{8b}$$

```
[Out] 1/2*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/exp(I*c)/Pi^(1/2)+1/8
*exp(I*c)*erfi(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.05, antiderivative size = 63, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6409, 6378, 6375, 30}

$$\frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{ic}\mathrm{Erfi}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Cos[c - I*b^2*x^2]*Erfi[b*x],x]
```

```
[Out] (E^(I*c)*Sqrt[Pi]*Erfi[b*x]^2)/(8*b) + (b*x^2*HypergeometricPFQ[{1, 1}, {3/
2, 2}, -(b^2*x^2)])/(2*E^(I*c)*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6409

```
Int[Cos[(c_.) + (d_.)*(x_)^2]*Erfi[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int[
E^(-(I*c) - I*d*x^2)*Erfi[b*x], x], x] + Dist[1/2, Int[E^(I*c + I*d*x^2)*Er
fi[b*x], x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, -b^4]
```

Rubi steps

$$\int \cos\left(c - ib^2x^2\right)\text{erfi}(bx)\,dx = \frac{1}{2}\int e^{-ic-b^2x^2}\text{erfi}(bx)\,dx + \frac{1}{2}\int e^{ic+b^2x^2}\text{erfi}(bx)\,dx$$
$$= \frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}} + \frac{\left(e^{ic}\sqrt{\pi}\right)\text{Subst}(\int x\,dx, x, \text{erfi}(bx))}{4b}$$
$$= \frac{e^{ic}\sqrt{\pi}\,\text{erfi}(bx)^2}{8b} + \frac{be^{-ic}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}$$

Mathematica [F] time = 0.51, size = 0, normalized size = 0.00

$$\int \cos\left(c - ib^2x^2\right)\text{erfi}(bx)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Cos[c - I*b^2*x^2]*Erfi[b*x],x]
[Out] Integrate[Cos[c - I*b^2*x^2]*Erfi[b*x], x]
```

fricas [F] time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{1}{2}\left(\text{erfi}\,(bx)\,e^{\left(-2\,b^2x^2-2i\,c\right)} + \text{erfi}\,(bx)\right)e^{\left(b^2x^2+i\,c\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b^2*x^2)*erfi(b*x),x, algorithm="fricas")
[Out] integral(1/2*(erfi(b*x)*e^(-2*b^2*x^2 - 2*I*c) + erfi(b*x))*e^(b^2*x^2 + I*
c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cos\left(i\,b^2x^2 - c\right)\text{erfi}\,(bx)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b^2*x^2)*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(cos(I*b^2*x^2 - c)*erfi(b*x), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int \cos\left(ib^2x^2 - c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(-c+I*b^2*x^2)*erfi(b*x),x)
```

```
[Out] int(cos(-c+I*b^2*x^2)*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\frac{\sqrt{\pi}\cos(c)\operatorname{erfi}(bx)^2}{8b} + \frac{i\sqrt{\pi}\operatorname{erfi}(bx)^2\sin(c)}{8b} + \frac{1}{2}\cos(c)\int \operatorname{erfi}(bx)e^{\left(-b^2x^2\right)}\,dx - \frac{1}{2}i\int \operatorname{erfi}(bx)e^{\left(-b^2x^2\right)}\,dx\sin(c)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b^2*x^2)*erfi(b*x),x, algorithm="maxima")
```

```
[Out] 1/8*sqrt(pi)*cos(c)*erfi(b*x)^2/b + 1/8*I*sqrt(pi)*erfi(b*x)^2*sin(c)/b + 1
/2*cos(c)*integrate(erfi(b*x)*e^(-b^2*x^2), x) - 1/2*I*integrate(erfi(b*x)*
e^(-b^2*x^2), x)*sin(c)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \cos\left(c - b^2\,x^2\,1\mathrm{i}\right)\operatorname{erfi}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cos(c - b^2*x^2*1i)*erfi(b*x),x)
```

```
[Out] int(cos(c - b^2*x^2*1i)*erfi(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cos\left(ib^2x^2 - c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cos(-c+I*b**2*x**2)*erfi(b*x),x)
```

```
[Out] Integral(cos(I*b**2*x**2 - c)*erfi(b*x), x)
```

3.308 $\int \mathbf{erfi}(bx)\sinh\left(c+b^2x^2\right)\,dx$

Optimal. Leaf size=57

$$\frac{\sqrt{\pi}\,e^c\text{erfi}(bx)^2}{8b}-\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}$$

```
[Out] -1/2*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/exp(c)/Pi^(1/2)+1/8*
exp(c)*erfi(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.05, antiderivative size = 57, 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 = {6412, 6375, 30, 6378}

