Computer algebra independent integration tests

2-Exponentials/2.1-u-F^-c-a+b-x-^n

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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 [98]. This is test number [53].

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 (98)	% 0.00 (0)
Mathematica	% 100.00 (98)	% 0.00 (0)
Maple	% 79.59 (78)	% 20.41 (20)
Maxima	% 65.31 (64)	% 34.69 (34)
Fricas	% 94.90 (93)	% 5.10 (5)
Sympy	% 40.82 (40)	% 59.18 (58)
Giac	% 56.12 (55)	% 43.88 (43)
Mupad	% 59.18 (58)	% 40.82 (40)

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.

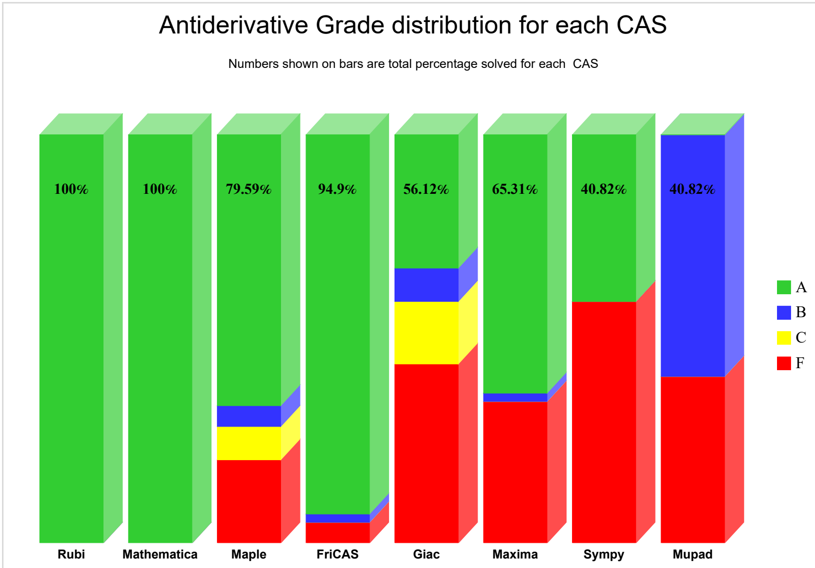
Table 1.2: Description of grading applied to integration result

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

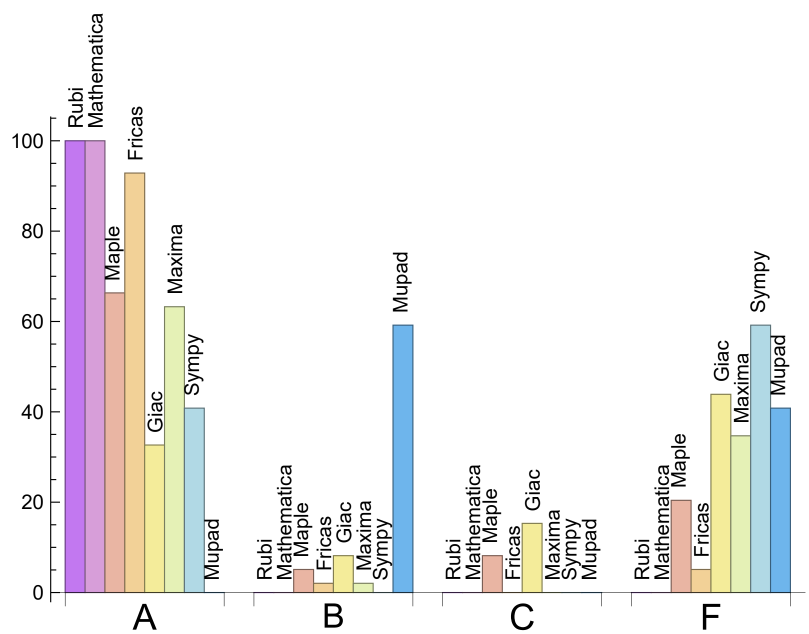
System	% A grade	% B grade	% C grade	% F grade
Rubi	100.00	0.00	0.00	0.00
Mathematica	100.00	0.00	0.00	0.00
Maple	66.33	5.10	8.16	20.41
Maxima	63.27	2.04	0.00	34.69
Fricas	92.86	2.04	0.00	5.10
Sympy	40.82	0.00	0.00	59.18
Giac	32.65	8.16	15.31	43.88
Mupad	0.00	59.18	0.00	40.82

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 time-out failure	Percentage exception failure
Rubi	0	0.00 %	0.00 %	0.00 %
Mathematica	0	0.00 %	0.00 %	0.00 %
Maple	20	100.00 %	0.00 %	0.00 %
Maxima	34	100.00 %	0.00 %	0.00 %
Fricas	5	100.00 %	0.00 %	0.00 %
Sympy	58	63.79 %	36.21 %	0.00 %
Giac	43	83.72 %	4.65 %	11.63 %
Mupad	40	100.00 %	0.00 %	0.00 %

Table 1.4: Time and leaf size performance for each CAS

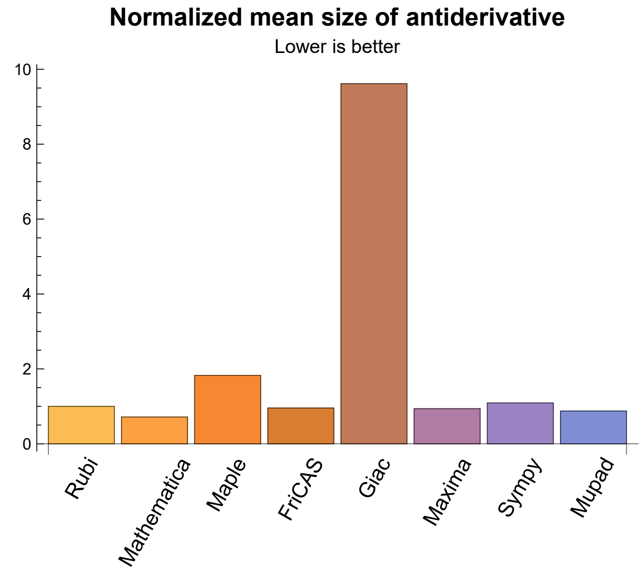
1.3 Performance

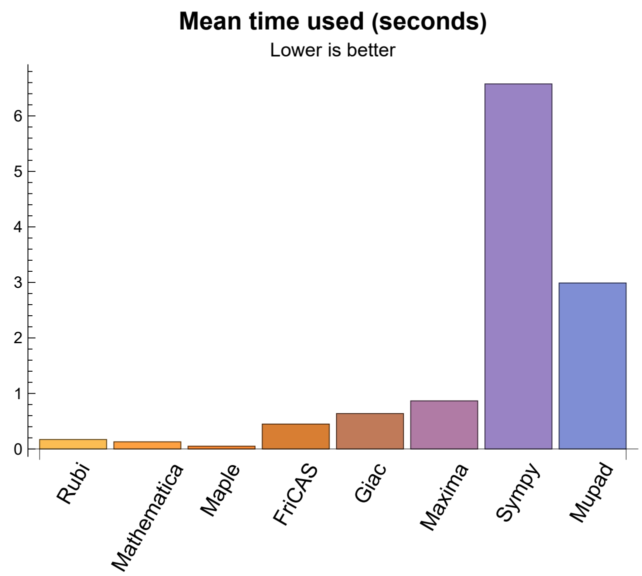
The table below summarizes the performance of each CAS system in terms of CPU time and leaf size of results.

System	Mean time (sec)	Mean size	Normalized mean	Median size	Normalized median
Rubi	0.17	134.81	1.00	95.50	1.00
Mathematica	0.13	86.01	0.72	65.50	0.71
Maple	0.05	177.45	1.83	137.00	1.15
Maxima	0.87	113.80	0.94	62.00	0.80
Fricas	0.45	131.90	0.96	83.00	0.88
Sympy	6.58	185.28	1.09	112.50	0.87
Giac	0.64	1563.91	9.62	183.00	1.09
Mupad	2.99	114.10	0.88	80.00	0.82

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

{}

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

Rubi {}

Mathematica {}

Maple {}

Maxima {}

Fricas {}

Sympy {}

Giac {}

Mupad {}

1.6 list of integrals solved by CAS but failed verification

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

Rubi {}

Mathematica {}

Maple Verification phase not implemented yet.

Maxima Verification phase not implemented yet.

Fricas Verification phase not implemented yet.

Sympy Verification phase not implemented yet.

Giac Verification phase not implemented yet.

Mupad Verification phase not implemented yet.