$$\frac{\sqrt{\pi}\,e^c\text{Erfi}(bx)^2}{8b}-\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]*Sinh[c + b^2*x^2],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^2)/(8*b) - (b*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2
}, -(b^2*x^2)])/(2*E^c*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6412

```
Int[Erfi[(b_.)*(x_)]*Sinh[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[1/2, Int
[E^(c + d*x^2)*Erfi[b*x], x], x] - Dist[1/2, Int[E^(-c - d*x^2)*Erfi[b*x],
x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\begin{aligned}\int \operatorname{erfi}(bx)\sinh\left(c+b^2x^2\right)\,dx &= -\left(\frac{1}{2}\int e^{-c-b^2x^2}\operatorname{erfi}(bx)\,dx\right)+\frac{1}{2}\int e^{c+b^2x^2}\operatorname{erfi}(bx)\,dx\\ &= -\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(e^c\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erfi}(bx))}{4b}\\ &= \frac{e^c\sqrt{\pi}\operatorname{erfi}(bx)^2}{8b}-\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 1.56, size = 74, normalized size = 1.30

$$\frac{4b^2x^2(\cosh(c)-\sinh(c))\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)+\pi\operatorname{erfi}(bx)(\operatorname{erfi}(bx)(\sinh(c)+\cosh(c))-2\operatorname{erf}(bx)(\cosh(c)-\sinh(}{8\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]*Sinh[c + b^2*x^2],x]
```

```
[Out] (4*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2]*(Cosh[c] - Sinh[c])
 + Pi*Erfi[b*x]*(-2*Erf[b*x]*(Cosh[c] - Sinh[c]) + Erfi[b*x]*(Cosh[c] + Sin
h[c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.48, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\operatorname{erfi}(bx)\sinh\left(b^2x^2+c\right),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)*sinh(b^2*x^2+c),x, algorithm="fricas")
```

```
[Out] integral(erfi(b*x)*sinh(b^2*x^2 + c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\sinh\left(b^2x^2+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)*sinh(b^2*x^2+c),x, algorithm="giac")
[Out] integrate(erfi(b*x)*sinh(b^2*x^2 + c), x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\sinh\left(b^2x^2+c\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(erfi(b*x)*sinh(b^2*x^2+c),x)
[Out] int(erfi(b*x)*sinh(b^2*x^2+c),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{erfi}(bx)\sinh\left(b^2x^2+c\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)*sinh(b^2*x^2+c),x, algorithm="maxima")
[Out] integrate(erfi(b*x)*sinh(b^2*x^2 + c), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \sinh\left(b^2\,x^2+c\right)\,\operatorname{erfi}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(c + b^2*x^2)*erfi(b*x),x)
[Out] int(sinh(c + b^2*x^2)*erfi(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \sinh\left(b^2x^2+c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(erfi(b*x)*sinh(b**2*x**2+c),x)
[Out] Integral(sinh(b**2*x**2 + c)*erfi(b*x), x)
```

3.309 $\int \textbf{erfi}(bx) \sinh\left(c - b^2x^2\right) \, dx$

Optimal. Leaf size=57

$$\frac{be^c x^2 \, _2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}} - \frac{\sqrt{\pi}\, e^{-c}\text{erfi}(bx)^2}{8b}$$

```
[Out] 1/2*b*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/Pi^(1/2)-1/8*e
rfi(b*x)^2*Pi^(1/2)/b/exp(c)
```

Rubi [A] time = 0.05, antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6412, 6378, 6375, 30}

$$\frac{be^c x^2 \, _2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}} - \frac{\sqrt{\pi}\, e^{-c}\text{Erfi}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Erfi[b*x]*Sinh[c - b^2*x^2],x]
```

```
[Out] -(Sqrt[Pi]*Erfi[b*x]^2)/(8*b*E^c) + (b*E^c*x^2*HypergeometricPFQ[{1, 1}, {3
/2, 2}, -(b^2*x^2)])/(2*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6412

```
Int[Erfi[(b_.)*(x_)]*Sinh[(c_.) + (d_.)*(x_)^2], x_Symbol] :> Dist[1/2, Int
[E^(c + d*x^2)*Erfi[b*x], x], x] - Dist[1/2, Int[E^(-c - d*x^2)*Erfi[b*x],
x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\int \text{erfi}(bx)\sinh\left(c-b^2x^2\right)\,dx = \frac{1}{2}\int e^{c-b^2x^2}\text{erfi}(bx)\,dx - \frac{1}{2}\int e^{-c+b^2x^2}\text{erfi}(bx)\,dx$$

$$= \frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}} - \frac{\left(e^{-c}\sqrt{\pi}\right)\text{Subst}(\int x\,dx,x,\text{erfi}(bx))}{4b}$$

$$= -\frac{e^{-c}\sqrt{\pi}\,\text{erfi}(bx)^2}{8b} + \frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}$$

Mathematica [A] time = 0.97, size = 72, normalized size = 1.26

$$\frac{\pi\text{erfi}(bx)(2\text{erf}(bx)(\sinh(c)+\cosh(c))+\text{erfi}(bx)(\sinh(c)-\cosh(c)))-4b^2x^2(\sinh(c)+\cosh(c))\,{}_2F_2\left(1,1;\frac{3}{2},2;b\right.}{8\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Erfi[b*x]*Sinh[c - b^2*x^2],x]
```

```
[Out] (-4*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2]*(Cosh[c] + Sinh[c]
) + Pi*Erfi[b*x]*(Erfi[b*x]*(-Cosh[c] + Sinh[c]) + 2*Erf[b*x]*(Cosh[c] + Si
nh[c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.56, size = 0, normalized size = 0.00

$$\text{integral}\left(-\text{erfi}\,(bx)\sinh\left(b^2x^2-c\right),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfi(b*x)*sinh(b^2*x^2-c),x, algorithm="fricas")
```

```
[Out] integral(-erfi(b*x)*sinh(b^2*x^2 - c), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int -\text{erfi}\,(bx)\sinh\left(b^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfi(b*x)*sinh(b^2*x^2-c),x, algorithm="giac")
[Out] integrate(-erfi(b*x)*sinh(b^2*x^2 - c), x)
```