1.7 Timing

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

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

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

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

1.8 Verification

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

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

1.9 Important notes about some of the results

1.9.1 Important note about Maxima results

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

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

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

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

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

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

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

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

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

1.9.2 Important note about FriCAS and Giac/XCAS results

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

These will fail With error `Exception raised: NotImplementedError`

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

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

1.9.3 Important note about finding leaf size of antiderivative

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

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

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

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

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

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

  except Exception as ee:
         leafCount =1
```

1.9.4 Important note about Mupad results

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

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

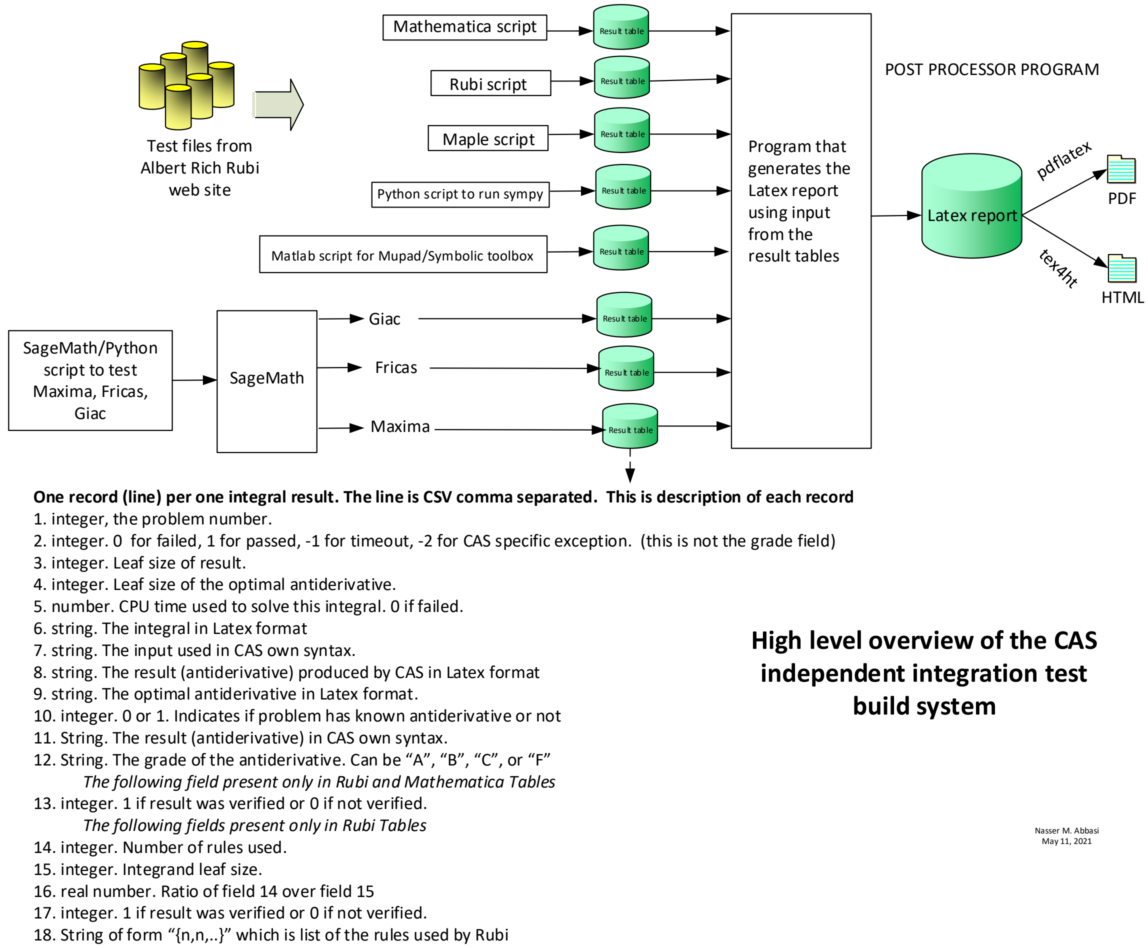
The following is an example of using Matlab's symbolic toolbox (Mupad) to solve an integral

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

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

1.10 Design of the test system

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



Chapter 2

detailed summary tables of results

2.1 List of integrals sorted by grade for each CAS

2.1.1 Rubi

A grade: { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98 }

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, 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 }

B grade: { }

C grade: { }

F grade: { }

2.1.3 Maple

A grade: { 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 48, 51, 52, 53, 54, 56, 57, 58, 59, 60, 61, 62, 63, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 90, 91, 92, 93, 94 }

B grade: { 64, 95, 96, 97, 98 }

C grade: { 55, 83, 84, 85, 86, 87, 88, 89 }

F grade: { 1, 19, 20, 21, 22, 23, 24, 25, 26, 39, 40, 41, 42, 43, 44, 45, 46, 47, 49, 50 }

2.1.4 Maxima

A grade: { 3, 4, 5, 6, 13, 14, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 48, 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, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98 }

B grade: { 2, 12 }

C grade: { }

F grade: { 1, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 39, 40, 41, 42, 43, 44, 45, 46, 47, 49, 50, 78, 79, 80, 81, 82 }

2.1.5 FriCAS

A grade: { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 23, 24, 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, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98 }

B grade: { 81, 82 }

C grade: { }

F grade: { 20, 21, 22, 25, 26 }

2.1.6 Sympy

A grade: { 2, 3, 4, 5, 6, 12, 13, 14, 27, 28, 29, 32, 35, 36, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 65, 66, 67, 68, 74, 75, 76, 77, 90, 91, 92, 93, 94 }

B grade: { }

C grade: { }

F grade: { 1, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 30, 31, 33, 34, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 64, 69, 70, 71, 72, 73, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 95, 96, 97, 98 }

2.1.7 Giac

A grade: { 6, 27, 28, 29, 30, 31, 32, 33, 34, 43, 48, 56, 57, 58, 59, 60, 61, 62, 63, 74, 75, 76, 77, 90, 91, 92, 93, 94, 95, 96, 97, 98 }

B grade: { 39, 40, 41, 42, 78, 79, 80, 81 }

C grade: { 2, 3, 4, 5, 12, 13, 14, 51, 52, 53, 54, 65, 66, 67, 68 }

F grade: { 1, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 35, 36, 37, 38, 44, 45, 46, 47, 49, 50, 55, 64, 69, 70, 71, 72, 73, 82, 83, 84, 85, 86, 87, 88, 89 }

2.1.8 Mupad

A grade: { }

B grade: { 2, 3, 4, 5, 6, 12, 13, 14, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 48, 51, 52, 53, 54, 56, 57, 58, 59, 60, 61, 62, 63, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94 }

C grade: { }

F grade: { 1, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 39, 40, 41, 42, 43, 44, 45, 46, 47, 49, 50, 55, 64, 78, 79, 80, 81, 82, 95, 96, 97, 98 }

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	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	67	67	67	0	0	65	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.97	0.00	0.00	-0.01
time (sec)	N/A	0.040	0.038	0.075	0.000	0.601	0.000	0.000	0.000

Problem 2	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	B	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	141	141	100	260	309	227	350	7867	260
normalized size	1	1.00	0.71	1.84	2.19	1.61	2.48	55.79	1.84
time (sec)	N/A	0.108	0.126	0.012	0.504	0.653	0.275	1.671	3.681

Problem 3	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	110	110	78	165	206	147	231	4693	165
normalized size	1	1.00	0.71	1.50	1.87	1.34	2.10	42.66	1.50
time (sec)	N/A	0.073	0.086	0.008	0.491	0.592	0.224	1.571	3.564

Problem 4	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	79	79	56	91	123	84	133	2494	91
normalized size	1	1.00	0.71	1.15	1.56	1.06	1.68	31.57	1.15
time (sec)	N/A	0.043	0.068	0.007	0.504	0.673	0.181	0.910	3.507

Problem 5	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	48	48	34	38	60	38	60	1083	38
normalized size	1	1.00	0.71	0.79	1.25	0.79	1.25	22.56	0.79
time (sec)	N/A	0.017	0.038	0.006	0.488	0.818	0.138	0.670	3.371

Problem 6	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	20	20	21	21	20	21	20	21	21
normalized size	1	1.00	1.05	1.05	1.00	1.05	1.00	1.05	1.05
time (sec)	N/A	0.004	0.005	0.003	0.482	0.438	0.100	0.314	3.428

Problem 7	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	31	31	31	56	0	39	0	0	-1
normalized size	1	1.00	1.00	1.81	0.00	1.26	0.00	0.00	-0.03
time (sec)	N/A	0.024	0.042	0.050	0.000	0.414	0.000	0.000	0.000

Problem 8	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	55	99	0	77	0	0	-1
normalized size	1	1.00	0.96	1.74	0.00	1.35	0.00	0.00	-0.02
time (sec)	N/A	0.043	0.119	0.053	0.000	0.417	0.000	0.000	0.000

Problem 9	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	95	95	88	155	0	134	0	0	-1
normalized size	1	1.00	0.93	1.63	0.00	1.41	0.00	0.00	-0.01
time (sec)	N/A	0.071	0.153	0.060	0.000	0.416	0.000	0.000	0.000

Problem 10	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	128	128	99	199	0	209	0	0	-1
normalized size	1	1.00	0.77	1.55	0.00	1.63	0.00	0.00	-0.01
time (sec)	N/A	0.100	0.194	0.066	0.000	0.435	0.000	0.000	0.000

Problem 11	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	161	161	121	243	0	300	0	0	-1
normalized size	1	1.00	0.75	1.51	0.00	1.86	0.00	0.00	-0.01
time (sec)	N/A	0.134	0.164	0.075	0.000	0.446	0.000	0.000	0.000

Problem 12	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	B	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	141	141	100	260	309	227	350	7867	260
normalized size	1	1.00	0.71	1.84	2.19	1.61	2.48	55.79	1.84
time (sec)	N/A	0.122	0.062	0.010	0.514	0.423	0.273	1.604	3.486

Problem 13	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	110	110	78	165	206	147	231	4693	165
normalized size	1	1.00	0.71	1.50	1.87	1.34	2.10	42.66	1.50
time (sec)	N/A	0.086	0.079	0.011	0.495	0.424	0.221	1.150	3.429

Problem 14	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	79	79	56	91	123	84	133	2494	91
normalized size	1	1.00	0.71	1.15	1.56	1.06	1.68	31.57	1.15
time (sec)	N/A	0.045	0.037	0.009	0.504	0.425	0.177	0.900	3.403

Problem 15	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	55	99	0	77	0	0	-1
normalized size	1	1.00	0.96	1.74	0.00	1.35	0.00	0.00	-0.02
time (sec)	N/A	0.043	0.061	0.066	0.000	0.439	0.000	0.000	0.000

Problem 16	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	95	95	88	155	0	134	0	0	-1
normalized size	1	1.00	0.93	1.63	0.00	1.41	0.00	0.00	-0.01
time (sec)	N/A	0.098	0.050	0.080	0.000	0.450	0.000	0.000	0.000

Problem 17	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	128	128	99	199	0	209	0	0	-1
normalized size	1	1.00	0.77	1.55	0.00	1.63	0.00	0.00	-0.01
time (sec)	N/A	0.134	0.044	0.095	0.000	0.468	0.000	0.000	0.000

Problem 18	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	F(-1)	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	161	161	121	243	0	300	0	0	-1
normalized size	1	1.00	0.75	1.51	0.00	1.86	0.00	0.00	-0.01
time (sec)	N/A	0.180	0.032	0.117	0.000	0.451	0.000	0.000	0.000

Problem 19	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	72	72	72	0	0	68	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.94	0.00	0.00	-0.01
time (sec)	N/A	0.054	0.012	0.072	0.000	0.431	0.000	0.000	0.000

Problem 20	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	71	0	0	0	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.070	0.015	0.173	0.000	0.433	0.000	0.000	0.000

Problem 21	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	71	0	0	0	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.060	0.014	0.120	0.000	0.456	0.000	0.000	0.000

Problem 22	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	71	0	0	0	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.057	0.014	0.143	0.000	0.430	0.000	0.000	0.000

Problem 23	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	67	67	67	0	0	65	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.97	0.00	0.00	-0.01
time (sec)	N/A	0.022	0.012	0.001	0.000	0.439	0.000	0.000	0.000

Problem 24	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	69	69	69	0	0	67	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.97	0.00	0.00	-0.01
time (sec)	N/A	0.024	0.014	0.073	0.000	0.445	0.000	0.000	0.000

Problem 25	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	73	73	73	0	0	0	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.057	0.011	0.140	0.000	0.430	0.000	0.000	0.000

Problem 26	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	F	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	73	73	73	0	0	0	0	0	-1
normalized size	1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	-0.01
time (sec)	N/A	0.060	0.012	0.122	0.000	0.448	0.000	0.000	0.000

Problem 27	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	15	15	15	14	13	13	15	13	13
normalized size	1	1.00	1.00	0.93	0.87	0.87	1.00	0.87	0.87
time (sec)	N/A	0.003	0.004	0.006	0.432	0.409	0.094	0.261	3.538

Problem 28	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	15	15	15	16	15	15	15	15	15
normalized size	1	1.00	1.00	1.07	1.00	1.00	1.00	1.00	1.00
time (sec)	N/A	0.003	0.003	0.005	0.429	0.420	0.099	0.264	3.442

Problem 29	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	19	19	19	14	13	13	10	13	11
normalized size	1	1.00	1.00	0.74	0.68	0.68	0.53	0.68	0.58
time (sec)	N/A	0.005	0.005	0.013	0.428	0.404	0.093	0.362	0.092

Problem 30	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	131	131	36	99	24	89	0	94	82
normalized size	1	1.00	0.27	0.76	0.18	0.68	0.00	0.72	0.63
time (sec)	N/A	0.147	0.007	0.032	0.640	0.471	0.000	0.308	3.433

Problem 31	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	108	108	36	87	24	77	0	82	72
normalized size	1	1.00	0.33	0.81	0.22	0.71	0.00	0.76	0.67
time (sec)	N/A	0.094	0.007	0.020	0.698	0.425	0.000	0.483	3.464

Problem 32	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	85	85	36	75	24	65	37	70	75
normalized size	1	1.00	0.42	0.88	0.28	0.76	0.44	0.82	0.88
time (sec)	N/A	0.066	0.006	0.019	0.651	0.439	130.971	0.425	3.417

Problem 33	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	62	62	30	66	24	51	0	58	55
normalized size	1	1.00	0.48	1.06	0.39	0.82	0.00	0.94	0.89
time (sec)	N/A	0.044	0.009	0.019	0.642	0.430	0.000	0.334	3.411

Problem 34	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	38	38	30	27	29	34	0	28	32
normalized size	1	1.00	0.79	0.71	0.76	0.89	0.00	0.74	0.84
time (sec)	N/A	0.025	0.007	0.019	0.637	0.417	0.000	0.275	3.497

Problem 35	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	54	54	38	64	24	44	34	0	42
normalized size	1	1.00	0.70	1.19	0.44	0.81	0.63	0.00	0.78
time (sec)	N/A	0.045	0.016	0.021	0.633	0.445	4.509	0.000	3.488

Problem 36	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	77	77	49	72	24	58	39	0	61
normalized size	1	1.00	0.64	0.94	0.31	0.75	0.51	0.00	0.79
time (sec)	N/A	0.065	0.039	0.022	0.643	0.441	53.166	0.000	3.505

Problem 37	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	100	100	61	84	24	74	0	0	80
normalized size	1	1.00	0.61	0.84	0.24	0.74	0.00	0.00	0.80
time (sec)	N/A	0.089	0.052	0.022	0.641	0.437	0.000	0.000	3.453

Problem 38	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	123	123	73	96	24	86	0	0	99
normalized size	1	1.00	0.59	0.78	0.20	0.70	0.00	0.00	0.80
time (sec)	N/A	0.108	0.064	0.023	0.640	0.426	0.000	0.000	3.525

Problem 39	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	208	208	72	0	0	230	0	1091	-1
normalized size	1	1.00	0.35	0.00	0.00	1.11	0.00	5.25	-0.00
time (sec)	N/A	0.266	0.028	0.073	0.000	0.436	0.000	1.754	0.000

Problem 40	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	173	173	72	0	0	167	0	691	-1
normalized size	1	1.00	0.42	0.00	0.00	0.97	0.00	3.99	-0.01
time (sec)	N/A	0.166	0.025	0.074	0.000	0.448	0.000	1.300	0.000

Problem 41	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	138	138	63	0	0	121	0	401	-1
normalized size	1	1.00	0.46	0.00	0.00	0.88	0.00	2.91	-0.01
time (sec)	N/A	0.119	0.074	0.075	0.000	0.440	0.000	0.906	0.000

Problem 42	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	105	105	63	0	0	90	0	198	-1
normalized size	1	1.00	0.60	0.00	0.00	0.86	0.00	1.89	-0.01
time (sec)	N/A	0.077	0.039	0.076	0.000	0.439	0.000	0.523	0.000

Problem 43	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	72	72	63	0	0	64	0	58	-1
normalized size	1	1.00	0.88	0.00	0.00	0.89	0.00	0.81	-0.01
time (sec)	N/A	0.045	0.029	0.072	0.000	0.426	0.000	0.390	0.000

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	97	97	75	0	0	90	0	0	-1
normalized size	1	1.00	0.77	0.00	0.00	0.93	0.00	0.00	-0.01
time (sec)	N/A	0.085	0.078	0.074	0.000	0.426	0.000	0.000	0.000

Problem 45	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	130	130	92	0	0	140	0	0	-1
normalized size	1	1.00	0.71	0.00	0.00	1.08	0.00	0.00	-0.01
time (sec)	N/A	0.119	0.237	0.074	0.000	0.427	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(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	165	165	118	0	0	230	0	0	-1
normalized size	1	1.00	0.72	0.00	0.00	1.39	0.00	0.00	-0.01
time (sec)	N/A	0.165	0.139	0.073	0.000	0.431	0.000	0.000	0.000

Problem 47	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	200	200	144	0	0	321	0	0	-1
normalized size	1	1.00	0.72	0.00	0.00	1.60	0.00	0.00	-0.00
time (sec)	N/A	0.203	0.168	0.073	0.000	0.435	0.000	0.000	0.000

Problem 48	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	151	151	24	145	79	82	0	80	89
normalized size	1	1.00	0.16	0.96	0.52	0.54	0.00	0.53	0.59
time (sec)	N/A	0.155	0.005	0.137	0.839	0.448	0.000	0.364	3.434

Problem 49	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	63	0	0	117	0	0	-1
normalized size	1	1.00	0.89	0.00	0.00	1.65	0.00	0.00	-0.01
time (sec)	N/A	0.031	0.079	0.074	0.000	0.451	0.000	0.000	0.000

Problem 50	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	F	F	A	F(-1)	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	98	98	78	0	0	133	0	0	-1
normalized size	1	1.00	0.80	0.00	0.00	1.36	0.00	0.00	-0.01
time (sec)	N/A	0.104	0.138	0.077	0.000	0.494	0.000	0.000	0.000

Problem 51	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	48	48	34	38	60	38	60	1083	38
normalized size	1	1.00	0.71	0.79	1.25	0.79	1.25	22.56	0.79
time (sec)	N/A	0.017	0.029	0.006	0.539	0.414	0.145	0.649	0.002

Problem 52	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	135	135	56	80	117	74	116	2490	80
normalized size	1	1.00	0.41	0.59	0.87	0.55	0.86	18.44	0.59
time (sec)	N/A	0.103	0.079	0.009	0.700	0.418	0.171	0.755	3.396

Problem 53	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	229	229	84	138	194	122	190	4287	138
normalized size	1	1.00	0.37	0.60	0.85	0.53	0.83	18.72	0.60
time (sec)	N/A	0.191	0.116	0.007	0.848	0.428	0.219	0.939	3.542

Problem 54	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	348	348	117	212	291	182	284	7425	212
normalized size	1	1.00	0.34	0.61	0.84	0.52	0.82	21.34	0.61
time (sec)	N/A	0.312	0.179	0.009	0.840	0.408	0.263	1.314	3.531

Problem 55	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	A	A	A	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	116	116	61	334	123	126	109	0	-1
normalized size	1	1.00	0.53	2.88	1.06	1.09	0.94	0.00	-0.01
time (sec)	N/A	0.175	0.059	0.109	0.964	0.421	34.422	0.000	0.000

Problem 56	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	397	397	121	182	196	121	236	202	175
normalized size	1	1.00	0.30	0.46	0.49	0.30	0.59	0.51	0.44
time (sec)	N/A	0.516	0.357	0.006	0.550	0.434	0.240	0.297	3.535

Problem 57	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	318	318	130	143	164	102	196	163	126
normalized size	1	1.00	0.41	0.45	0.52	0.32	0.62	0.51	0.40
time (sec)	N/A	0.412	0.210	0.006	0.518	0.418	0.215	0.315	3.523

Problem 58	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	184	184	96	102	132	78	148	123	117
normalized size	1	1.00	0.52	0.55	0.72	0.42	0.80	0.67	0.64
time (sec)	N/A	0.242	0.133	0.004	0.488	0.435	0.190	0.401	3.430

Problem 59	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	80	80	41	68	103	57	104	87	66
normalized size	1	1.00	0.51	0.85	1.29	0.71	1.30	1.09	0.82
time (sec)	N/A	0.068	0.048	0.004	0.699	0.413	0.168	0.296	0.109

Problem 60	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	102	102	52	113	69	50	70	95	69
normalized size	1	1.00	0.51	1.11	0.68	0.49	0.69	0.93	0.68
time (sec)	N/A	0.156	0.055	0.015	0.704	0.405	16.642	0.324	3.558

Problem 61	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	94	94	54	92	61	56	99	92	72
normalized size	1	1.00	0.57	0.98	0.65	0.60	1.05	0.98	0.77
time (sec)	N/A	0.161	0.070	0.018	0.966	0.400	5.866	0.445	3.635

Problem 62	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	130	130	68	112	64	70	56	125	100
normalized size	1	1.00	0.52	0.86	0.49	0.54	0.43	0.96	0.77
time (sec)	N/A	0.213	0.077	0.017	1.236	0.425	5.302	0.328	3.636

Problem 63	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	198	198	81	167	63	83	53	183	142
normalized size	1	1.00	0.41	0.84	0.32	0.42	0.27	0.92	0.72
time (sec)	N/A	0.290	0.113	0.019	1.168	0.401	5.330	0.410	3.565

Problem 64	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	A	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	139	139	86	433	123	161	0	0	-1
normalized size	1	1.00	0.62	3.12	0.88	1.16	0.00	0.00	-0.01
time (sec)	N/A	0.309	0.126	0.121	1.134	0.436	0.000	0.000	0.000

Problem 65	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	414	414	159	250	328	228	323	9953	249
normalized size	1	1.00	0.38	0.60	0.79	0.55	0.78	24.04	0.60
time (sec)	N/A	0.672	0.125	0.011	0.797	0.417	0.283	1.524	3.646

Problem 66	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	328	328	121	197	262	178	260	7061	196
normalized size	1	1.00	0.37	0.60	0.80	0.54	0.79	21.53	0.60
time (sec)	N/A	0.532	0.246	0.010	0.717	0.416	0.281	1.345	3.559

Problem 67	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	242	242	91	144	196	132	199	4696	143
normalized size	1	1.00	0.38	0.60	0.81	0.55	0.82	19.40	0.59
time (sec)	N/A	0.356	0.154	0.011	0.592	0.421	0.227	1.063	3.519

Problem 68	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	A	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	85	85	58	93	134	85	134	2747	92
normalized size	1	1.00	0.68	1.09	1.58	1.00	1.58	32.32	1.08
time (sec)	N/A	0.120	0.072	0.008	0.609	0.414	0.179	0.934	3.443

Problem 69	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	96	96	54	126	87	75	0	0	80
normalized size	1	1.00	0.56	1.31	0.91	0.78	0.00	0.00	0.83
time (sec)	N/A	0.258	0.129	0.062	1.045	0.421	0.000	0.000	3.584

Problem 70	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	85	85	58	135	68	83	0	0	89
normalized size	1	1.00	0.68	1.59	0.80	0.98	0.00	0.00	1.05
time (sec)	N/A	0.277	0.155	0.071	0.918	0.413	0.000	0.000	3.588

Problem 71	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	136	136	76	204	74	89	0	0	133
normalized size	1	1.00	0.56	1.50	0.54	0.65	0.00	0.00	0.98
time (sec)	N/A	0.363	0.153	0.076	1.233	0.404	0.000	0.000	3.601

Problem 72	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	217	217	116	290	85	137	0	0	202
normalized size	1	1.00	0.53	1.34	0.39	0.63	0.00	0.00	0.93
time (sec)	N/A	0.459	0.229	0.079	1.048	0.417	0.000	0.000	3.660

Problem 73	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	321	321	156	382	93	186	0	0	258
normalized size	1	1.00	0.49	1.19	0.29	0.58	0.00	0.00	0.80
time (sec)	N/A	0.578	0.302	0.086	1.015	0.430	0.000	0.000	3.679

Problem 74	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	754	754	458	1062	894	544	1445	1096	803
normalized size	1	1.00	0.61	1.41	1.19	0.72	1.92	1.45	1.06
time (sec)	N/A	0.916	0.718	0.009	1.096	0.413	0.720	0.439	3.819

Problem 75	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	495	495	320	640	599	354	899	674	537
normalized size	1	1.00	0.65	1.29	1.21	0.72	1.82	1.36	1.08
time (sec)	N/A	0.636	0.470	0.008	0.867	0.411	0.496	0.447	3.663

Problem 76	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	271	271	191	297	344	197	447	331	264
normalized size	1	1.00	0.70	1.10	1.27	0.73	1.65	1.22	0.97
time (sec)	N/A	0.339	0.266	0.006	0.786	0.405	0.315	0.416	0.178

Problem 77	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	102	102	50	108	149	83	158	132	120
normalized size	1	1.00	0.49	1.06	1.46	0.81	1.55	1.29	1.18
time (sec)	N/A	0.096	0.066	0.006	0.613	0.400	0.276	0.373	0.110

Problem 78	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	277	277	175	489	0	235	0	546	-1
normalized size	1	1.00	0.63	1.77	0.00	0.85	0.00	1.97	-0.00
time (sec)	N/A	0.338	0.309	0.019	0.000	0.414	0.000	0.401	0.000

Problem 79	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	258	258	163	406	0	353	0	2861	-1
normalized size	1	1.00	0.63	1.57	0.00	1.37	0.00	11.09	-0.00
time (sec)	N/A	0.379	0.440	0.024	0.000	0.417	0.000	0.686	0.000

Problem 80	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	294	294	267	418	0	550	0	1995	-1
normalized size	1	1.00	0.91	1.42	0.00	1.87	0.00	6.79	-0.00
time (sec)	N/A	0.408	0.659	0.024	0.000	0.464	0.000	0.472	0.000

Problem 81	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	B	F(-1)	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	396	396	389	511	0	793	0	3178	-1
normalized size	1	1.00	0.98	1.29	0.00	2.00	0.00	8.03	-0.00
time (sec)	N/A	0.521	0.817	0.023	0.000	0.450	0.000	0.530	0.000

Problem 82	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	B	F(-1)	F(-1)	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	557	557	669	596	0	1084	0	0	-1
normalized size	1	1.00	1.20	1.07	0.00	1.95	0.00	0.00	-0.00
time (sec)	N/A	0.684	0.740	0.024	0.000	0.509	0.000	0.000	0.000

Problem 83	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	A	A	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	24	24	24	192	42	32	0	0	25
normalized size	1	1.00	1.00	8.00	1.75	1.33	0.00	0.00	1.04
time (sec)	N/A	0.146	0.385	0.315	1.678	0.473	0.000	0.000	3.589

Problem 84	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	A	A	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	22	22	23	198	42	25	0	0	23
normalized size	1	1.00	1.05	9.00	1.91	1.14	0.00	0.00	1.05
time (sec)	N/A	0.131	0.311	0.213	1.627	0.658	0.000	0.000	3.499

Problem 85	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	A	A	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	22	22	23	198	42	25	0	0	23
normalized size	1	1.00	1.05	9.00	1.91	1.14	0.00	0.00	1.05
time (sec)	N/A	0.090	0.275	0.210	1.590	0.476	0.000	0.000	3.392

Problem 86	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	A	A	F	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	20	20	21	186	38	23	0	0	21
normalized size	1	1.00	1.05	9.30	1.90	1.15	0.00	0.00	1.05
time (sec)	N/A	0.046	0.180	0.236	1.603	0.461	0.000	0.000	3.479

Problem 87	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	A	A	F	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	19	19	19	180	36	22	0	0	20
normalized size	1	1.00	1.00	9.47	1.89	1.16	0.00	0.00	1.05
time (sec)	N/A	0.129	0.034	0.202	1.613	0.489	0.000	0.000	3.516

Problem 88	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	A	A	F	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	22	22	23	136	39	25	0	0	23
normalized size	1	1.00	1.05	6.18	1.77	1.14	0.00	0.00	1.05
time (sec)	N/A	0.131	0.347	0.224	1.627	0.504	0.000	0.000	3.571

Problem 89	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	A	A	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	22	22	23	136	39	25	0	0	23
normalized size	1	1.00	1.05	6.18	1.77	1.14	0.00	0.00	1.05
time (sec)	N/A	0.131	0.337	0.226	1.625	0.492	0.000	0.000	3.583

Problem 90	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	91	91	45	43	60	43	51	43	45
normalized size	1	1.00	0.49	0.47	0.66	0.47	0.56	0.47	0.49
time (sec)	N/A	0.143	0.022	0.005	0.895	0.471	0.129	0.338	0.130

Problem 91	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	72	72	37	35	48	35	42	35	37
normalized size	1	1.00	0.51	0.49	0.67	0.49	0.58	0.49	0.51
time (sec)	N/A	0.101	0.014	0.004	0.889	0.435	0.125	0.291	0.055

Problem 92	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	53	53	29	27	36	27	34	27	29
normalized size	1	1.00	0.55	0.51	0.68	0.51	0.64	0.51	0.55
time (sec)	N/A	0.064	0.013	0.002	0.900	0.425	0.116	0.350	0.058

Problem 93	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	34	34	21	19	24	19	26	19	18
normalized size	1	1.00	0.62	0.56	0.71	0.56	0.76	0.56	0.53
time (sec)	N/A	0.029	0.010	0.004	0.898	0.411	0.106	0.448	0.045

Problem 94	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	16	16	16	14	14	14	14	14	13
normalized size	1	1.00	1.00	0.88	0.88	0.88	0.88	0.88	0.81
time (sec)	N/A	0.007	0.005	0.003	0.871	0.422	0.093	0.317	3.388

Problem 95	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	A	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	27	27	27	57	10	10	0	10	-1
normalized size	1	1.00	1.00	2.11	0.37	0.37	0.00	0.37	-0.04
time (sec)	N/A	0.058	0.016	0.056	1.227	0.398	0.000	0.358	0.000

Problem 96	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	A	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	48	48	47	116	13	29	0	29	-1
normalized size	1	1.00	0.98	2.42	0.27	0.60	0.00	0.60	-0.02
time (sec)	N/A	0.086	0.028	0.041	1.241	0.430	0.000	0.407	0.000

Problem 97	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	A	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	56	155	15	38	0	46	-1
normalized size	1	1.00	0.79	2.18	0.21	0.54	0.00	0.65	-0.01
time (sec)	N/A	0.119	0.049	0.048	1.244	0.458	0.000	0.356	0.000

Problem 98	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	A	A	F	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	92	92	64	189	15	46	0	63	-1
normalized size	1	1.00	0.70	2.05	0.16	0.50	0.00	0.68	-0.01
time (sec)	N/A	0.155	0.064	0.050	1.248	0.432	0.000	0.356	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 [48] had the largest ratio of [.2500]

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	1	1	1.00	17	0.059
2	A	5	2	1.00	17	0.118
3	A	4	2	1.00	17	0.118
4	A	3	2	1.00	17	0.118
5	A	2	2	1.00	15	0.133
6	A	1	1	1.00	9	0.111
7	A	1	1	1.00	17	0.059
8	A	2	2	1.00	17	0.118
9	A	3	2	1.00	17	0.118
10	A	4	2	1.00	17	0.118
11	A	5	2	1.00	17	0.118
12	A	6	3	1.00	48	0.062
13	A	5	3	1.00	37	0.081
14	A	4	3	1.00	26	0.115
15	A	3	3	1.00	28	0.107

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
16	A	4	3	1.00	39	0.077
17	A	5	3	1.00	50	0.060
18	A	6	3	1.00	61	0.049
19	A	2	2	1.00	19	0.105
20	A	2	2	1.00	50	0.040
21	A	2	2	1.00	39	0.051
22	A	2	2	1.00	28	0.071
23	A	1	1	1.00	17	0.059
24	A	1	1	1.00	19	0.053
25	A	2	2	1.00	30	0.067
26	A	2	2	1.00	41	0.049
27	A	1	1	1.00	7	0.143
28	A	1	1	1.00	7	0.143
29	A	1	1	1.00	7	0.143
30	A	6	3	1.00	13	0.231
31	A	5	3	1.00	13	0.231
32	A	4	3	1.00	13	0.231
33	A	3	3	1.00	13	0.231
34	A	2	2	1.00	13	0.154
35	A	3	3	1.00	13	0.231
36	A	4	3	1.00	13	0.231
37	A	5	3	1.00	13	0.231
38	A	6	3	1.00	13	0.231
39	A	6	3	1.00	19	0.158
40	A	5	3	1.00	19	0.158
41	A	4	3	1.00	19	0.158

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
42	A	3	3	1.00	19	0.158
43	A	2	2	1.00	19	0.105
44	A	3	3	1.00	19	0.158
45	A	4	3	1.00	19	0.158
46	A	5	3	1.00	19	0.158
47	A	6	3	1.00	19	0.158
48	A	9	3	1.00	12	0.250
49	A	1	1	1.00	19	0.053
50	A	2	2	1.00	21	0.095
51	A	2	2	1.00	15	0.133
52	A	8	3	1.00	20	0.150
53	A	12	3	1.00	25	0.120
54	A	17	3	1.00	30	0.100
55	A	6	2	1.00	21	0.095
56	A	24	3	1.00	21	0.143
57	A	20	3	1.00	21	0.143
58	A	11	3	1.00	19	0.158
59	A	4	2	1.00	18	0.111
60	A	9	4	1.00	21	0.190
61	A	8	5	1.00	21	0.238
62	A	9	4	1.00	21	0.190
63	A	12	3	1.00	21	0.143
64	A	5	2	1.00	22	0.091
65	A	17	3	1.00	22	0.136
66	A	14	3	1.00	22	0.136
67	A	11	3	1.00	20	0.150

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
68	A	4	3	1.00	19	0.158
69	A	6	4	1.00	22	0.182
70	A	6	4	1.00	22	0.182
71	A	8	3	1.00	22	0.136
72	A	11	3	1.00	22	0.136
73	A	14	3	1.00	22	0.136
74	A	28	3	1.00	25	0.120
75	A	20	3	1.00	25	0.120
76	A	13	3	1.00	23	0.130
77	A	5	2	1.00	18	0.111
78	A	13	4	1.00	25	0.160
79	A	11	5	1.00	25	0.200
80	A	11	5	1.00	25	0.200
81	A	13	4	1.00	25	0.160
82	A	17	3	1.00	25	0.120
83	A	1	1	1.00	39	0.026
84	A	1	1	1.00	38	0.026
85	A	1	1	1.00	36	0.028
86	A	1	1	1.00	35	0.029
87	A	1	1	1.00	35	0.029
88	A	1	1	1.00	38	0.026
89	A	1	1	1.00	38	0.026
90	A	5	2	1.00	15	0.133
91	A	4	2	1.00	15	0.133
92	A	3	2	1.00	15	0.133
93	A	2	2	1.00	13	0.154

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
94	A	1	1	1.00	11	0.091
95	A	2	2	1.00	15	0.133
96	A	3	3	1.00	15	0.200
97	A	4	3	1.00	15	0.200
98	A	5	3	1.00	15	0.200

Chapter 3

Listing of integrals

3.1 $\int F^{c(a+bx)}(d+ex)^m\,dx$

Optimal. Leaf size=67

$$\frac{(d+ex)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-m}\Gamma\left(m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

[Out] F^(c*(a-b*d/e))*(e*x+d)^m*GAMMA(1+m,-b*c*(e*x+d)*ln(F)/e)/b/c/ln(F)/((-b*c*(e*x+d)*ln(F)/e)^m)

Rubi [A] time = 0.04, antiderivative size = 67, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.059, Rules used = {2181}

$$\frac{(d+ex)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-m}\text{Gamma}\left(m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

[In] Int[F^(c*(a + b*x))*(d + e*x)^m,x]

[Out] (F^(c*(a - (b*d)/e))*(d + e*x)^m*Gamma[1 + m, -((b*c*(d + e*x)*Log[F])/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^m)

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
```

```
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&  !I
ntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}(d+ex)^m\,dx=\frac{F^{c\left(a-\frac{bd}{e}\right)}(d+ex)^m\Gamma\left(1+m,-\frac{bc(d+ex)\log(F)}{e}\right)\left(-\frac{bc(d+ex)\log(F)}{e}\right)^{-m}}{bc\log(F)}$$

Mathematica [A] time = 0.04, size = 67, normalized size = 1.00

$$\frac{(d+ex)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-m}\Gamma\left(m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*(d + e*x)^m*Gamma[1 + m, -((b*c*(d + e*x)*Log[F])/e)])
/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^m)
```

fricas [A] time = 0.60, size = 65, normalized size = 0.97

$$\frac{e^{\left(-\frac{em\log\left(-\frac{bc\log(F)}{e}\right)+(bcd-ace)\log(F)}{e}\right)}\Gamma\left(m+1,-\frac{(bcex+bcd)\log(F)}{e}\right)}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^m,x, algorithm="fricas")
```

```
[Out] e^(-(e*m*log(-b*c*log(F)/e) + (b*c*d - a*c*e)*log(F))/e)*gamma(m + 1, -(b*c
*e*x + b*c*d)*log(F)/e)/(b*c*log(F))
```

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

$$\int(ex+d)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^m,x, algorithm="giac")
[Out] integrate((e*x + d)^m*F^((b*x + a)*c), x)
```

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int F^{(bx+a)c} (ex+d)^m \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(b*x+a))*(e*x+d)^m,x)
[Out] int(F^(c*(b*x+a))*(e*x+d)^m,x)
```

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

$$\int (ex+d)^m F^{(bx+a)c} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^m,x, algorithm="maxima")
[Out] integrate((e*x + d)^m*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)}\,{(d+e\,x)}^m \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x)^m,x)
[Out] int(F^(c*(a + b*x))*(d + e*x)^m, x)
```

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

$$\int F^{c(a+bx)} (d+ex)^m \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**m,x)
[Out] Integral(F**(c*(a + b*x))*(d + e*x)**m, x)
```

3.2 $\int F^{c(a+bx)}(d+ex)^4\,dx$

Optimal. Leaf size=141

$$\frac{24e^4F^{c(a+bx)}}{b^5c^5\log^5(F)}-\frac{24e^3(d+ex)F^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{12e^2(d+ex)^2F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{4e(d+ex)^3F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{(d+ex)^4F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] 24*e^4*F^(c*(b*x+a))/b^5/c^5/ln(F)^5-24*e^3*F^(c*(b*x+a))*(e*x+d)/b^4/c^4/l
n(F)^4+12*e^2*F^(c*(b*x+a))*(e*x+d)^2/b^3/c^3/ln(F)^3-4*e*F^(c*(b*x+a))*(e*
x+d)^3/b^2/c^2/ln(F)^2+F^(c*(b*x+a))*(e*x+d)^4/b/c/ln(F)
```

Rubi [A] time = 0.11, antiderivative size = 141, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {2176, 2194}

$$\frac{12e^2(d+ex)^2F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{24e^3(d+ex)F^{c(a+bx)}}{b^4c^4\log^4(F)}-\frac{4e(d+ex)^3F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{24e^4F^{c(a+bx)}}{b^5c^5\log^5(F)}+\frac{(d+ex)^4F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (24*e^4*F^(c*(a + b*x)))/(b^5*c^5*Log[F]^5) - (24*e^3*F^(c*(a + b*x))*(d +
e*x))/(b^4*c^4*Log[F]^4) + (12*e^2*F^(c*(a + b*x))*(d + e*x)^2)/(b^3*c^3*Lo
g[F]^3) - (4*e*F^(c*(a + b*x))*(d + e*x)^3)/(b^2*c^2*Log[F]^2) + (F^(c*(a +
 b*x))*(d + e*x)^4)/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int F^{c(a+bx)}(d+ex)^4\,dx = \frac{F^{c(a+bx)}(d+ex)^4}{bc\log(F)} - \frac{(4e)\int F^{c(a+bx)}(d+ex)^3\,dx}{bc\log(F)}$$
$$= -\frac{4eF^{c(a+bx)}(d+ex)^3}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^4}{bc\log(F)} + \frac{\left(12e^2\right)\int F^{c(a+bx)}(d+ex)^2\,dx}{b^2c^2\log^2(F)}$$
$$= \frac{12e^2F^{c(a+bx)}(d+ex)^2}{b^3c^3\log^3(F)} - \frac{4eF^{c(a+bx)}(d+ex)^3}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^4}{bc\log(F)} - \frac{\left(24e^3\right)\int F^{c(a+bx)}(d+}{b^3c^3\log^3(F)}$$
$$= -\frac{24e^3F^{c(a+bx)}(d+ex)}{b^4c^4\log^4(F)} + \frac{12e^2F^{c(a+bx)}(d+ex)^2}{b^3c^3\log^3(F)} - \frac{4eF^{c(a+bx)}(d+ex)^3}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^4}{bc\log(F)}$$
$$= \frac{24e^4F^{c(a+bx)}}{b^5c^5\log^5(F)} - \frac{24e^3F^{c(a+bx)}(d+ex)}{b^4c^4\log^4(F)} + \frac{12e^2F^{c(a+bx)}(d+ex)^2}{b^3c^3\log^3(F)} - \frac{4eF^{c(a+bx)}(d+ex)^3}{b^2c^2\log^2(F)} + \frac{F^{c}}{}$$