maple [F] time = 0.02, size = 0, normalized size = 0.00

$$\int -\operatorname{erfi}(bx)\sinh\left(b^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-erfi(b*x)*sinh(b^2*x^2-c),x)
[Out] int(-erfi(b*x)*sinh(b^2*x^2-c),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$-\int \operatorname{erfi}(bx)\sinh\left(b^2x^2-c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfi(b*x)*sinh(b^2*x^2-c),x, algorithm="maxima")
[Out] -integrate(erfi(b*x)*sinh(b^2*x^2 - c), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \sinh\left(c-b^2\,x^2\right)\,\operatorname{erfi}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(c - b^2*x^2)*erfi(b*x),x)
[Out] int(sinh(c - b^2*x^2)*erfi(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$-\int \sinh\left(b^2x^2-c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(-erfi(b*x)*sinh(b**2*x**2-c),x)
[Out] -Integral(sinh(b**2*x**2 - c)*erfi(b*x), x)
```

3.310 $\int \cosh\left(c + b^2x^2\right) \mathbf{erfi}(bx)\, dx$

Optimal. Leaf size=57

$$\frac{be^{-c}x^2\, {}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}} + \frac{\sqrt{\pi}\, e^c \text{erfi}(bx)^2}{8b}$$

```
[Out] 1/2*b*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/exp(c)/Pi^(1/2)+1/8*e
xp(c)*erfi(b*x)^2*Pi^(1/2)/b
```

Rubi [A] time = 0.05, antiderivative size = 57, 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 = {6415, 6375, 30, 6378}

$$\frac{be^{-c}x^2\, {}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}} + \frac{\sqrt{\pi}\, e^c \text{Erfi}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[c + b^2*x^2]*Erfi[b*x],x]
```

```
[Out] (E^c*Sqrt[Pi]*Erfi[b*x]^2)/(8*b) + (b*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2
}, -(b^2*x^2)])/(2*E^c*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6415

```
Int[Cosh[(c_.) + (d_.)*(x_)^2]*Erfi[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int
[E^(c + d*x^2)*Erfi[b*x], x], x] + Dist[1/2, Int[E^(-c - d*x^2)*Erfi[b*x],
x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\begin{aligned}\int \cosh\left(c+b^2x^2\right)\operatorname{erfi}(bx)\,dx &= \frac{1}{2}\int e^{-c-b^2x^2}\operatorname{erfi}(bx)\,dx+\frac{1}{2}\int e^{c+b^2x^2}\operatorname{erfi}(bx)\,dx\\ &= \frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\left(e^c\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx,x,\operatorname{erfi}(bx))}{4b}\\ &= \frac{e^c\sqrt{\pi}\operatorname{erfi}(bx)^2}{8b}+\frac{be^{-c}x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}\end{aligned}$$

Mathematica [A] time = 12.95, size = 74, normalized size = 1.30

$$\frac{4b^2x^2(\sinh(c)-\cosh(c))\,{}_2F_2\left(1,1;\frac{3}{2},2;b^2x^2\right)+\pi\operatorname{erfi}(bx)(2\operatorname{erf}(bx)(\cosh(c)-\sinh(c))+\operatorname{erfi}(bx)(\sinh(c)+\cosh(c$$
$$8\sqrt{\pi}\,b$$

Antiderivative was successfully verified.

```
[In] Integrate[Cosh[c + b^2*x^2]*Erfi[b*x],x]
```

```
[Out] (4*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2]*(-Cosh[c] + Sinh[c]
) + Pi*Erfi[b*x]*(2*Erf[b*x]*(Cosh[c] - Sinh[c]) + Erfi[b*x]*(Cosh[c] + Sin
h[c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.53, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\cosh\left(b^2x^2+c\right)\operatorname{erfi}(bx),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2+c)*erfi(b*x),x, algorithm="fricas")
```

```
[Out] integral(cosh(b^2*x^2 + c)*erfi(b*x), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2+c)*erfi(b*x),x, algorithm="giac")
```

```
[Out] integrate(cosh(b^2*x^2 + c)*erfi(b*x), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(b^2*x^2+c)*erfi(b*x),x)
```

```
[Out] int(cosh(b^2*x^2+c)*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2+c)*erfi(b*x),x, algorithm="maxima")
```

```
[Out] integrate(cosh(b^2*x^2 + c)*erfi(b*x), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \cosh\left(b^2\,x^2+c\right)\,\operatorname{erfi}(b\,x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(c + b^2*x^2)*erfi(b*x),x)
```

```
[Out] int(cosh(c + b^2*x^2)*erfi(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2+c\right)\operatorname{erfi}(bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b**2*x**2+c)*erfi(b*x),x)
```

```
[Out] Integral(cosh(b**2*x**2 + c)*erfi(b*x), x)
```

3.311 $\int \cosh\left(c-b^2x^2\right) \mathbf{erfi}(bx)\,dx$

Optimal. Leaf size=57

$$\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{-c}\mathrm{erfi}(bx)^2}{8b}$$

```
[Out] 1/2*b*exp(c)*x^2*HypergeometricPFQ([1, 1],[3/2, 2],-b^2*x^2)/Pi^(1/2)+1/8*e
rfi(b*x)^2*Pi^(1/2)/b/exp(c)
```

Rubi [A] time = 0.05, antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6415, 6378, 6375, 30}

$$\frac{be^cx^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}+\frac{\sqrt{\pi}\,e^{-c}\mathrm{Erfi}(bx)^2}{8b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[c - b^2*x^2]*Erfi[b*x],x]
```

```
[Out] (Sqrt[Pi]*Erfi[b*x]^2)/(8*b*E^c) + (b*E^c*x^2*HypergeometricPFQ[{1, 1}, {3/
2, 2}, -(b^2*x^2)])/(2*Sqrt[Pi])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6375

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)]^(n_.), x_Symbol] :> Dist[(E^c
*Sqrt[Pi])/(2*b), Subst[Int[x^n, x], x, Erfi[b*x]], x] /; FreeQ[{b, c, d, n
}, x] && EqQ[d, b^2]
```

Rule 6378

```
Int[E^((c_.) + (d_.)*(x_)^2)*Erfi[(b_.)*(x_)], x_Symbol] :> Simp[(b*E^c*x^2
*HypergeometricPFQ[{1, 1}, {3/2, 2}, -(b^2*x^2)])/Sqrt[Pi], x] /; FreeQ[{b,
 c, d}, x] && EqQ[d, -b^2]
```

Rule 6415

```
Int[Cosh[(c_.) + (d_.)*(x_)^2]*Erfi[(b_.)*(x_)], x_Symbol] :> Dist[1/2, Int
[E^(c + d*x^2)*Erfi[b*x], x], x] + Dist[1/2, Int[E^(-c - d*x^2)*Erfi[b*x],
x], x] /; FreeQ[{b, c, d}, x] && EqQ[d^2, b^4]
```

Rubi steps

$$\int \cosh\left(c-b^2x^2\right)\operatorname{erfi}(bx)\,dx = \frac{1}{2}\int e^{c-b^2x^2}\operatorname{erfi}(bx)\,dx + \frac{1}{2}\int e^{-c+b^2x^2}\operatorname{erfi}(bx)\,dx$$
$$= \frac{be^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}} + \frac{\left(e^{-c}\sqrt{\pi}\right)\operatorname{Subst}(\int x\,dx, x, \operatorname{erfi}(bx))}{4b}$$
$$= \frac{e^{-c}\sqrt{\pi}\operatorname{erfi}(bx)^2}{8b} + \frac{be^c x^2\,{}_2F_2\left(1,1;\frac{3}{2},2;-b^2x^2\right)}{2\sqrt{\pi}}$$

Mathematica [A] time = 1.96, size = 72, normalized size = 1.26

$$\frac{\pi\operatorname{erfi}(bx)(2\operatorname{erf}(bx)(\sinh(c)+\cosh(c))+\operatorname{erfi}(bx)(\cosh(c)-\sinh(c)))-4b^2x^2(\sinh(c)+\cosh(c))\,{}_2F_2\left(1,1;\frac{3}{2},2;b\right.}{8\sqrt{\pi}\,b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Cosh[c - b^2*x^2]*Erfi[b*x],x]
```

```
[Out] (-4*b^2*x^2*HypergeometricPFQ[{1, 1}, {3/2, 2}, b^2*x^2]*(Cosh[c] + Sinh[c]
) + Pi*Erfi[b*x]*(Erfi[b*x]*(Cosh[c] - Sinh[c]) + 2*Erf[b*x]*(Cosh[c] + Sin
h[c])))/(8*b*Sqrt[Pi])
```

fricas [F] time = 0.46, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\cosh\left(b^2x^2-c\right)\operatorname{erfi}\left(bx\right),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2-c)*erfi(b*x),x, algorithm="fricas")
```

```
[Out] integral(cosh(b^2*x^2 - c)*erfi(b*x), x)
```

giac [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erfi}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2-c)*erfi(b*x),x, algorithm="giac")
[Out] integrate(cosh(b^2*x^2 - c)*erfi(b*x), x)
```

maple [F] time = 0.03, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erfi}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(b^2*x^2-c)*erfi(b*x),x)
[Out] int(cosh(b^2*x^2-c)*erfi(b*x),x)
```

maxima [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erfi}\left(bx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b^2*x^2-c)*erfi(b*x),x, algorithm="maxima")
[Out] integrate(cosh(b^2*x^2 - c)*erfi(b*x), x)
```

mupad [F] time = 0.00, size = -1, normalized size = -0.02

$$\int \cosh\left(c-b^2\,x^2\right)\,\operatorname{erfi}\left(b\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(c - b^2*x^2)*erfi(b*x),x)
[Out] int(cosh(c - b^2*x^2)*erfi(b*x), x)
```

sympy [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \cosh\left(b^2x^2-c\right)\operatorname{erfi}\left(bx\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(b**2*x**2-c)*erfi(b*x),x)
[Out] Integral(cosh(b**2*x**2 - c)*erfi(b*x), x)
```

Chapter 4

Listing of Grading functions

The following are the current version of the grading functions used for grading the quality of the antiderivative with reference to the optimal antiderivative included in the test suite.

There is a version for Maple and for Mathematica/Rubi. There is a version for grading Sympy and version for use with Sagemath.

The following are links to the current source code.

The following are the listings of source code of the grading functions.