Mathematica [A] time = 0.13, size = 100, normalized size = 0.71

$$\frac{F^{c(a+bx)}\left(b^4c^4\log^4(F)(d+ex)^4 - 4b^3c^3e\log^3(F)(d+ex)^3 + 12b^2c^2e^2\log^2(F)(d+ex)^2 - 24bce^3\log(F)(d+ex) + 2\right.}{b^5c^5\log^5(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(c*(a + b*x))*(24*e^4 - 24*b*c*e^3*(d + e*x)*Log[F] + 12*b^2*c^2*e^2*(d
+ e*x)^2*Log[F]^2 - 4*b^3*c^3*e*(d + e*x)^3*Log[F]^3 + b^4*c^4*(d + e*x)^4*
Log[F]^4))/(b^5*c^5*Log[F]^5)
```

fricas [A] time = 0.65, size = 227, normalized size = 1.61

$$\frac{\left(\left(b^4c^4e^4x^4 + 4\,b^4c^4de^3x^3 + 6\,b^4c^4d^2e^2x^2 + 4\,b^4c^4d^3ex + b^4c^4d^4\right)\log(F)^4 + 24\,e^4 - 4\left(b^3c^3e^4x^3 + 3\,b^3c^3de^3x^2 + 3\right.\right.}{b^5c^5\,l}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^4*c^4*e^4*x^4 + 4*b^4*c^4*d*e^3*x^3 + 6*b^4*c^4*d^2*e^2*x^2 + 4*b^4*c^4
*d^3*e*x + b^4*c^4*d^4)*log(F)^4 + 24*e^4 - 4*(b^3*c^3*e^4*x^3 + 3*b^3*c^3*
d*e^3*x^2 + 3*b^3*c^3*d^2*e^2*x + b^3*c^3*d^3*e)*log(F)^3 + 12*(b^2*c^2*e^4
*x^2 + 2*b^2*c^2*d*e^3*x + b^2*c^2*d^2*e^2)*log(F)^2 - 24*(b*c*e^4*x + b*c*
d*e^3)*log(F))*F^(b*c*x + a*c)/(b^5*c^5*log(F)^5)
```

giac [C] time = 1.67, size = 7867, normalized size = 55.79

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -((4*(pi^3*b^4*c^4*x^4*log(abs(F))*sgn(F) - pi*b^4*c^4*x^4*log(abs(F))^3*sg
n(F) - pi^3*b^4*c^4*x^4*log(abs(F)) + pi*b^4*c^4*x^4*log(abs(F))^3 - pi^3*b
^3*c^3*x^3*sgn(F) + 3*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) + pi^3*b^3*c^3*x^
3 - 3*pi*b^3*c^3*x^3*log(abs(F))^2 - 6*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) +
6*pi*b^2*c^2*x^2*log(abs(F)) + 6*pi*b*c*x*sgn(F) - 6*pi*b*c*x)*(pi^5*b^5*c^
5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^
4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F))^2 - 5*pi*b^5*c^5*log(
abs(F))^4)/((pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5
*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F
))^2 - 5*pi*b^5*c^5*log(abs(F))^4)^2 + (5*pi^4*b^5*c^5*log(abs(F))*sgn(F) -
 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^
2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(abs(F))^5)^2) - (pi^4*b^4*c^4*x^4*s
gn(F) - 6*pi^2*b^4*c^4*x^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4*x^4 + 6*pi^2
*b^4*c^4*x^4*log(abs(F))^2 - 2*b^4*c^4*x^4*log(abs(F))^4 + 12*pi^2*b^3*c^3*
x^3*log(abs(F))*sgn(F) - 12*pi^2*b^3*c^3*x^3*log(abs(F)) + 8*b^3*c^3*x^3*lo
g(abs(F))^3 - 12*pi^2*b^2*c^2*x^2*sgn(F) + 12*pi^2*b^2*c^2*x^2 - 24*b^2*c^2
*x^2*log(abs(F))^2 + 48*b*c*x*log(abs(F)) - 48)*(5*pi^4*b^5*c^5*log(abs(F))
*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F))
 + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(abs(F))^5)/((pi^5*b^5*c^5*
sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*
sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F))^2 - 5*pi*b^5*c^5*log(ab
s(F))^4)^2 + (5*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F
))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 -
2*b^5*c^5*log(abs(F))^5)^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*
pi*a*c*sgn(F) + 1/2*pi*a*c) - ((pi^4*b^4*c^4*x^4*sgn(F) - 6*pi^2*b^4*c^4*x^
4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4*x^4 + 6*pi^2*b^4*c^4*x^4*log(abs(F))^
2 - 2*b^4*c^4*x^4*log(abs(F))^4 + 12*pi^2*b^3*c^3*x^3*log(abs(F))*sgn(F) -
12*pi^2*b^3*c^3*x^3*log(abs(F)) + 8*b^3*c^3*x^3*log(abs(F))^3 - 12*pi^2*b^2
*c^2*x^2*sgn(F) + 12*pi^2*b^2*c^2*x^2 - 24*b^2*c^2*x^2*log(abs(F))^2 + 48*b
*c*x*log(abs(F)) - 48)*(pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2
*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^
5*log(abs(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)/((pi^5*b^5*c^5*sgn(F) - 10*pi
^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*
b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)^2 + (
5*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) -
5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(
abs(F))^5)^2) + 4*(pi^3*b^4*c^4*x^4*log(abs(F))*sgn(F) - pi*b^4*c^4*x^4*log
```

```
(abs(F))^3*sgn(F) - pi^3*b^4*c^4*x^4*log(abs(F)) + pi*b^4*c^4*x^4*log(abs(F
))^3 - pi^3*b^3*c^3*x^3*sgn(F) + 3*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) + pi
^3*b^3*c^3*x^3 - 3*pi*b^3*c^3*x^3*log(abs(F))^2 - 6*pi*b^2*c^2*x^2*log(abs(
F))*sgn(F) + 6*pi*b^2*c^2*x^2*log(abs(F)) + 6*pi*b*c*x*sgn(F) - 6*pi*b*c*x)
*(5*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F)
- 5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*lo
g(abs(F))^5)/((pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) +
 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs
(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)^2 + (5*pi^4*b^5*c^5*log(abs(F))*sgn(F)
 - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F)) + 10*p
i^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(abs(F))^5)^2))*sin(-1/2*pi*b*c*x*
sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F
)) + a*c*log(abs(F)) + 4) + 1/2*I*((-16*I*pi^4*b^4*c^4*x^4*sgn(F) + 64*pi^3
*b^4*c^4*x^4*log(abs(F))*sgn(F) + 96*I*pi^2*b^4*c^4*x^4*log(abs(F))^2*sgn(F
) - 64*pi*b^4*c^4*x^4*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4*c^4*x^4 - 64*pi^
3*b^4*c^4*x^4*log(abs(F)) - 96*I*pi^2*b^4*c^4*x^4*log(abs(F))^2 + 64*pi*b^4
*c^4*x^4*log(abs(F))^3 + 32*I*b^4*c^4*x^4*log(abs(F))^4 - 64*pi^3*b^3*c^3*x
^3*sgn(F) - 192*I*pi^2*b^3*c^3*x^3*log(abs(F))*sgn(F) + 192*pi*b^3*c^3*x^3*
log(abs(F))^2*sgn(F) + 64*pi^3*b^3*c^3*x^3 + 192*I*pi^2*b^3*c^3*x^3*log(abs
(F)) - 192*pi*b^3*c^3*x^3*log(abs(F))^2 - 128*I*b^3*c^3*x^3*log(abs(F))^3 +
 192*I*pi^2*b^2*c^2*x^2*sgn(F) - 384*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - 19
2*I*pi^2*b^2*c^2*x^2 + 384*pi*b^2*c^2*x^2*log(abs(F)) + 384*I*b^2*c^2*x^2*l
og(abs(F))^2 + 384*pi*b*c*x*sgn(F) - 384*pi*b*c*x - 768*I*b*c*x*log(abs(F))
 + 768*I)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) -
 1/2*I*pi*a*c)/(16*I*pi^5*b^5*c^5*sgn(F) - 80*pi^4*b^5*c^5*log(abs(F))*sgn(
F) - 160*I*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 160*pi^2*b^5*c^5*log(abs(F))
^3*sgn(F) + 80*I*pi*b^5*c^5*log(abs(F))^4*sgn(F) - 16*I*pi^5*b^5*c^5 + 80*p
i^4*b^5*c^5*log(abs(F)) + 160*I*pi^3*b^5*c^5*log(abs(F))^2 - 160*pi^2*b^5*c
^5*log(abs(F))^3 - 80*I*pi*b^5*c^5*log(abs(F))^4 + 32*b^5*c^5*log(abs(F))^5
) - (-16*I*pi^4*b^4*c^4*x^4*sgn(F) - 64*pi^3*b^4*c^4*x^4*log(abs(F))*sgn(F)
 + 96*I*pi^2*b^4*c^4*x^4*log(abs(F))^2*sgn(F) + 64*pi*b^4*c^4*x^4*log(abs(F
))^3*sgn(F) + 16*I*pi^4*b^4*c^4*x^4 + 64*pi^3*b^4*c^4*x^4*log(abs(F)) - 96*
I*pi^2*b^4*c^4*x^4*log(abs(F))^2 - 64*pi*b^4*c^4*x^4*log(abs(F))^3 + 32*I*b
^4*c^4*x^4*log(abs(F))^4 + 64*pi^3*b^3*c^3*x^3*sgn(F) - 192*I*pi^2*b^3*c^3*
x^3*log(abs(F))*sgn(F) - 192*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - 64*pi^3*
b^3*c^3*x^3 + 192*I*pi^2*b^3*c^3*x^3*log(abs(F)) + 192*pi*b^3*c^3*x^3*log(a
bs(F))^2 - 128*I*b^3*c^3*x^3*log(abs(F))^3 + 192*I*pi^2*b^2*c^2*x^2*sgn(F)
+ 384*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - 192*I*pi^2*b^2*c^2*x^2 - 384*pi*b
^2*c^2*x^2*log(abs(F)) + 384*I*b^2*c^2*x^2*log(abs(F))^2 - 384*pi*b*c*x*sgn
(F) + 384*pi*b*c*x - 768*I*b*c*x*log(abs(F)) + 768*I)*e^(-1/2*I*pi*b*c*x*sg
n(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(-16*I*pi^5*b^5
*c^5*sgn(F) - 80*pi^4*b^5*c^5*log(abs(F))*sgn(F) + 160*I*pi^3*b^5*c^5*log(a
bs(F))^2*sgn(F) + 160*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 80*I*pi*b^5*c^5*l
og(abs(F))^4*sgn(F) + 16*I*pi^5*b^5*c^5 + 80*pi^4*b^5*c^5*log(abs(F)) - 160
*I*pi^3*b^5*c^5*log(abs(F))^2 - 160*pi^2*b^5*c^5*log(abs(F))^3 + 80*I*pi*b^
```

5*c^5*log(abs(F))^4 + 32*b^5*c^5*log(abs(F))^5))*e^(b*c*x*log(abs(F)) + a*c
log(abs(F)) + 4) - 4(((3*pi^2*b^3*c^3*d*x^3*log(abs(F))*sgn(F) - 3*pi^2*b
^3*c^3*d*x^3*log(abs(F)) + 2*b^3*c^3*d*x^3*log(abs(F))^3 - 3*pi^2*b^2*c^2*d
*x^2*sgn(F) + 3*pi^2*b^2*c^2*d*x^2 - 6*b^2*c^2*d*x^2*log(abs(F))^2 + 12*b*c
*d*x*log(abs(F)) - 12*d)*(pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^
2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(
F))^4)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b
^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi
^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*
c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2) - 4*(pi^3*b^3*c^3*d*x^3*sgn(
F) - 3*pi*b^3*c^3*d*x^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3*d*x^3 + 3*pi*b^
3*c^3*d*x^3*log(abs(F))^2 + 6*pi*b^2*c^2*d*x^2*log(abs(F))*sgn(F) - 6*pi*b^
2*c^2*d*x^2*log(abs(F)) - 6*pi*b*c*d*x*sgn(F) + 6*pi*b*c*d*x)*(pi^3*b^4*c^4
*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(ab
s(F)) + pi*b^4*c^4*log(abs(F))^3)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*lo
g(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^
4*log(abs(F))^4)^2 + 16*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(a
bs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2))*
cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) -
((pi^3*b^3*c^3*d*x^3*sgn(F) - 3*pi*b^3*c^3*d*x^3*log(abs(F))^2*sgn(F) - pi
^3*b^3*c^3*d*x^3 + 3*pi*b^3*c^3*d*x^3*log(abs(F))^2 + 6*pi*b^2*c^2*d*x^2*lo
g(abs(F))*sgn(F) - 6*pi*b^2*c^2*d*x^2*log(abs(F)) - 6*pi*b*c*d*x*sgn(F) + 6
*pi*b*c*d*x)*(pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - p
i^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)/((pi^
4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*p
i^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*c^4*l
og(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(
F)) + pi*b^4*c^4*log(abs(F))^3)^2) + 4*(3*pi^2*b^3*c^3*d*x^3*log(abs(F))*sg
n(F) - 3*pi^2*b^3*c^3*d*x^3*log(abs(F)) + 2*b^3*c^3*d*x^3*log(abs(F))^3 - 3
*pi^2*b^2*c^2*d*x^2*sgn(F) + 3*pi^2*b^2*c^2*d*x^2 - 6*b^2*c^2*d*x^2*log(abs
(F))^2 + 12*b*c*d*x*log(abs(F)) - 12*d)*(pi^3*b^4*c^4*log(abs(F))*sgn(F) -
pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log
(abs(F))^3)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - p
i^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 1
6*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3
*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(
F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) +
a*c*log(abs(F)) + 3) - 1/2*I*((32*pi^3*b^3*c^3*d*x^3*sgn(F) + 96*I*pi^2*b^
3*c^3*d*x^3*log(abs(F))*sgn(F) - 96*pi*b^3*c^3*d*x^3*log(abs(F))^2*sgn(F) -
32*pi^3*b^3*c^3*d*x^3 - 96*I*pi^2*b^3*c^3*d*x^3*log(abs(F)) + 96*pi*b^3*c^
3*d*x^3*log(abs(F))^2 + 64*I*b^3*c^3*d*x^3*log(abs(F))^3 - 96*I*pi^2*b^2*c^
2*d*x^2*sgn(F) + 192*pi*b^2*c^2*d*x^2*log(abs(F))*sgn(F) + 96*I*pi^2*b^2*c^
2*d*x^2 - 192*pi*b^2*c^2*d*x^2*log(abs(F)) - 192*I*b^2*c^2*d*x^2*log(abs(F)
)^2 - 192*pi*b*c*d*x*sgn(F) + 192*pi*b*c*d*x + 384*I*b*c*d*x*log(abs(F)) -
384*I*d)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) -

```
1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn(F) + 32*I*pi^3*b^4*c^4*log(abs(F))*sgn(F)
 - 48*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - 32*I*pi*b^4*c^4*log(abs(F))^3*sgn
(F) - 8*pi^4*b^4*c^4 - 32*I*pi^3*b^4*c^4*log(abs(F)) + 48*pi^2*b^4*c^4*log(
abs(F))^2 + 32*I*pi*b^4*c^4*log(abs(F))^3 - 16*b^4*c^4*log(abs(F))^4) + (32
*pi^3*b^3*c^3*d*x^3*sgn(F) - 96*I*pi^2*b^3*c^3*d*x^3*log(abs(F))*sgn(F) - 9
6*pi*b^3*c^3*d*x^3*log(abs(F))^2*sgn(F) - 32*pi^3*b^3*c^3*d*x^3 + 96*I*pi^2
*b^3*c^3*d*x^3*log(abs(F)) + 96*pi*b^3*c^3*d*x^3*log(abs(F))^2 - 64*I*b^3*c
^3*d*x^3*log(abs(F))^3 + 96*I*pi^2*b^2*c^2*d*x^2*sgn(F) + 192*pi*b^2*c^2*d*
x^2*log(abs(F))*sgn(F) - 96*I*pi^2*b^2*c^2*d*x^2 - 192*pi*b^2*c^2*d*x^2*log
(abs(F)) + 192*I*b^2*c^2*d*x^2*log(abs(F))^2 - 192*pi*b*c*d*x*sgn(F) + 192*
pi*b*c*d*x - 384*I*b*c*d*x*log(abs(F)) + 384*I*d)*e^(-1/2*I*pi*b*c*x*sgn(F)
 + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn
(F) - 32*I*pi^3*b^4*c^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*c^4*log(abs(F))^2*
sgn(F) + 32*I*pi*b^4*c^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*c^4 + 32*I*pi^3*
b^4*c^4*log(abs(F)) + 48*pi^2*b^4*c^4*log(abs(F))^2 - 32*I*pi*b^4*c^4*log(a
bs(F))^3 - 16*b^4*c^4*log(abs(F))^4))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)
) + 3) - 6*((2*(pi*b^2*c^2*d^2*x^2*log(abs(F))*sgn(F) - pi*b^2*c^2*d^2*x^2*
log(abs(F)) - pi*b*c*d^2*x*sgn(F) + pi*b*c*d^2*x)*(pi^3*b^3*c^3*sgn(F) - 3*
pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2
)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3
+ 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi
^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2) - (pi^2*b^2*c^2*d^2*x^
2*sgn(F) - pi^2*b^2*c^2*d^2*x^2 + 2*b^2*c^2*d^2*x^2*log(abs(F))^2 - 4*b*c*d
^2*x*log(abs(F)) + 4*d^2)*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c
^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*
c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (
3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*
log(abs(F))^3)^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn
(F) + 1/2*pi*a*c) - ((pi^2*b^2*c^2*d^2*x^2*sgn(F) - pi^2*b^2*c^2*d^2*x^2 +
2*b^2*c^2*d^2*x^2*log(abs(F))^2 - 4*b*c*d^2*x*log(abs(F)) + 4*d^2)*(pi^3*b^
3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*
c^3*log(abs(F))^2)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F
) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(
F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2) + 2*(
pi*b^2*c^2*d^2*x^2*log(abs(F))*sgn(F) - pi*b^2*c^2*d^2*x^2*log(abs(F)) - pi
*b*c*d^2*x*sgn(F) + pi*b*c*d^2*x)*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi
^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)/((pi^3*b^3*c^3*sgn(F) - 3
*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^
2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*
b^3*c^3*log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi
*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 2) + 1/
2*I*((24*I*pi^2*b^2*c^2*d^2*x^2*sgn(F) - 48*pi*b^2*c^2*d^2*x^2*log(abs(F))*
sgn(F) - 24*I*pi^2*b^2*c^2*d^2*x^2 + 48*pi*b^2*c^2*d^2*x^2*log(abs(F)) + 48
*I*b^2*c^2*d^2*x^2*log(abs(F))^2 + 48*pi*b*c*d^2*x*sgn(F) - 48*pi*b*c*d^2*x
 - 96*I*b*c*d^2*x*log(abs(F)) + 96*I*d^2)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*
```