4.0.1 Mathematica and Rubi grading function

```
(* Original version thanks to Albert Rich emailed on 03/21/2017 *)
(* ::Package:: *)

(* ::Subsection:: *)
(*GradeAntiderivative[result,optimal]*)


(* ::Text:: *)
(*If result and optimal are mathematical expressions, *)
(*          GradeAntiderivative[result,optimal] returns*)
(*  "F" if the result fails to integrate an expression that*)
(*      is integrable*)
(*  "C" if result involves higher level functions than necessary*)
(*  "B" if result is more than twice the size of the optimal*)
(*      antiderivative*)
(*  "A" if result can be considered optimal*)


GradeAntiderivative[result_,optimal_] :=
  If[ExpnType[result]<=ExpnType[optimal],
```

```
    If[FreeQ[result,Complex] || Not[FreeQ[optimal,Complex]],
      If[LeafCount[result]<=2*LeafCount[optimal],
        "A",
      "B"],
    "C"],
  If[FreeQ[result,Integrate] && FreeQ[result,Int],
    "C",
  "F"]]


(* ::Text:: *)
(*The following summarizes the type number assigned an *)
(*expression based on the functions it involves*)
(*1 = rational function*)
(*2 = algebraic function*)
(*3 = elementary function*)
(*4 = special function*)
(*5 = hyperpergeometric function*)
(*6 = appell function*)
(*7 = rootsum function*)
(*8 = integrate function*)
(*9 = unknown function*)


ExpnType[expn_] :=
  If[AtomQ[expn],
    1,
  If[ListQ[expn],
    Max[Map[ExpnType,expn]],
  If[Head[expn]===Power,
    If[IntegerQ[expn[[2]]],
      ExpnType[expn[[1]]],
    If[Head[expn[[2]]]===Rational,
      If[IntegerQ[expn[[1]]] || Head[expn[[1]]]===Rational,
        1,
      Max[ExpnType[expn[[1]]],2]],
    Max[ExpnType[expn[[1]]],ExpnType[expn[[2]]],3]]],
  If[Head[expn]===Plus || Head[expn]===Times,
    Max[ExpnType[First[expn]],ExpnType[Rest[expn]]],
  If[ElementaryFunctionQ[Head[expn]],
    Max[3,ExpnType[expn[[1]]]]],
  If[SpecialFunctionQ[Head[expn]],
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],4]],
  If[HypergeometricFunctionQ[Head[expn]],
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],5]],
  If[AppellFunctionQ[Head[expn]],
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],6]],
```

```
  If[Head[expn]===RootSum,
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],7]],
  If[Head[expn]===Integrate || Head[expn]===Int,
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],8]],
  9]]]]]]]]]]


ElementaryFunctionQ[func_] :=
  MemberQ[{
        Exp,Log,
        Sin,Cos,Tan,Cot,Sec,Csc,
        ArcSin,ArcCos,ArcTan,ArcCot,ArcSec,ArcCsc,
        Sinh,Cosh,Tanh,Coth,Sech,Csch,
        ArcSinh,ArcCosh,ArcTanh,ArcCoth,ArcSech,ArcCsch
},func]


SpecialFunctionQ[func_] :=
  MemberQ[{
        Erf, Erfc, Erfi,
        FresnelS, FresnelC,
        ExpIntegralE, ExpIntegralEi, LogIntegral,
        SinIntegral, CosIntegral, SinhIntegral, CoshIntegral,
        Gamma, LogGamma, PolyGamma,
        Zeta, PolyLog, ProductLog,
        EllipticF, EllipticE, EllipticPi
},func]


HypergeometricFunctionQ[func_] :=
  MemberQ[{Hypergeometric1F1,Hypergeometric2F1,HypergeometricPFQ},func]


AppellFunctionQ[func_] :=
  MemberQ[{AppellF1},func]
```