```
pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(-4*I*pi^3*b^3*c^3*sgn(F) +
12*pi^2*b^3*c^3*log(abs(F))*sgn(F) + 12*I*pi*b^3*c^3*log(abs(F))^2*sgn(F) +
 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) - 12*I*pi*b^3*c^3*log(abs(F
))^2 + 8*b^3*c^3*log(abs(F))^3) - (24*I*pi^2*b^2*c^2*d^2*x^2*sgn(F) + 48*pi
*b^2*c^2*d^2*x^2*log(abs(F))*sgn(F) - 24*I*pi^2*b^2*c^2*d^2*x^2 - 48*pi*b^2
*c^2*d^2*x^2*log(abs(F)) + 48*I*b^2*c^2*d^2*x^2*log(abs(F))^2 - 48*pi*b*c*d
^2*x*sgn(F) + 48*pi*b*c*d^2*x - 96*I*b*c*d^2*x*log(abs(F)) + 96*I*d^2)*e^(-
1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c
)/(4*I*pi^3*b^3*c^3*sgn(F) + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 12*I*pi*b
^3*c^3*log(abs(F))^2*sgn(F) - 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)
) + 12*I*pi*b^3*c^3*log(abs(F))^2 + 8*b^3*c^3*log(abs(F))^3))*e^(b*c*x*log(
abs(F)) + a*c*log(abs(F)) + 2) + 4*(2*((b*c*d^3*x*log(abs(F)) - d^3)*(pi^2*
b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)/((pi^2*b^2*c^2*sgn
(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))
*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) + (pi*b*c*d^3*x*sgn(F) - pi*b*c*d^3*x)
*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))/((pi^2*b^2*c^2*sg
n(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F)
)*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*
c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi*b*c*d^3*x*sgn(F) - pi*b*c*d^3*
x)*(pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)/((pi^2*b^
2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*lo
g(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) - 4*(b*c*d^3*x*log(abs(F)) -
d^3)*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))/((pi^2*b^2*c^
2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(ab
s(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*p
i*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(a
bs(F)) + 1) - 1/2*I*((8*pi*b*c*d^3*x*sgn(F) - 8*pi*b*c*d^3*x - 16*I*b*c*d^3
*x*log(abs(F)) + 16*I*d^3)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*
I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) + 4*I*pi*b^2*c^2*log
(abs(F))*sgn(F) - 2*pi^2*b^2*c^2 - 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*l
og(abs(F))^2) + (8*pi*b*c*d^3*x*sgn(F) - 8*pi*b*c*d^3*x + 16*I*b*c*d^3*x*lo
g(abs(F)) - 16*I*d^3)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi
*a*c*sgn(F) + 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*I*pi*b^2*c^2*log(abs
(F))*sgn(F) - 2*pi^2*b^2*c^2 + 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(a
bs(F))^2))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 1) + 2*(2*b*c*d^4*cos(-
1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)*log(ab
s(F))/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2) - (pi*b*c*sgn(
F) - pi*b*c)*d^4*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F
) + 1/2*pi*a*c)/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2))*e^(
b*c*x*log(abs(F)) + a*c*log(abs(F))) - 1/2*I*(-2*I*d^4*e^(1/2*I*pi*b*c*x*sg
n(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(I*pi*b*c*sgn(F
) - I*pi*b*c + 2*b*c*log(abs(F))) + 2*I*d^4*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2
*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(-I*pi*b*c*sgn(F) + I*pi*
b*c + 2*b*c*log(abs(F))))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)))
```

maple [A] time = 0.01, size = 260, normalized size = 1.84

$$\frac{\left(b^4c^4e^4x^4\ln(F)^4 + 4b^4c^4d\,e^3x^3\ln(F)^4 + 6b^4c^4d^2e^2x^2\ln(F)^4 + 4b^4c^4d^3ex\ln(F)^4 + b^4c^4d^4\ln(F)^4 - 4b^3c^3e^4x^3\ln(F)\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (e^4*x^4*b^4*c^4*ln(F)^4+4*ln(F)^4*b^4*c^4*d*e^3*x^3+6*ln(F)^4*b^4*c^4*d^2*
e^2*x^2+4*ln(F)^4*b^4*c^4*d^3*e*x+ln(F)^4*b^4*c^4*d^4-4*ln(F)^3*b^3*c^3*e^4
*x^3-12*ln(F)^3*b^3*c^3*d*e^3*x^2-12*ln(F)^3*b^3*c^3*d^2*e^2*x-4*ln(F)^3*b^
3*c^3*d^3*e+12*ln(F)^2*b^2*c^2*e^4*x^2+24*ln(F)^2*b^2*c^2*d*e^3*x+12*b^2*c^
2*ln(F)^2*d^2*e^2-24*ln(F)*b*c*e^4*x-24*d*e^3*b*c*ln(F)+24*e^4)*F^((b*x+a)*
c)/b^5/c^5/ln(F)^5
```

maxima [B] time = 0.50, size = 309, normalized size = 2.19

$$\frac{F^{bcx+ac}d^4}{bc\log(F)} + \frac{4\left(F^{ac}bcx\log(F) - F^{ac}\right)F^{bcx}d^3e}{b^2c^2\log(F)^2} + \frac{6\left(F^{ac}b^2c^2x^2\log(F)^2 - 2F^{ac}bcx\log(F) + 2F^{ac}\right)F^{bcx}d^2e^2}{b^3c^3\log(F)^3} + \frac{4\left(F^{ac}b^3c^3x\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*c*x + a*c)*d^4/(b*c*log(F)) + 4*(F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*
c*x)*d^3*e/(b^2*c^2*log(F)^2) + 6*(F^(a*c)*b^2*c^2*x^2*log(F)^2 - 2*F^(a*c)
*b*c*x*log(F) + 2*F^(a*c))*F^(b*c*x)*d^2*e^2/(b^3*c^3*log(F)^3) + 4*(F^(a*c
)*b^3*c^3*x^3*log(F)^3 - 3*F^(a*c)*b^2*c^2*x^2*log(F)^2 + 6*F^(a*c)*b*c*x*l
og(F) - 6*F^(a*c))*F^(b*c*x)*d*e^3/(b^4*c^4*log(F)^4) + (F^(a*c)*b^4*c^4*x^
4*log(F)^4 - 4*F^(a*c)*b^3*c^3*x^3*log(F)^3 + 12*F^(a*c)*b^2*c^2*x^2*log(F)
^2 - 24*F^(a*c)*b*c*x*log(F) + 24*F^(a*c))*F^(b*c*x)*e^4/(b^5*c^5*log(F)^5)
```

mupad [B] time = 3.68, size = 260, normalized size = 1.84

$$\frac{F^{a\,c+b\,c\,x}\,\left(b^4\,c^4\,d^4\,\ln(F)^4 + 4\,b^4\,c^4\,d^3\,e\,x\,\ln(F)^4 + 6\,b^4\,c^4\,d^2\,e^2\,x^2\,\ln(F)^4 + 4\,b^4\,c^4\,d\,e^3\,x^3\,\ln(F)^4 + b^4\,c^4\,e^4\,x^4\,\ln(F)^4\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^(a*c + b*c*x)*(24*e^4 + b^4*c^4*d^4*log(F)^4 - 24*b*c*e^4*x*log(F) - 4*b
^3*c^3*d^3*e*log(F)^3 + 12*b^2*c^2*d^2*e^2*log(F)^2 + 12*b^2*c^2*e^4*x^2*lo
g(F)^2 - 4*b^3*c^3*e^4*x^3*log(F)^3 + b^4*c^4*e^4*x^4*log(F)^4 - 24*b*c*d*e
```

```
^3*log(F) + 6*b^4*c^4*d^2*e^2*x^2*log(F)^4 + 24*b^2*c^2*d*e^3*x*log(F)^2 +
4*b^4*c^4*d^3*e*x*log(F)^4 - 12*b^3*c^3*d^2*e^2*x*log(F)^3 - 12*b^3*c^3*d*e
^3*x^2*log(F)^3 + 4*b^4*c^4*d*e^3*x^3*log(F)^4))/(b^5*c^5*log(F)^5)
```

sympy [A] time = 0.27, size = 350, normalized size = 2.48

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^4c^4d^4\log(F)^4+4b^4c^4d^3ex\log(F)^4+6b^4c^4d^2e^2x^2\log(F)^4+4b^4c^4de^3x^3\log(F)^4+b^4c^4e^4x^4\log(F)^4-4b^3c^3d^3e\log(F)^3-12b^3c^3d^2e^2x\log(F)^3-1\right.}{b^5c^5\log(} \\ d^4x+2d^3ex^2+2d^2e^2x^3+de^3x^4+\frac{e^4x^5}{5} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**4,x)
```

```
[Out] Piecewise(((F**(c*(a + b*x))*(b**4*c**4*d**4*log(F)**4 + 4*b**4*c**4*d**3*e*
x*log(F)**4 + 6*b**4*c**4*d**2*e**2*x**2*log(F)**4 + 4*b**4*c**4*d*e**3*x**
3*log(F)**4 + b**4*c**4*e**4*x**4*log(F)**4 - 4*b**3*c**3*d**3*e*log(F)**3
- 12*b**3*c**3*d**2*e**2*x*log(F)**3 - 12*b**3*c**3*d*e**3*x**2*log(F)**3 -
 4*b**3*c**3*e**4*x**3*log(F)**3 + 12*b**2*c**2*d**2*e**2*log(F)**2 + 24*b*
*2*c**2*d*e**3*x*log(F)**2 + 12*b**2*c**2*e**4*x**2*log(F)**2 - 24*b*c*d*e*
*3*log(F) - 24*b*c*e**4*x*log(F) + 24*e**4)/(b**5*c**5*log(F)**5), Ne(b**5*
c**5*log(F)**5, 0)), (d**4*x + 2*d**3*e*x**2 + 2*d**2*e**2*x**3 + d*e**3*x*
*4 + e**4*x**5/5, True))
```

3.3 $\int F^{c(a+bx)}(d+ex)^3\,dx$

Optimal. Leaf size=110

$$-\frac{6e^3F^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{6e^2(d+ex)F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{3e(d+ex)^2F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{(d+ex)^3F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] -6*e^3*F^(c*(b*x+a))/b^4/c^4/ln(F)^4+6*e^2*F^(c*(b*x+a))*(e*x+d)/b^3/c^3/ln
(F)^3-3*e*F^(c*(b*x+a))*(e*x+d)^2/b^2/c^2/ln(F)^2+F^(c*(b*x+a))*(e*x+d)^3/b
/c/ln(F)
```

Rubi [A] time = 0.07, antiderivative size = 110, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {2176, 2194}

$$\frac{6e^2(d+ex)F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{3e(d+ex)^2F^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{6e^3F^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{(d+ex)^3F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (-6*e^3*F^(c*(a + b*x)))/(b^4*c^4*Log[F]^4) + (6*e^2*F^(c*(a + b*x))*(d + e
*x))/(b^3*c^3*Log[F]^3) - (3*e*F^(c*(a + b*x))*(d + e*x)^2)/(b^2*c^2*Log[F]
^2) + (F^(c*(a + b*x))*(d + e*x)^3)/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\begin{aligned}\int F^{c(a+bx)}(d+ex)^3\,dx &= \frac{F^{c(a+bx)}(d+ex)^3}{bc\log(F)} - \frac{(3e)\int F^{c(a+bx)}(d+ex)^2\,dx}{bc\log(F)} \\ &= -\frac{3eF^{c(a+bx)}(d+ex)^2}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^3}{bc\log(F)} + \frac{\left(6e^2\right)\int F^{c(a+bx)}(d+ex)\,dx}{b^2c^2\log^2(F)} \\ &= \frac{6e^2F^{c(a+bx)}(d+ex)}{b^3c^3\log^3(F)} - \frac{3eF^{c(a+bx)}(d+ex)^2}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^3}{bc\log(F)} - \frac{\left(6e^3\right)\int F^{c(a+bx)}\,dx}{b^3c^3\log^3(F)} \\ &= -\frac{6e^3F^{c(a+bx)}}{b^4c^4\log^4(F)} + \frac{6e^2F^{c(a+bx)}(d+ex)}{b^3c^3\log^3(F)} - \frac{3eF^{c(a+bx)}(d+ex)^2}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^3}{bc\log(F)}\end{aligned}$$

Mathematica [A] time = 0.09, size = 78, normalized size = 0.71

$$\frac{F^{c(a+bx)}\left(b^3c^3\log^3(F)(d+ex)^3 - 3b^2c^2e\log^2(F)(d+ex)^2 + 6bce^2\log(F)(d+ex) - 6e^3\right)}{b^4c^4\log^4(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(c*(a + b*x))*(-6*e^3 + 6*b*c*e^2*(d + e*x)*Log[F] - 3*b^2*c^2*e*(d + e*
x)^2*Log[F]^2 + b^3*c^3*(d + e*x)^3*Log[F]^3))/(b^4*c^4*Log[F]^4)
```

fricas [A] time = 0.59, size = 147, normalized size = 1.34

$$\frac{\left(\left(b^3c^3e^3x^3 + 3\,b^3c^3de^2x^2 + 3\,b^3c^3d^2ex + b^3c^3d^3\right)\log(F)^3 - 6\,e^3 - 3\left(b^2c^2e^3x^2 + 2\,b^2c^2de^2x + b^2c^2d^2e\right)\log(F)^2 + 6}{b^4c^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^3*c^3*e^3*x^3 + 3*b^3*c^3*d*e^2*x^2 + 3*b^3*c^3*d^2*e*x + b^3*c^3*d^3)*
log(F)^3 - 6*e^3 - 3*(b^2*c^2*e^3*x^2 + 2*b^2*c^2*d*e^2*x + b^2*c^2*d^2*e)*
log(F)^2 + 6*(b*c*e^3*x + b*c*d*e^2)*log(F))*F^(b*c*x + a*c)/(b^4*c^4*log(F
)^4)
```

giac [C] time = 1.57, size = 4693, normalized size = 42.66

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

[Out] ((4*(pi^3*b^3*c^3*x^3*sgn(F) - 3*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - pi^3
*b^3*c^3*x^3 + 3*pi*b^3*c^3*x^3*log(abs(F))^2 + 6*pi*b^2*c^2*x^2*log(abs(F)
)*sgn(F) - 6*pi*b^2*c^2*x^2*log(abs(F)) - 6*pi*b*c*x*sgn(F) + 6*pi*b*c*x)*(
pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^
4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)/((pi^4*b^4*c^4*sgn(F) - 6*pi^
2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^
2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b
^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs
(F))^3)^2) - (pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - p
i^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)*(3*pi
^2*b^3*c^3*x^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*x^3*log(abs(F)) + 2*b^3*
c^3*x^3*log(abs(F))^3 - 3*pi^2*b^2*c^2*x^2*sgn(F) + 3*pi^2*b^2*c^2*x^2 - 6*
b^2*c^2*x^2*log(abs(F))^2 + 12*b*c*x*log(abs(F)) - 12)/((pi^4*b^4*c^4*sgn(F
) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log
(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*c^4*log(abs(F))*sgn(
F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^
4*log(abs(F))^3)^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*s
gn(F) + 1/2*pi*a*c) + ((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*
sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F)
)^4)*(pi^3*b^3*c^3*x^3*sgn(F) - 3*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - pi^
3*b^3*c^3*x^3 + 3*pi*b^3*c^3*x^3*log(abs(F))^2 + 6*pi*b^2*c^2*x^2*log(abs(F
))*sgn(F) - 6*pi*b^2*c^2*x^2*log(abs(F)) - 6*pi*b*c*x*sgn(F) + 6*pi*b*c*x)/
((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4
+ 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*
c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log
(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2) + 4*(pi^3*b^4*c^4*log(abs(F))*sgn(F
) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4
*log(abs(F))^3)*(3*pi^2*b^3*c^3*x^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*x^3
*log(abs(F)) + 2*b^3*c^3*x^3*log(abs(F))^3 - 3*pi^2*b^2*c^2*x^2*sgn(F) + 3*
pi^2*b^2*c^2*x^2 - 6*b^2*c^2*x^2*log(abs(F))^2 + 12*b*c*x*log(abs(F)) - 12)
/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4
 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4
*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*lo
g(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi
*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(ab
s(F)) + 3) - 1/2*I*((8*pi^3*b^3*c^3*x^3*sgn(F) + 24*I*pi^2*b^3*c^3*x^3*log(
abs(F))*sgn(F) - 24*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*c^3*x^
3 - 24*I*pi^2*b^3*c^3*x^3*log(abs(F)) + 24*pi*b^3*c^3*x^3*log(abs(F))^2 + 1
6*I*b^3*c^3*x^3*log(abs(F))^3 - 24*I*pi^2*b^2*c^2*x^2*sgn(F) + 48*pi*b^2*c^
2*x^2*log(abs(F))*sgn(F) + 24*I*pi^2*b^2*c^2*x^2 - 48*pi*b^2*c^2*x^2*log(ab
s(F)) - 48*I*b^2*c^2*x^2*log(abs(F))^2 - 48*pi*b*c*x*sgn(F) + 48*pi*b*c*x +
 96*I*b*c*x*log(abs(F)) - 96*I)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x +
 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn(F) + 32*I*pi^3*b^4
```