4.0.2 Maple grading function

```
# File: GradeAntiderivative.mpl
# Original version thanks to Albert Rich emailed on 03/21/2017

#Nasser 03/22/2017  Use Maple leaf count instead since buildin
#Nasser 03/23/2017  missing 'ln' for ElementaryFunctionQ added
#Nasser 03/24/2017  corrected the check for complex result
#Nasser 10/27/2017  check for leafsize and do not call ExpnType()
#                   if leaf size is "too large". Set at 500,000
```

```
#Nasser 12/22/2019  Added debug flag, added 'dilog' to special functions
#                   see problem 156, file Apostol_Problems

GradeAntiderivative := proc(result,optimal)
local leaf_count_result, leaf_count_optimal,ExpnType_result,ExpnType_optimal,
   debug:=false;

      leaf_count_result:=leafcount(result);
      #do NOT call ExpnType() if leaf size is too large. Recursion problem
      if leaf_count_result > 500000 then
          return "B";
      fi;

      leaf_count_optimal:=leafcount(optimal);

      ExpnType_result:=ExpnType(result);
      ExpnType_optimal:=ExpnType(optimal);

      if debug then
         print("ExpnType_result",ExpnType_result," ExpnType_optimal=",
   ExpnType_optimal);
      fi;

# If result and optimal are mathematical expressions,
#  GradeAntiderivative[result,optimal] returns
#   "F" if the result fails to integrate an expression that
#       is integrable
#   "C" if result involves higher level functions than necessary
#   "B" if result is more than twice the size of the optimal
#       antiderivative
#   "A" if result can be considered optimal

  #This check below actually is not needed, since I only
  #call this grading only for passed integrals. i.e. I check
  #for "F" before calling this. But no harm of keeping it here.
  #just in case.


  if not type(result,freeof('int')) then
     return "F";
  end if;


  if ExpnType_result<=ExpnType_optimal then
      if debug then
          print("ExpnType_result<=ExpnType_optimal");
      fi;
```

```
      if is_contains_complex(result) then
         if is_contains_complex(optimal) then
            if debug then
               print("both result and optimal complex");
            fi;
            #both result and optimal complex
            if leaf_count_result<=2*leaf_count_optimal then
               return "A";
            else
               return "B";
            end if
         else #result contains complex but optimal is not
            if debug then
               print("result contains complex but optimal is not");
            fi;
            return "C";
         end if
      else # result do not contain complex
           # this assumes optimal do not as well
           if debug then
               print("result do not contain complex, this assumes optimal do not
    as well");
           fi;
           if leaf_count_result<=2*leaf_count_optimal then
              if debug then
                 print("leaf_count_result<=2*leaf_count_optimal");
              fi;
              return "A";
           else
              if debug then
                 print("leaf_count_result>2*leaf_count_optimal");
              fi;
              return "B";
           end if
      end if
  else #ExpnType(result) > ExpnType(optimal)
      if debug then
         print("ExpnType(result) > ExpnType(optimal)");
      fi;
      return "C";
  end if

end proc:

#
# is_contains_complex(result)
# takes expressions and returns true if it contains "I" else false
```

```
#
#Nasser 032417
is_contains_complex:= proc(expression)
  return (has(expression,I));
end proc:

# The following summarizes the type number assigned an expression
# based on the functions it involves
# 1 = rational function
# 2 = algebraic function
# 3 = elementary function
# 4 = special function
# 5 = hyperpergeometric function
# 6 = appell function
# 7 = rootsum function
# 8 = integrate function
# 9 = unknown function

ExpnType := proc(expn)
  if type(expn,'atomic') then
    1
  elif type(expn,'list') then
    apply(max,map(ExpnType,expn))
  elif type(expn,'sqrt') then
    if type(op(1,expn),'rational') then
       1
    else
       max(2,ExpnType(op(1,expn)))
    end if
  elif type(expn,'`^`') then
    if type(op(2,expn),'integer') then
      ExpnType(op(1,expn))
    elif type(op(2,expn),'rational') then
      if type(op(1,expn),'rational') then
         1
      else
         max(2,ExpnType(op(1,expn)))
      end if
    else
         max(3,ExpnType(op(1,expn)),ExpnType(op(2,expn)))
    end if
  elif type(expn,'`+`') or type(expn,'`*`') then
    max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
  elif ElementaryFunctionQ(op(0,expn)) then
    max(3,ExpnType(op(1,expn)))
  elif SpecialFunctionQ(op(0,expn)) then
    max(4,apply(max,map(ExpnType,[op(expn)])))
```

```
  elif HypergeometricFunctionQ(op(0,expn)) then
    max(5,apply(max,map(ExpnType,[op(expn)])))
  elif AppellFunctionQ(op(0,expn)) then
    max(6,apply(max,map(ExpnType,[op(expn)])))
  elif op(0,expn)='int' then
    max(8,apply(max,map(ExpnType,[op(expn)]))) else
  9
  end if
end proc:


ElementaryFunctionQ := proc(func)
  member(func,[
        exp,log,ln,
        sin,cos,tan,cot,sec,csc,
        arcsin,arccos,arctan,arccot,arcsec,arccsc,
        sinh,cosh,tanh,coth,sech,csch,
        arcsinh,arccosh,arctanh,arccoth,arcsech,arccsch])
end proc:

SpecialFunctionQ := proc(func)
  member(func,[
        erf,erfc,erfi,
        FresnelS,FresnelC,
        Ei,Ei,Li,Si,Ci,Shi,Chi,
        GAMMA,lnGAMMA,Psi,Zeta,polylog,dilog,LambertW,
        EllipticF,EllipticE,EllipticPi])
end proc:

HypergeometricFunctionQ := proc(func)
  member(func,[Hypergeometric1F1,hypergeom,HypergeometricPFQ])
end proc:

AppellFunctionQ := proc(func)
  member(func,[AppellF1])
end proc:

# u is a sum or product.  rest(u) returns all but the
# first term or factor of u.
rest := proc(u) local v;
  if nops(u)=2 then
     op(2,u)
  else
     apply(op(0,u),op(2..nops(u),u))
  end if
end proc:
```

```
#leafcount(u) returns the number of nodes in u.
#Nasser 3/23/17  Replaced by build-in leafCount from package in Maple
leafcount := proc(u)
   MmaTranslator[Mma][LeafCount](u);
end proc:
```