```
*c^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - 32*I*pi*b^
4*c^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*c^4 - 32*I*pi^3*b^4*c^4*log(abs(F))
 + 48*pi^2*b^4*c^4*log(abs(F))^2 + 32*I*pi*b^4*c^4*log(abs(F))^3 - 16*b^4*c
^4*log(abs(F))^4) + (8*pi^3*b^3*c^3*x^3*sgn(F) - 24*I*pi^2*b^3*c^3*x^3*log(
abs(F))*sgn(F) - 24*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*c^3*x^
3 + 24*I*pi^2*b^3*c^3*x^3*log(abs(F)) + 24*pi*b^3*c^3*x^3*log(abs(F))^2 - 1
6*I*b^3*c^3*x^3*log(abs(F))^3 + 24*I*pi^2*b^2*c^2*x^2*sgn(F) + 48*pi*b^2*c^
2*x^2*log(abs(F))*sgn(F) - 24*I*pi^2*b^2*c^2*x^2 - 48*pi*b^2*c^2*x^2*log(ab
s(F)) + 48*I*b^2*c^2*x^2*log(abs(F))^2 - 48*pi*b*c*x*sgn(F) + 48*pi*b*c*x -
 96*I*b*c*x*log(abs(F)) + 96*I)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x
- 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn(F) - 32*I*pi^3*b^
4*c^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) + 32*I*pi*b
^4*c^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*c^4 + 32*I*pi^3*b^4*c^4*log(abs(F)
) + 48*pi^2*b^4*c^4*log(abs(F))^2 - 32*I*pi*b^4*c^4*log(abs(F))^3 - 16*b^4*
c^4*log(abs(F))^4))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 3) + 3*(((pi^2
*b^2*c^2*d*x^2*sgn(F) - pi^2*b^2*c^2*d*x^2 + 2*b^2*c^2*d*x^2*log(abs(F))^2
- 4*b*c*d*x*log(abs(F)) + 4*d)*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*
b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)/((pi^3*b^3*c^3*sgn(F) - 3*pi
*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^
2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3
*c^3*log(abs(F))^3)^2) - 2*(pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^
2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)*(pi*b^2*c^2*d*x^2*log
(abs(F))*sgn(F) - pi*b^2*c^2*d*x^2*log(abs(F)) - pi*b*c*d*x*sgn(F) + pi*b*c
*d*x)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*
c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) -
3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2))*cos(-1/2*pi*b*c*x
*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi^3*b^3*c^3*s
gn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log
(abs(F))^2)*(pi^2*b^2*c^2*d*x^2*sgn(F) - pi^2*b^2*c^2*d*x^2 + 2*b^2*c^2*d*x
^2*log(abs(F))^2 - 4*b*c*d*x*log(abs(F)) + 4*d)/((pi^3*b^3*c^3*sgn(F) - 3*p
i*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)
^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^
3*c^3*log(abs(F))^3)^2) + 2*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3
*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)*(pi*b^2*c^2*d*x^2*log(abs(F))*s
gn(F) - pi*b^2*c^2*d*x^2*log(abs(F)) - pi*b*c*d*x*sgn(F) + pi*b*c*d*x)/((pi
^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi
*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3
*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(F) +
1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*
log(abs(F)) + 2) + 1/2*I*((12*I*pi^2*b^2*c^2*d*x^2*sgn(F) - 24*pi*b^2*c^2*d
*x^2*log(abs(F))*sgn(F) - 12*I*pi^2*b^2*c^2*d*x^2 + 24*pi*b^2*c^2*d*x^2*log
(abs(F)) + 24*I*b^2*c^2*d*x^2*log(abs(F))^2 + 24*pi*b*c*d*x*sgn(F) - 24*pi*
b*c*d*x - 48*I*b*c*d*x*log(abs(F)) + 48*I*d)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2
*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(-4*I*pi^3*b^3*c^3*sgn(F)
 + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) + 12*I*pi*b^3*c^3*log(abs(F))^2*sgn(F
```

```
) + 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) - 12*I*pi*b^3*c^3*log(ab
s(F))^2 + 8*b^3*c^3*log(abs(F))^3) - (12*I*pi^2*b^2*c^2*d*x^2*sgn(F) + 24*p
i*b^2*c^2*d*x^2*log(abs(F))*sgn(F) - 12*I*pi^2*b^2*c^2*d*x^2 - 24*pi*b^2*c^
2*d*x^2*log(abs(F)) + 24*I*b^2*c^2*d*x^2*log(abs(F))^2 - 24*pi*b*c*d*x*sgn(
F) + 24*pi*b*c*d*x - 48*I*b*c*d*x*log(abs(F)) + 48*I*d)*e^(-1/2*I*pi*b*c*x*
sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(4*I*pi^3*b^3
*c^3*sgn(F) + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 12*I*pi*b^3*c^3*log(abs(
F))^2*sgn(F) - 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) + 12*I*pi*b^3
*c^3*log(abs(F))^2 + 8*b^3*c^3*log(abs(F))^3))*e^(b*c*x*log(abs(F)) + a*c*l
og(abs(F)) + 2) + 3*(2*((pi*b*c*d^2*x*sgn(F) - pi*b*c*d^2*x)*(pi*b^2*c^2*lo
g(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2
*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b
^2*c^2*log(abs(F)))^2) + (pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*lo
g(abs(F))^2)*(b*c*d^2*x*log(abs(F)) - d^2)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2
*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b
^2*c^2*log(abs(F)))^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*
c*sgn(F) + 1/2*pi*a*c) + ((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*l
og(abs(F))^2)*(pi*b*c*d^2*x*sgn(F) - pi*b*c*d^2*x)/((pi^2*b^2*c^2*sgn(F) -
pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F
) - pi*b^2*c^2*log(abs(F)))^2) - 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*
c^2*log(abs(F)))*(b*c*d^2*x*log(abs(F)) - d^2)/((pi^2*b^2*c^2*sgn(F) - pi^2
*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) -
pi*b^2*c^2*log(abs(F)))^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*p
i*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 1) - 1
/2*I*((6*pi*b*c*d^2*x*sgn(F) - 6*pi*b*c*d^2*x - 12*I*b*c*d^2*x*log(abs(F))
+ 12*I*d^2)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F)
 - 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) + 4*I*pi*b^2*c^2*log(abs(F))*sgn(F)
 - 2*pi^2*b^2*c^2 - 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2) +
 (6*pi*b*c*d^2*x*sgn(F) - 6*pi*b*c*d^2*x + 12*I*b*c*d^2*x*log(abs(F)) - 12*
I*d^2)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1
/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2
*pi^2*b^2*c^2 + 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2))*e^(b
*c*x*log(abs(F)) + a*c*log(abs(F)) + 1) + 2*(2*b*c*d^3*cos(-1/2*pi*b*c*x*sg
n(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)*log(abs(F))/(4*b^2*c^
2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2) - (pi*b*c*sgn(F) - pi*b*c)*d^
3*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)
/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2))*e^(b*c*x*log(abs(F
)) + a*c*log(abs(F))) - 1/2*I*(-2*I*d^3*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi
*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(I*pi*b*c*sgn(F) - I*pi*b*c +
2*b*c*log(abs(F))) + 2*I*d^3*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1
/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(-I*pi*b*c*sgn(F) + I*pi*b*c + 2*b*c*log
(abs(F))))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)))
```

maple [A] time = 0.01, size = 165, normalized size = 1.50

$$\frac{\left(b^3c^3e^3x^3\ln(F)^3+3b^3c^3d\,e^2x^2\ln(F)^3+3b^3c^3d^2ex\ln(F)^3+b^3c^3d^3\ln(F)^3-3b^2c^2e^3x^2\ln(F)^2-6b^2c^2d\,e^2x\ln(F)^2-\right.}{b^4c^4\ln(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (e^3*x^3*b^3*c^3*ln(F)^3+3*ln(F)^3*b^3*c^3*d*e^2*x^2+3*ln(F)^3*b^3*c^3*d^2*
e*x+b^3*c^3*ln(F)^3*d^3-3*ln(F)^2*b^2*c^2*e^3*x^2-6*ln(F)^2*b^2*c^2*d*e^2*x
-3*b^2*c^2*ln(F)^2*e*d^2+6*ln(F)*b*c*e^3*x+6*d*e^2*b*c*ln(F)-6*e^3)*F^((b*x
+a)*c)/b^4/c^4/ln(F)^4
```

maxima [A] time = 0.49, size = 206, normalized size = 1.87

$$\frac{F^{bcx+ac}d^3}{bc\log(F)}+\frac{3\left(F^{ac}bcx\log(F)-F^{ac}\right)F^{bcx}d^2e}{b^2c^2\log(F)^2}+\frac{3\left(F^{ac}b^2c^2x^2\log(F)^2-2\,F^{ac}bcx\log(F)+2\,F^{ac}\right)F^{bcx}de^2}{b^3c^3\log(F)^3}+\frac{\left(F^{ac}b^3c^3x^3\log\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*c*x + a*c)*d^3/(b*c*log(F)) + 3*(F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*
c*x)*d^2*e/(b^2*c^2*log(F)^2) + 3*(F^(a*c)*b^2*c^2*x^2*log(F)^2 - 2*F^(a*c)
*b*c*x*log(F) + 2*F^(a*c))*F^(b*c*x)*d*e^2/(b^3*c^3*log(F)^3) + (F^(a*c)*b^
3*c^3*x^3*log(F)^3 - 3*F^(a*c)*b^2*c^2*x^2*log(F)^2 + 6*F^(a*c)*b*c*x*log(F
) - 6*F^(a*c))*F^(b*c*x)*e^3/(b^4*c^4*log(F)^4)
```

mupad [B] time = 3.56, size = 165, normalized size = 1.50

$$\frac{F^{a\,c+b\,c\,x}\,\left(b^3\,c^3\,d^3\ln(F)^3+3\,b^3\,c^3\,d^2\,e\,x\ln(F)^3+3\,b^3\,c^3\,d\,e^2\,x^2\ln(F)^3+b^3\,c^3\,e^3\,x^3\ln(F)^3-3\,b^2\,c^2\,d^2\,e\ln(F)^2-6\,b^2\right.}{b^4\,c^4\ln(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^(a*c + b*c*x)*(b^3*c^3*d^3*log(F)^3 - 6*e^3 + 6*b*c*e^3*x*log(F) - 3*b^2
*c^2*d^2*e*log(F)^2 - 3*b^2*c^2*e^3*x^2*log(F)^2 + b^3*c^3*e^3*x^3*log(F)^3
 + 6*b*c*d*e^2*log(F) - 6*b^2*c^2*d*e^2*x*log(F)^2 + 3*b^3*c^3*d^2*e*x*log(
F)^3 + 3*b^3*c^3*d*e^2*x^2*log(F)^3))/(b^4*c^4*log(F)^4)
```

sympy [A] time = 0.22, size = 231, normalized size = 2.10

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^3c^3d^3\log(F)^3+3b^3c^3d^2ex\log(F)^3+3b^3c^3de^2x^2\log(F)^3+b^3c^3e^3x^3\log(F)^3-3b^2c^2d^2e\log(F)^2-6b^2c^2de^2x\log(F)^2-3b^2c^2e^3x^2\log(F)^2+6bc\right.}{b^4c^4\log(F)^4} \\ d^3x+\frac{3d^2ex^2}{2}+de^2x^3+\frac{e^3x^4}{4} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**3,x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b**3*c**3*d**3*log(F)**3 + 3*b**3*c**3*d**2*e*
x*log(F)**3 + 3*b**3*c**3*d*e**2*x**2*log(F)**3 + b**3*c**3*e**3*x**3*log(F
)**3 - 3*b**2*c**2*d**2*e*log(F)**2 - 6*b**2*c**2*d*e**2*x*log(F)**2 - 3*b*
*2*c**2*e**3*x**2*log(F)**2 + 6*b*c*d*e**2*log(F) + 6*b*c*e**3*x*log(F) - 6
*e**3)/(b**4*c**4*log(F)**4), Ne(b**4*c**4*log(F)**4, 0)), (d**3*x + 3*d**2
*e*x**2/2 + d*e**2*x**3 + e**3*x**4/4, True))
```

3.4 $\int F^{c(a+bx)}(d+ex)^2\,dx$

Optimal. Leaf size=79

$$\frac{2e^2F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{2e(d+ex)F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{(d+ex)^2F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] 2*e^2*F^(c*(b*x+a))/b^3/c^3/ln(F)^3-2*e*F^(c*(b*x+a))*(e*x+d)/b^2/c^2/ln(F)
^2+F^(c*(b*x+a))*(e*x+d)^2/b/c/ln(F)
```

Rubi [A] time = 0.04, antiderivative size = 79, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {2176, 2194}

$$-\frac{2e(d+ex)F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{2e^2F^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{(d+ex)^2F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (2*e^2*F^(c*(a + b*x)))/(b^3*c^3*Log[F]^3) - (2*e*F^(c*(a + b*x))*(d + e*x)
)/(b^2*c^2*Log[F]^2) + (F^(c*(a + b*x))*(d + e*x)^2)/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int F^{c(a+bx)}(d+ex)^2\,dx = \frac{F^{c(a+bx)}(d+ex)^2}{bc\log(F)} - \frac{(2e)\int F^{c(a+bx)}(d+ex)\,dx}{bc\log(F)}$$
$$= -\frac{2eF^{c(a+bx)}(d+ex)}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^2}{bc\log(F)} + \frac{\left(2e^2\right)\int F^{c(a+bx)}\,dx}{b^2c^2\log^2(F)}$$
$$= \frac{2e^2F^{c(a+bx)}}{b^3c^3\log^3(F)} - \frac{2eF^{c(a+bx)}(d+ex)}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^2}{bc\log(F)}$$

Mathematica [A] time = 0.07, size = 56, normalized size = 0.71

$$\frac{F^{c(a+bx)}\left(b^2c^2\log^2(F)(d+ex)^2-2bce\log(F)(d+ex)+2e^2\right)}{b^3c^3\log^3(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(c*(a + b*x))*(2*e^2 - 2*b*c*e*(d + e*x)*Log[F] + b^2*c^2*(d + e*x)^2*Lo
g[F]^2))/(b^3*c^3*Log[F]^3)
```

fricas [A] time = 0.67, size = 84, normalized size = 1.06

$$\frac{\left(\left(b^2c^2e^2x^2+2\,b^2c^2dex+b^2c^2d^2\right)\log(F)^2+2\,e^2-2\left(bce^2x+bcde\right)\log(F)\right)F^{bcx+ac}}{b^3c^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^2*c^2*e^2*x^2 + 2*b^2*c^2*d*e*x + b^2*c^2*d^2)*log(F)^2 + 2*e^2 - 2*(b*
c*e^2*x + b*c*d*e)*log(F))*F^(b*c*x + a*c)/(b^3*c^3*log(F)^3)
```

giac [C] time = 0.91, size = 2494, normalized size = 31.57

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (((3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c
^3*log(abs(F))^3)*(pi^2*b^2*c^2*x^2*sgn(F) - pi^2*b^2*c^2*x^2 + 2*b^2*c^2*x
```