4.0.3 Sympy grading function

```
#Dec 24, 2019. Nasser M. Abbasi:
#              Port of original Maple grading function by
#              Albert Rich to use with Sympy/Python
#Dec 27, 2019  Nasser. Added `RootSum`. See problem 177, Timofeev file
#              added 'exp_polar'
from sympy import *

def leaf_count(expr):
    #sympy do not have leaf count function. This is approximation
    return round(1.7*count_ops(expr))

def is_sqrt(expr):
    if isinstance(expr,Pow):
        if expr.args[1] == Rational(1,2):
            return True
        else:
            return False
    else:
        return False

def is_elementary_function(func):
    return func in [exp,log,ln,sin,cos,tan,cot,sec,csc,
            asin,acos,atan,acot,asec,acsc,sinh,cosh,tanh,coth,sech,csch,
            asinh,acosh,atanh,acoth,asech,acsch
        ]

def is_special_function(func):
    return func in [ erf,erfc,erfi,
             fresnels,fresnelc,Ei,Ei,Li,Si,Ci,Shi,Chi,
             gamma,loggamma,digamma,zeta,polylog,LambertW,
             elliptic_f,elliptic_e,elliptic_pi,exp_polar
         ]

def is_hypergeometric_function(func):
    return func in [hyper]

def is_appell_function(func):
    return func in [appellf1]
```

```
def is_atom(expn):
    try:
        if expn.isAtom or isinstance(expn,int) or isinstance(expn,float):
           return True
        else:
           return False

    except AttributeError as error:
        return False

def expnType(expn):
    debug=False
    if debug:
        print("expn=",expn,"type(expn)=",type(expn))

    if is_atom(expn):
       return 1
    elif isinstance(expn,list):
        return max(map(expnType, expn))   #apply(max,map(ExpnType,expn))
    elif  is_sqrt(expn):
        if isinstance(expn.args[0],Rational): #type(op(1,expn),'rational')
            return 1
        else:
            return max(2,expnType(expn.args[0]))  #max(2,ExpnType(op(1,expn)))
    elif isinstance(expn,Pow):   #type(expn,'`^`')
        if isinstance(expn.args[1],Integer):  #type(op(2,expn),'integer')
            return expnType(expn.args[0])   #ExpnType(op(1,expn))
        elif isinstance(expn.args[1],Rational):  #type(op(2,expn),'rational')
            if isinstance(expn.args[0],Rational): #type(op(1,expn),'rational')
                return 1
            else:
                return max(2,expnType(expn.args[0]))  #max(2,ExpnType(op(1,expn)
   ))
        else:
            return max(3,expnType(expn.args[0]),expnType(expn.args[1])) #max(3,
   ExpnType(op(1,expn)),ExpnType(op(2,expn)))
    elif isinstance(expn,Add) or isinstance(expn,Mul): #type(expn,'`+`') or type
   (expn,'`*`')
        m1 = expnType(expn.args[0])
        m2 = expnType(list(expn.args[1:]))
        return max(m1,m2)  #max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
    elif is_elementary_function(expn.func):  #ElementaryFunctionQ(op(0,expn))
        return max(3,expnType(expn.args[0]))  #max(3,ExpnType(op(1,expn)))
    elif is_special_function(expn.func): #SpecialFunctionQ(op(0,expn))
        m1 = max(map(expnType, list(expn.args)))
        return max(4,m1)   #max(4,apply(max,map(ExpnType,[op(expn)])))
```

```
    elif is_hypergeometric_function(expn.func): #HypergeometricFunctionQ(op(0,
   expn))
        m1 = max(map(expnType, list(expn.args)))
        return max(5,m1)   #max(5,apply(max,map(ExpnType,[op(expn)])))
    elif is_appell_function(expn.func):
        m1 = max(map(expnType, list(expn.args)))
        return max(6,m1)   #max(5,apply(max,map(ExpnType,[op(expn)])))
    elif isinstance(expn,RootSum):
        m1 = max(map(expnType, list(expn.args))) #Apply[Max,Append[Map[ExpnType,
   Apply[List,expn]],7]],
        return max(7,m1)
    elif str(expn).find("Integral") != -1:
        m1 = max(map(expnType, list(expn.args)))
        return max(8,m1)   #max(5,apply(max,map(ExpnType,[op(expn)])))
    else:
        return 9

#main function
def grade_antiderivative(result,optimal):

    leaf_count_result  = leaf_count(result)
    leaf_count_optimal = leaf_count(optimal)

    expnType_result  = expnType(result)
    expnType_optimal = expnType(optimal)

    if str(result).find("Integral") != -1:
        return "F"

    if expnType_result <= expnType_optimal:
        if result.has(I):
            if optimal.has(I): #both result and optimal complex
                if leaf_count_result <= 2*leaf_count_optimal:
                    return "A"
                else:
                    return "B"
            else: #result contains complex but optimal is not
                return "C"
        else: # result do not contain complex, this assumes optimal do not as
   well
            if leaf_count_result <= 2*leaf_count_optimal:
                return "A"
            else:
                return "B"
    else:
        return "C"
```

4.0.4 SageMath grading function

```
#Dec 24, 2019. Nasser: Ported original Maple grading function by
#              Albert Rich to use with Sagemath. This is used to
#              grade Fricas, Giac and Maxima results.
#Dec 24, 2019. Nasser: Added 'exp_integral_e' and 'sng', 'sin_integral'
#              'arctan2','floor','abs','log_integral'

from sage.all import *
from sage.symbolic.operators import add_vararg, mul_vararg

debug=False;

def tree_size(expr):
    r"""
    Return the tree size of this expression.
    """
    if expr not in SR:
        # deal with lists, tuples, vectors
        return 1 + sum(tree_size(a) for a in expr)
    expr = SR(expr)
    x, aa = expr.operator(), expr.operands()
    if x is None:
        return 1
    else:
        return 1 + sum(tree_size(a) for a in aa)

def is_sqrt(expr):
    if expr.operator() == operator.pow:   #isinstance(expr,Pow):
        if expr.operands()[1]==1/2: #expr.args[1] == Rational(1,2):
            if debug: print ("expr is sqrt")
            return True
        else:
            return False
    else:
        return False

def is_elementary_function(func):
    debug=False
    m = func.name() in ['exp','log','ln',
            'sin','cos','tan','cot','sec','csc',
            'arcsin','arccos','arctan','arccot','arcsec','arccsc',
            'sinh','cosh','tanh','coth','sech','csch',
            'arcsinh','arccosh','arctanh','arccoth','arcsech','arccsch','sgn',
        'arctan2','floor','abs'
        ]
    if debug:
        if m:
```

```
            print ("func ", func , " is elementary_function")
        else:
            print ("func ", func , " is NOT elementary_function")


    return m

def is_special_function(func):
    debug=False
    if debug: print ("type(func)=", type(func))

    m= func.name() in ['erf','erfc','erfi','fresnel_sin','fresnel_cos','Ei',
            'Ei','Li','Si','sin_integral','Ci','cos_integral','Shi','
    sinh_integral'
            'Chi','cosh_integral','gamma','log_gamma','psi,zeta',
            'polylog','lambert_w','elliptic_f','elliptic_e',
            'elliptic_pi','exp_integral_e','log_integral']

    if debug:
        print ("m=",m)
        if m:
            print ("func ", func ," is special_function")
        else:
            print ("func ", func ," is NOT special_function")


    return m


def is_hypergeometric_function(func):
    return func.name() in ['hypergeometric','hypergeometric_M','hypergeometric_U
    ']

def is_appell_function(func):
    return func.name() in ['hypergeometric']   #[appellf1] can't find this in
    sagemath

def is_atom(expn):

    debug=False
    if debug: print ("Enter is_atom")


    #thanks to answer at https://ask.sagemath.org/question/49179/what-is-
    sagemath-equivalent-to-atomic-type-in-maple/
    try:
        if expn.parent() is SR:
```

```
            return expn.operator() is None
        if expn.parent() in (ZZ, QQ, AA, QQbar):
            return expn in expn.parent() # Should always return True
        if hasattr(expn.parent(),"base_ring") and hasattr(expn.parent(),"gens"):
            return expn in expn.parent().base_ring() or expn in expn.parent().
    gens()
        return False

    except AttributeError as error:
        return False


def expnType(expn):

    if debug:
        print (">>>>>Enter expnType, expn=", expn)
        print (">>>>>is_atom(expn)=", is_atom(expn))

    if is_atom(expn):
        return 1
    elif type(expn)==list:   #isinstance(expn,list):
        return max(map(expnType, expn))   #apply(max,map(ExpnType,expn))
    elif  is_sqrt(expn):
        if  type(expn.operands()[0])==Rational: #type(isinstance(expn.args[0],
    Rational):
            return 1
        else:
            return max(2,expnType(expn.operands()[0]))  #max(2,expnType(expn.
    args[0]))
    elif expn.operator() == operator.pow:   #isinstance(expn,Pow)
        if type(expn.operands()[1])==Integer:  #isinstance(expn.args[1],Integer)
            return expnType(expn.operands()[0])   #expnType(expn.args[0])
        elif type(expn.operands()[1])==Rational:  #isinstance(expn.args[1],
    Rational)
            if type(expn.operands()[0])==Rational: #isinstance(expn.args[0],
    Rational)
                return 1
            else:
                return max(2,expnType(expn.operands()[0]))  #max(2,expnType(expn.
    args[0]))
        else:
            return max(3,expnType(expn.operands()[0]),expnType(expn.operands()
    [1])) #max(3,expnType(expn.operands()[0]),expnType(expn.operands()[1]))
    elif expn.operator() == add_vararg or expn.operator() == mul_vararg: #
    isinstance(expn,Add) or isinstance(expn,Mul)
        m1 = expnType(expn.operands()[0]) #expnType(expn.args[0])
        m2 = expnType(expn.operands()[1:]) #expnType(list(expn.args[1:]))
```

```
        return max(m1,m2)  #max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
    elif is_elementary_function(expn.operator()):  #is_elementary_function(expn.
    func)
        return max(3,expnType(expn.operands()[0]))
    elif is_special_function(expn.operator()): #is_special_function(expn.func)
        m1 = max(map(expnType, expn.operands()))      #max(map(expnType, list(
    expn.args)))
        return max(4,m1)   #max(4,m1)
    elif is_hypergeometric_function(expn.operator()): #
    is_hypergeometric_function(expn.func)
        m1 = max(map(expnType, expn.operands()))       #max(map(expnType, list(
    expn.args)))
        return max(5,m1)   #max(5,m1)
    elif is_appell_function(expn.operator()):
        m1 = max(map(expnType, expn.operands()))       #max(map(expnType, list(
    expn.args)))
        return max(6,m1)   #max(6,m1)
    elif str(expn).find("Integral") != -1: #this will never happen, since it
                #is checked before calling the grading function that is passed.
                #but kept it here.
        m1 = max(map(expnType, expn.operands()))       #max(map(expnType, list(
    expn.args)))
        return max(8,m1)   #max(5,apply(max,map(ExpnType,[op(expn)])))
    else:
        return 9

#main function
def grade_antiderivative(result,optimal):

    if debug: print ("Enter grade_antiderivative for sagemath")

    leaf_count_result  = tree_size(result) #leaf_count(result)
    leaf_count_optimal = tree_size(optimal) #leaf_count(optimal)

    if debug: print ("leaf_count_result=", leaf_count_result, "
    leaf_count_optimal=",leaf_count_optimal)


    expnType_result  = expnType(result)
    expnType_optimal = expnType(optimal)

    if debug: print ("expnType_result=", expnType_result, "expnType_optimal=",
    expnType_optimal)

    if expnType_result <= expnType_optimal:
        if result.has(I):
            if optimal.has(I): #both result and optimal complex
```

```
            if leaf_count_result <= 2*leaf_count_optimal:
                return "A"
            else:
                return "B"
        else: #result contains complex but optimal is not
            return "C"
    else: # result do not contain complex, this assumes optimal do not as
well
        if leaf_count_result <= 2*leaf_count_optimal:
            return "A"
        else:
            return "B"
else:
    return "C"
```