```
^2*log(abs(F))^2 - 4*b*c*x*log(abs(F)) + 4)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^
3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 +
 (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^
3*log(abs(F))^3)^2) - 2*(pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*s
gn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)*(pi*b^2*c^2*x^2*log(abs(
F))*sgn(F) - pi*b^2*c^2*x^2*log(abs(F)) - pi*b*c*x*sgn(F) + pi*b*c*x)/((pi^
3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*
b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*
c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1
/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi^3*b^3*c^3*sgn(F) - 3*p
i*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)
*(pi^2*b^2*c^2*x^2*sgn(F) - pi^2*b^2*c^2*x^2 + 2*b^2*c^2*x^2*log(abs(F))^2
- 4*b*c*x*log(abs(F)) + 4)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))
^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*
log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^
2) + 2*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*
b^3*c^3*log(abs(F))^3)*(pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - pi*b^2*c^2*x^2*
log(abs(F)) - pi*b*c*x*sgn(F) + pi*b*c*x)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*
c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (
3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*
log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn
(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 2) + 1/2*I*((4*
I*pi^2*b^2*c^2*x^2*sgn(F) - 8*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - 4*I*pi^2*
b^2*c^2*x^2 + 8*pi*b^2*c^2*x^2*log(abs(F)) + 8*I*b^2*c^2*x^2*log(abs(F))^2
+ 8*pi*b*c*x*sgn(F) - 8*pi*b*c*x - 16*I*b*c*x*log(abs(F)) + 16*I)*e^(1/2*I*
pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(-4*
I*pi^3*b^3*c^3*sgn(F) + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) + 12*I*pi*b^3*c^
3*log(abs(F))^2*sgn(F) + 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) - 1
2*I*pi*b^3*c^3*log(abs(F))^2 + 8*b^3*c^3*log(abs(F))^3) - (4*I*pi^2*b^2*c^2
*x^2*sgn(F) + 8*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - 4*I*pi^2*b^2*c^2*x^2 -
8*pi*b^2*c^2*x^2*log(abs(F)) + 8*I*b^2*c^2*x^2*log(abs(F))^2 - 8*pi*b*c*x*s
gn(F) + 8*pi*b*c*x - 16*I*b*c*x*log(abs(F)) + 16*I)*e^(-1/2*I*pi*b*c*x*sgn(
F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(4*I*pi^3*b^3*c^3
*sgn(F) + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 12*I*pi*b^3*c^3*log(abs(F))^
2*sgn(F) - 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) + 12*I*pi*b^3*c^3
*log(abs(F))^2 + 8*b^3*c^3*log(abs(F))^3))*e^(b*c*x*log(abs(F)) + a*c*log(a
bs(F)) + 2) + 2*(2*((pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F))
)*(pi*b*c*d*x*sgn(F) - pi*b*c*d*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2
*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*l
og(abs(F)))^2) + (pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F)
)^2)*(b*c*d*x*log(abs(F)) - d)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2
*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(a
bs(F)))^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1
/2*pi*a*c) + ((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2
)*(pi*b*c*d*x*sgn(F) - pi*b*c*d*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2
```

```
*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*l
og(abs(F)))^2) - 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))
*(b*c*d*x*log(abs(F)) - d)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2
*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F
)))^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*p
i*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 1) - 1/2*I*((4*pi*b*c*d*x*
sgn(F) - 4*pi*b*c*d*x - 8*I*b*c*d*x*log(abs(F)) + 8*I*d)*e^(1/2*I*pi*b*c*x*
sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(2*pi^2*b^2*c
^2*sgn(F) + 4*I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2*pi^2*b^2*c^2 - 4*I*pi*b^2
*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2) + (4*pi*b*c*d*x*sgn(F) - 4*pi*b
*c*d*x + 8*I*b*c*d*x*log(abs(F)) - 8*I*d)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I
*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*
I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2*pi^2*b^2*c^2 + 4*I*pi*b^2*c^2*log(abs(F
)) + 4*b^2*c^2*log(abs(F))^2))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 1)
+ 2*(2*b*c*d^2*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F)
+ 1/2*pi*a*c)*log(abs(F))/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*
c)^2) - (pi*b*c*sgn(F) - pi*b*c)*d^2*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*
x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(
F) - pi*b*c)^2))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F))) - 1/2*I*(-2*I*d^2*
e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*
a*c)/(I*pi*b*c*sgn(F) - I*pi*b*c + 2*b*c*log(abs(F))) + 2*I*d^2*e^(-1/2*I*p
i*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(-I*p
i*b*c*sgn(F) + I*pi*b*c + 2*b*c*log(abs(F))))*e^(b*c*x*log(abs(F)) + a*c*lo
g(abs(F)))
```

maple [A] time = 0.01, size = 91, normalized size = 1.15

$$\frac{\left(b^2c^2e^2x^2\ln(F)^2 + 2b^2c^2dex\ln(F)^2 + b^2c^2d^2\ln(F)^2 - 2bc\,e^2x\ln(F) - 2bcde\ln(F) + 2e^2\right)F^{(bx+a)c}}{b^3c^3\ln(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (e^2*x^2*b^2*c^2*ln(F)^2+2*ln(F)^2*b^2*c^2*d*e*x+b^2*c^2*ln(F)^2*d^2-2*ln(F
)*b*c*e^2*x-2*ln(F)*b*c*e*d+2*e^2)*F^((b*x+a)*c)/b^3/c^3/ln(F)^3
```

maxima [A] time = 0.50, size = 123, normalized size = 1.56

$$\frac{F^{bcx+ac}d^2}{bc\log(F)} + \frac{2\left(F^{ac}bcx\log(F) - F^{ac}\right)F^{bcx}de}{b^2c^2\log(F)^2} + \frac{\left(F^{ac}b^2c^2x^2\log(F)^2 - 2\,F^{ac}bcx\log(F) + 2\,F^{ac}\right)F^{bcx}e^2}{b^3c^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*c*x + a*c)*d^2/(b*c*log(F)) + 2*(F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*
c*x)*d*e/(b^2*c^2*log(F)^2) + (F^(a*c)*b^2*c^2*x^2*log(F)^2 - 2*F^(a*c)*b*c
*x*log(F) + 2*F^(a*c))*F^(b*c*x)*e^2/(b^3*c^3*log(F)^3)
```

mupad [B] time = 3.51, size = 91, normalized size = 1.15

$$\frac{F^{a\,c+b\,c\,x}\,\left(b^2\,c^2\,d^2\,\ln(F)^2+2\,b^2\,c^2\,d\,e\,x\,\ln(F)^2+b^2\,c^2\,e^2\,x^2\,\ln(F)^2-2\,b\,c\,d\,e\,\ln(F)-2\,b\,c\,e^2\,x\,\ln(F)+2\,e^2\right)}{b^3\,c^3\,\ln(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^(a*c + b*c*x)*(2*e^2 + b^2*c^2*d^2*log(F)^2 - 2*b*c*e^2*x*log(F) + b^2*c
^2*e^2*x^2*log(F)^2 - 2*b*c*d*e*log(F) + 2*b^2*c^2*d*e*x*log(F)^2))/(b^3*c^
3*log(F)^3)
```

sympy [A] time = 0.18, size = 133, normalized size = 1.68

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^{2}c^{2}d^{2}\log{(F)}^{2}+2b^{2}c^{2}dex\log{(F)}^{2}+b^{2}c^{2}e^{2}x^{2}\log{(F)}^{2}-2bcde\log{(F)}-2bce^{2}x\log{(F)}+2e^{2}\right)}{b^{3}c^{3}\log{(F)}^{3}} & \text{for}\: b^{3}c^{3}\log{(F)}^{3} \neq 0 \\ d^{2}x+dex^{2}+\frac{e^{2}x^{3}}{3} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**2,x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b**2*c**2*d**2*log(F)**2 + 2*b**2*c**2*d*e*x*l
og(F)**2 + b**2*c**2*e**2*x**2*log(F)**2 - 2*b*c*d*e*log(F) - 2*b*c*e**2*x*
log(F) + 2*e**2)/(b**3*c**3*log(F)**3), Ne(b**3*c**3*log(F)**3, 0)), (d**2*
x + d*e*x**2 + e**2*x**3/3, True))
```

3.5 $\int F^{c(a+bx)}(d+ex)\,dx$

Optimal. Leaf size=48

$$\frac{(d+ex)F^{c(a+bx)}}{bc\log(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}$$

```
[Out] -e*F^(c*(b*x+a))/b^2/c^2/ln(F)^2+F^(c*(b*x+a))*(e*x+d)/b/c/ln(F)
```

Rubi [A] time = 0.02, antiderivative size = 48, 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 = {2176, 2194}

$$\frac{(d+ex)F^{c(a+bx)}}{bc\log(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x),x]
```

```
[Out] -((e*F^(c*(a + b*x)))/(b^2*c^2*Log[F]^2)) + (F^(c*(a + b*x))*(d + e*x))/(b*
c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\begin{aligned}\int F^{c(a+bx)}(d+ex)\,dx &= \frac{F^{c(a+bx)}(d+ex)}{bc\log(F)}-\frac{e\int F^{c(a+bx)}\,dx}{bc\log(F)}\\ &= -\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{F^{c(a+bx)}(d+ex)}{bc\log(F)}\end{aligned}$$

Mathematica [A] time = 0.04, size = 34, normalized size = 0.71

$$\frac{F^{c(a+bx)}(bc\log(F)(d+ex)-e)}{b^2c^2\log^2(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x),x]
```

```
[Out] (F^(c*(a + b*x))*(-e + b*c*(d + e*x)*Log[F]))/(b^2*c^2*Log[F]^2)
```

fricas [A] time = 0.82, size = 38, normalized size = 0.79

$$\frac{\left((bcex+bcd)\log(F)-e\right)F^{bcx+ac}}{b^2c^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d),x, algorithm="fricas")
```

```
[Out] ((b*c*e*x + b*c*d)*log(F) - e)*F^(b*c*x + a*c)/(b^2*c^2*log(F)^2)
```

giac [C] time = 0.67, size = 1083, normalized size = 22.56

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d),x, algorithm="giac")
```

```
[Out] (2*((pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(pi*b*c*x*sgn(
F) - pi*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))
^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) + (pi
^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(b*c*x*log(abs(
F)) - 1)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*cos(-1/2*p
i*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi^2*b^
2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(pi*b*c*x*sgn(F) - p
i*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) - 4*(pi*b^2
*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(b*c*x*log(abs(F)) - 1)/(
(pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^
2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*sin(-1/2*pi*b*c*x*sg
n(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F))
 + a*c*log(abs(F)) + 1) - 1/2*I*((2*pi*b*c*x*sgn(F) - 2*pi*b*c*x - 4*I*b*c*
x*log(abs(F)) + 4*I)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a
```

```
*c*sgn(F) - 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) + 4*I*pi*b^2*c^2*log(abs(F
))*sgn(F) - 2*pi^2*b^2*c^2 - 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs
(F))^2) + (2*pi*b*c*x*sgn(F) - 2*pi*b*c*x + 4*I*b*c*x*log(abs(F)) - 4*I)*e^
(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a
*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2*pi^2*b^2
*c^2 + 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2))*e^(b*c*x*log(
abs(F)) + a*c*log(abs(F)) + 1) + 2*(2*b*c*d*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*
pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)*log(abs(F))/(4*b^2*c^2*log(abs(F
))^2 + (pi*b*c*sgn(F) - pi*b*c)^2) - (pi*b*c*sgn(F) - pi*b*c)*d*sin(-1/2*pi
*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)/(4*b^2*c^2*l
og(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2))*e^(b*c*x*log(abs(F)) + a*c*log(
abs(F))) - 1/2*I*(-2*I*d*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*
pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(I*pi*b*c*sgn(F) - I*pi*b*c + 2*b*c*log(abs(F
))) + 2*I*d*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F
) + 1/2*I*pi*a*c)/(-I*pi*b*c*sgn(F) + I*pi*b*c + 2*b*c*log(abs(F))))*e^(b*c
*x*log(abs(F)) + a*c*log(abs(F)))
```

maple [A] time = 0.01, size = 38, normalized size = 0.79

$$\frac{(bcex\ln(F) + bcd\ln(F) - e)\,F^{(bx+a)c}}{b^2c^2\ln(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e*x+d),x)
```

```
[Out] (ln(F)*b*c*e*x+ln(F)*b*c*d-e)*F^((b*x+a)*c)/b^2/c^2/ln(F)^2
```

maxima [A] time = 0.49, size = 60, normalized size = 1.25

$$\frac{F^{bcx+ac}d}{bc\log(F)} + \frac{\left(F^{ac}bcx\log(F) - F^{ac}\right)F^{bcx}e}{b^2c^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d),x, algorithm="maxima")
```

```
[Out] F^(b*c*x + a*c)*d/(b*c*log(F)) + (F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*c*x)
*e/(b^2*c^2*log(F)^2)
```

mupad [B] time = 3.37, size = 38, normalized size = 0.79

$$\frac{F^{a\,c+b\,c\,x}\,\left(b\,c\,d\,\ln(F) - e + b\,c\,e\,x\,\ln(F)\right)}{b^2\,c^2\,\ln(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x),x)
```

```
[Out] (F^(a*c + b*c*x)*(b*c*d*log(F) - e + b*c*e*x*log(F)))/(b^2*c^2*log(F)^2)
```

sympy [A] time = 0.14, size = 60, normalized size = 1.25

$$\begin{cases} \frac{F^{c(a+bx)}(bcd\log(F)+bcex\log(F)-e)}{b^2c^2\log(F)^2} & \text{for } b^2c^2\log(F)^2 \neq 0 \\ dx + \frac{ex^2}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d),x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b*c*d*log(F) + b*c*e*x*log(F) - e)/(b**2*c**2*
log(F)**2), Ne(b**2*c**2*log(F)**2, 0)), (d*x + e*x**2/2, True))
```

3.6 $\int F^{c(a+bx)}\,dx$

Optimal. Leaf size=20

$$\frac{F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] F^(c*(b*x+a))/b/c/ln(F)
```

Rubi [A] time = 0.00, antiderivative size = 20, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {2194}

$$\frac{F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] F^(c*(a + b*x))/(b*c*Log[F])
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int F^{c(a+bx)}\,dx = \frac{F^{c(a+bx)}}{bc\log(F)}$$

Mathematica [A] time = 0.00, size = 21, normalized size = 1.05

$$\frac{F^{ac+bcx}}{bc\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] F^(a*c + b*c*x)/(b*c*Log[F])
```

fricas [A] time = 0.44, size = 21, normalized size = 1.05

$$\frac{F^{bcx+ac}}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

giac [A] time = 0.31, size = 21, normalized size = 1.05

$$\frac{F^{bcx+ac}}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.00, size = 21, normalized size = 1.05

$$\frac{F^{(bx+a)c}}{bc\ln(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c),x)
[Out] F^((b*x+a)*c)/b/c/ln(F)
```

maxima [A] time = 0.48, size = 20, normalized size = 1.00

$$\frac{F^{(bx+a)c}}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

mupad [B] time = 3.43, size = 21, normalized size = 1.05

$$\frac{F^{a\,c+b\,c\,x}}{b\,c\,\ln(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(a*c + b*c*x)/(b*c*log(F))
```

sympy [A] time = 0.10, size = 20, normalized size = 1.00

$$\begin{cases} \frac{F^{c(a+bx)}}{bc\log(F)} & \text{for } bc\log(F) \neq 0 \\ x & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a)),x)
[Out] Piecewise((F**(c*(a + b*x))/(b*c*log(F)), Ne(b*c*log(F), 0)), (x, True))
```

3.7 $\int \frac{F^{c(a+bx)}}{d+ex} dx$

Optimal. Leaf size=31

$$\frac{F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{e}$$

```
[Out] F^(c*(a-b*d/e))*Ei(b*c*(e*x+d)*ln(F)/e)/e
```

Rubi [A] time = 0.02, antiderivative size = 31, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.059, Rules used = {2178}

$$\frac{F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{e}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d + e*x),x]
```

```
[Out] (F^(c*(a - (b*d)/e))*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e])/e
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{d+ex} dx = \frac{F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{e}$$

Mathematica [A] time = 0.04, size = 31, normalized size = 1.00

$$\frac{F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{e}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d + e*x),x]
```

[Out] (F^(c*(a - (b*d)/e))*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e])/e

fricas [A] time = 0.41, size = 39, normalized size = 1.26

$$\frac{\mathrm{Ei}\left(\frac{(bcex+bcd)\log(F)}{e}\right)}{F^{\frac{bcd-ace}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(F^(c*(b*x+a))/(e*x+d),x, algorithm="fricas")

[Out] Ei((b*c*e*x + b*c*d)*log(F)/e)/(F^((b*c*d - a*c*e)/e)*e)

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

$$\int \frac{F^{(bx+a)c}}{ex+d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(F^(c*(b*x+a))/(e*x+d),x, algorithm="giac")

[Out] integrate(F^((b*x + a)*c)/(e*x + d), x)

maple [A] time = 0.05, size = 56, normalized size = 1.81

$$-\frac{F^{\frac{(ae-bd)c}{e}}\,\mathrm{Ei}\left(1,-bcx\ln(F)-ac\ln(F)-\frac{-ace\ln(F)+bcd\ln(F)}{e}\right)}{e}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(F^((b*x+a)*c)/(e*x+d),x)

[Out] -1/e*F^(c*(a*e-b*d)/e)*Ei(1,-b*c*x*ln(F)-a*c*ln(F)-(-ln(F)*a*c*e+b*c*d*ln(F
))/e)

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

$$\int \frac{F^{(bx+a)c}}{ex+d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(F^(c*(b*x+a))/(e*x+d),x, algorithm="maxima")

[Out] integrate(F^((b*x + a)*c)/(e*x + d), x)

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

$$\int \frac{F^{c\,(a+b\,x)}}{d+e\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d + e*x),x)
[Out] int(F^(c*(a + b*x))/(d + e*x), x)
```

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

$$\int \frac{F^{c(a+bx)}}{d+ex}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/(e*x+d),x)
[Out] Integral(F**(c*(a + b*x))/(d + e*x), x)
```

3.8 $\int \frac{F^{c(a+bx)}}{(d+ex)^2} dx$

Optimal. Leaf size=57

$$\frac{bc\log(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{e^2}-\frac{F^{c(a+bx)}}{e(d+ex)}$$

```
[Out] -F^(c*(b*x+a))/e/(e*x+d)+b*c*F^(c*(a-b*d/e))*Ei(b*c*(e*x+d)*ln(F)/e)*ln(F)/
e^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 = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {2177, 2178}

$$\frac{bc\log(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{e^2}-\frac{F^{c(a+bx)}}{e(d+ex)}$$

Antiderivative was successfully verified.

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

```
[Out] -(F^(c*(a + b*x))/(e*(d + e*x))) + (b*c*F^(c*(a - (b*d)/e))*ExpIntegralEi[(
b*c*(d + e*x)*Log[F])/e]*Log[F])/e^2
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{(d+ex)^2}\,dx = -\frac{F^{c(a+bx)}}{e(d+ex)} + \frac{(bc\log(F))\int \frac{F^{c(a+bx)}}{d+ex}\,dx}{e}$$
$$= -\frac{F^{c(a+bx)}}{e(d+ex)} + \frac{bcF^{c\left(a-\frac{bd}{e}\right)}\mathrm{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)\log(F)}{e^2}$$

Mathematica [A] time = 0.12, size = 55, normalized size = 0.96

$$\frac{F^{ac}\left(bc\log(F)F^{-\frac{bcd}{e}}\mathrm{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right) - \frac{eF^{bcx}}{d+ex}\right)}{e^2}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(a*c)*(-((e*F^(b*c*x))/(d + e*x)) + (b*c*ExpIntegralEi[(b*c*(d + e*x)*Lo
g[F])/e]*Log[F])/F^((b*c*d)/e)))/e^2
```

fricas [A] time = 0.42, size = 77, normalized size = 1.35

$$-\frac{F^{bcx+ac}e - \frac{(bcex+bcd)\mathrm{Ei}\left(\frac{(bcex+bcd)\log(F)}{e}\right)\log(F)}{F^{\frac{bcd-ace}{e}}}}{e^3x + de^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(F^(b*c*x + a*c)*e - (b*c*e*x + b*c*d)*Ei((b*c*e*x + b*c*d)*log(F)/e)*log(
F)/F^((b*c*d - a*c*e)/e))/(e^3*x + d*e^2)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.05, size = 99, normalized size = 1.74

$$-\frac{bc\,F^{ac}F^{bcx}\ln(F)}{\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)e^2}-\frac{bc\,F^{\frac{(ae-bd)c}{e}}\operatorname{Ei}\left(1,-bcx\ln(F)-ac\ln(F)-\frac{-ace\ln(F)+bcd\ln(F)}{e}\right)\ln(F)}{e^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -b*c*ln(F)/e^2*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+1/e*ln(F)*b*c*d)-b*c*ln(F)/e^
2*F^((a*e-b*d)*c/e)*Ei(1,-b*c*x*ln(F)-a*c*ln(F)-(-a*c*e*ln(F)+b*c*d*ln(F))/
e)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{F^{c\,(a+b\,x)}}{(d+e\,x)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(F^(c*(a + b*x))/(d + e*x)^2, x)
```

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

$$\int \frac{F^{c(a+bx)}}{(d+ex)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(F**(c*(a + b*x))/(d + e*x)**2, x)
```

3.9 $\int \frac{F^{c(a+bx)}}{(d+ex)^3}\,dx$

Optimal. Leaf size=95

$$\frac{b^2c^2\log^2(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{2e^3}-\frac{bc\log(F)F^{c(a+bx)}}{2e^2(d+ex)}-\frac{F^{c(a+bx)}}{2e(d+ex)^2}$$

```
[Out] -1/2*F^(c*(b*x+a))/e/(e*x+d)^2-1/2*b*c*F^(c*(b*x+a))*ln(F)/e^2/(e*x+d)+1/2*
b^2*c^2*F^(c*(a-b*d/e))*Ei(b*c*(e*x+d)*ln(F)/e)*ln(F)^2/e^3
```

Rubi [A] time = 0.07, antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {2177, 2178}

$$\frac{b^2c^2\log^2(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{2e^3}-\frac{bc\log(F)F^{c(a+bx)}}{2e^2(d+ex)}-\frac{F^{c(a+bx)}}{2e(d+ex)^2}$$

Antiderivative was successfully verified.

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

```
[Out] -F^(c*(a + b*x))/(2*e*(d + e*x)^2) - (b*c*F^(c*(a + b*x))*Log[F])/(2*e^2*(d
 + e*x)) + (b^2*c^2*F^(c*(a - (b*d)/e))*ExpIntegralEi[(b*c*(d + e*x)*Log[F]
)/e]*Log[F]^2)/(2*e^3)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{(d+ex)^3}\,dx = -\frac{F^{c(a+bx)}}{2e(d+ex)^2} + \frac{(bc\log(F))\int \frac{F^{c(a+bx)}}{(d+ex)^2}\,dx}{2e}$$

$$= -\frac{F^{c(a+bx)}}{2e(d+ex)^2} - \frac{bcF^{c(a+bx)}\log(F)}{2e^2(d+ex)} + \frac{\left(b^2c^2\log^2(F)\right)\int \frac{F^{c(a+bx)}}{d+ex}\,dx}{2e^2}$$

$$= -\frac{F^{c(a+bx)}}{2e(d+ex)^2} - \frac{bcF^{c(a+bx)}\log(F)}{2e^2(d+ex)} + \frac{b^2c^2F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)\log^2(F)}{2e^3}$$

Mathematica [A] time = 0.15, size = 88, normalized size = 0.93

$$\frac{F^{c\left(a-\frac{bd}{e}\right)}\left(b^2c^2\log^2(F)(d+ex)^2\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right) - eF^{\frac{bc(d+ex)}{e}}(bc\log(F)(d+ex)+e)\right)}{2e^3(d+ex)^2}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(c*(a - (b*d)/e))*(b^2*c^2*(d + e*x)^2*ExpIntegralEi[(b*c*(d + e*x)*Log[
F])/e]*Log[F]^2 - e*F^((b*c*(d + e*x))/e)*(e + b*c*(d + e*x)*Log[F])))/(2*e
^3*(d + e*x)^2)
```

fricas [A] time = 0.42, size = 134, normalized size = 1.41

$$\frac{\frac{\left(b^2c^2e^2x^2+2\,b^2c^2dex+b^2c^2d^2\right)\text{Ei}\left(\frac{(bcex+bcd)\log(F)}{e}\right)\log(F)^2}{F^{\frac{bcd-ace}{e}}} - \left(e^2+\left(bce^2x+bcde\right)\log(F)\right)F^{bcx+ac}}{2\left(e^5x^2+2\,de^4x+d^2e^3\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*((b^2*c^2*e^2*x^2 + 2*b^2*c^2*d*e*x + b^2*c^2*d^2)*Ei((b*c*e*x + b*c*d)
*log(F)/e)*log(F)^2/F^((b*c*d - a*c*e)/e) - (e^2 + (b*c*e^2*x + b*c*d*e)*lo
g(F))*F^(b*c*x + a*c))/(e^5*x^2 + 2*d*e^4*x + d^2*e^3)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.06, size = 155, normalized size = 1.63

$$-\frac{b^2c^2F^{ac}F^{bcx}\ln(F)^2}{2\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^2e^3}-\frac{b^2c^2F^{ac}F^{bcx}\ln(F)^2}{2\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)e^3}-\frac{b^2c^2F^{\frac{(ae-bd)c}{e}}\,\mathrm{Ei}\left(1,-bcx\ln(F)-ac\ln(F)-\frac{-ace\ln(F)+bcd\ln(F)}{e}\right)}{2e^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/2*b^2*c^2*ln(F)^2/e^3*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+b*c*d/e*ln(F))^2-1/
2*b^2*c^2*ln(F)^2/e^3*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+b*c*d/e*ln(F))-1/2*b^2
*c^2*ln(F)^2/e^3*F^((a*e-b*d)*c/e)*Ei(1,-b*c*x*ln(F)-a*c*ln(F)-(-a*c*e*ln(F
)+b*c*d*ln(F))/e)
```

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

$$\int\frac{F^{(bx+a)c}}{(ex+d)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int\frac{F^{c\,(a+b\,x)}}{{(d+e\,x)}^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(F^(c*(a + b*x))/(d + e*x)^3, x)
```

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

$$\int\frac{F^{c(a+bx)}}{(d+ex)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.10 $\int \frac{F^{c(a+bx)}}{(d+ex)^4}\,dx$

Optimal. Leaf size=128

$$\frac{b^3c^3\log^3(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{6e^4}-\frac{b^2c^2\log^2(F)F^{c(a+bx)}}{6e^3(d+ex)}-\frac{bc\log(F)F^{c(a+bx)}}{6e^2(d+ex)^2}-\frac{F^{c(a+bx)}}{3e(d+ex)^3}$$

```
[Out] -1/3*F^(c*(b*x+a))/e/(e*x+d)^3-1/6*b*c*F^(c*(b*x+a))*ln(F)/e^2/(e*x+d)^2-1/
6*b^2*c^2*F^(c*(b*x+a))*ln(F)^2/e^3/(e*x+d)+1/6*b^3*c^3*F^(c*(a-b*d/e))*Ei(
b*c*(e*x+d)*ln(F)/e)*ln(F)^3/e^4
```

Rubi [A] time = 0.10, antiderivative size = 128, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {2177, 2178}

$$\frac{b^3c^3\log^3(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{6e^4}-\frac{b^2c^2\log^2(F)F^{c(a+bx)}}{6e^3(d+ex)}-\frac{bc\log(F)F^{c(a+bx)}}{6e^2(d+ex)^2}-\frac{F^{c(a+bx)}}{3e(d+ex)^3}$$

Antiderivative was successfully verified.

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

```
[Out] -F^(c*(a + b*x))/(3*e*(d + e*x)^3) - (b*c*F^(c*(a + b*x))*Log[F])/(6*e^2*(d
 + e*x)^2) - (b^2*c^2*F^(c*(a + b*x))*Log[F]^2)/(6*e^3*(d + e*x)) + (b^3*c^
3*F^(c*(a - (b*d)/e))*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F]^3)/(6*
e^4)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{(d+ex)^4}\,dx = -\frac{F^{c(a+bx)}}{3e(d+ex)^3} + \frac{(bc\log(F))\int \frac{F^{c(a+bx)}}{(d+ex)^3}\,dx}{3e}$$
$$= -\frac{F^{c(a+bx)}}{3e(d+ex)^3} - \frac{bcF^{c(a+bx)}\log(F)}{6e^2(d+ex)^2} + \frac{\left(b^2c^2\log^2(F)\right)\int \frac{F^{c(a+bx)}}{(d+ex)^2}\,dx}{6e^2}$$
$$= -\frac{F^{c(a+bx)}}{3e(d+ex)^3} - \frac{bcF^{c(a+bx)}\log(F)}{6e^2(d+ex)^2} - \frac{b^2c^2F^{c(a+bx)}\log^2(F)}{6e^3(d+ex)} + \frac{\left(b^3c^3\log^3(F)\right)\int \frac{F^{c(a+bx)}}{d+ex}\,dx}{6e^3}$$
$$= -\frac{F^{c(a+bx)}}{3e(d+ex)^3} - \frac{bcF^{c(a+bx)}\log(F)}{6e^2(d+ex)^2} - \frac{b^2c^2F^{c(a+bx)}\log^2(F)}{6e^3(d+ex)} + \frac{b^3c^3F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)\log^3(}{6e^4}$$

Mathematica [A] time = 0.19, size = 99, normalized size = 0.77

$$\frac{F^{ac}\left(b^3c^3\log^3(F)F^{-\frac{bcd}{e}}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right) - \frac{eF^{bcx}\left(b^2c^2\log^2(F)(d+ex)^2+bce\log(F)(d+ex)+2e^2\right)}{(d+ex)^3}\right)}{6e^4}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(a*c)*((b^3*c^3*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F]^3)/F^((b*
c*d)/e) - (e*F^(b*c*x)*(2*e^2 + b*c*e*(d + e*x)*Log[F] + b^2*c^2*(d + e*x)^
2*Log[F]^2))/(d + e*x)^3))/(6*e^4)
```

fricas [A] time = 0.44, size = 209, normalized size = 1.63

$$\frac{\frac{\left(b^3c^3e^3x^3+3\,b^3c^3de^2x^2+3\,b^3c^3d^2ex+b^3c^3d^3\right)\text{Ei}\left(\frac{(bcex+bcd)\log(F)}{e}\right)\log(F)^3}{F^{\frac{bcd-ace}{e}}} - \left(2\,e^3 + \left(b^2c^2e^3x^2 + 2\,b^2c^2de^2x + b^2c^2d^2e\right)\log(F)^2 + \left(bc\right.\right.}{6\left(e^7x^3 + 3\,de^6x^2 + 3\,d^2e^5x + d^3e^4\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/6*((b^3*c^3*e^3*x^3 + 3*b^3*c^3*d*e^2*x^2 + 3*b^3*c^3*d^2*e*x + b^3*c^3*d
^3)*Ei((b*c*e*x + b*c*d)*log(F)/e)*log(F)^3/F^((b*c*d - a*c*e)/e) - (2*e^3
+ (b^2*c^2*e^3*x^2 + 2*b^2*c^2*d*e^2*x + b^2*c^2*d^2*e)*log(F)^2 + (b*c*e^3
*x + b*c*d*e^2)*log(F))*F^(b*c*x + a*c))/(e^7*x^3 + 3*d*e^6*x^2 + 3*d^2*e^5
*x + d^3*e^4)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.07, size = 199, normalized size = 1.55

$$-\frac{b^3c^3F^{ac}F^{bcx}\ln(F)^3}{3\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^3e^4}-\frac{b^3c^3F^{ac}F^{bcx}\ln(F)^3}{6\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^2e^4}-\frac{b^3c^3F^{ac}F^{bcx}\ln(F)^3}{6\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)e^4}-\frac{b^3c^3F^{\frac{(ae-bd)c}{e}}\operatorname{Ei}\left(1,-bcx\ln(F\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/3*b^3*c^3*ln(F)^3/e^4*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+b*c*d/e*ln(F))^3-1/
6*b^3*c^3*ln(F)^3/e^4*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+b*c*d/e*ln(F))^2-1/6*b
^3*c^3*ln(F)^3/e^4*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+b*c*d/e*ln(F))-1/6*b^3*c^
3*ln(F)^3/e^4*F^((a*e-b*d)*c/e)*Ei(1,-b*c*x*ln(F)-a*c*ln(F)-(-a*c*e*ln(F)+b
*c*d*ln(F))/e)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{F^{c\,(a+b\,x)}}{{(d+e\,x)}^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(F^(c*(a + b*x))/(d + e*x)^4, x)
```

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

$$\int \frac{F^{c(a+bx)}}{(d+ex)^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.11 $\int \frac{F^{c(a+bx)}}{(d+ex)^5} dx$

Optimal. Leaf size=161

$$\frac{b^4c^4\log^4(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{24e^5}-\frac{b^3c^3\log^3(F)F^{c(a+bx)}}{24e^4(d+ex)}-\frac{b^2c^2\log^2(F)F^{c(a+bx)}}{24e^3(d+ex)^2}-\frac{bc\log(F)F^{c(a+bx)}}{12e^2(d+ex)^3}-\frac{F^{c(a+bx)}}{4e(d+ex)^4}$$

```
[Out] -1/4*F^(c*(b*x+a))/e/(e*x+d)^4-1/12*b*c*F^(c*(b*x+a))*ln(F)/e^2/(e*x+d)^3-1
/24*b^2*c^2*F^(c*(b*x+a))*ln(F)^2/e^3/(e*x+d)^2-1/24*b^3*c^3*F^(c*(b*x+a))*
ln(F)^3/e^4/(e*x+d)+1/24*b^4*c^4*F^(c*(a-b*d/e))*Ei(b*c*(e*x+d)*ln(F)/e)*ln
(F)^4/e^5
```

Rubi [A] time = 0.13, antiderivative size = 161, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118, Rules used = {2177, 2178}

$$\frac{b^4c^4\log^4(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{24e^5}-\frac{b^3c^3\log^3(F)F^{c(a+bx)}}{24e^4(d+ex)}-\frac{b^2c^2\log^2(F)F^{c(a+bx)}}{24e^3(d+ex)^2}-\frac{bc\log(F)F^{c(a+bx)}}{12e^2(d+ex)^3}-\frac{F^{c(a+bx)}}{4e(d+ex)^4}$$

Antiderivative was successfully verified.

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

```
[Out] -F^(c*(a + b*x))/(4*e*(d + e*x)^4) - (b*c*F^(c*(a + b*x))*Log[F])/(12*e^2*(
d + e*x)^3) - (b^2*c^2*F^(c*(a + b*x))*Log[F]^2)/(24*e^3*(d + e*x)^2) - (b^
3*c^3*F^(c*(a + b*x))*Log[F]^3)/(24*e^4*(d + e*x)) + (b^4*c^4*F^(c*(a - (b*
d)/e))*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F]^4)/(24*e^5)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{(d+ex)^5}\,dx = -\frac{F^{c(a+bx)}}{4e(d+ex)^4} + \frac{(bc\log(F))\int \frac{F^{c(a+bx)}}{(d+ex)^4}\,dx}{4e}$$
$$= -\frac{F^{c(a+bx)}}{4e(d+ex)^4} - \frac{bcF^{c(a+bx)}\log(F)}{12e^2(d+ex)^3} + \frac{\left(b^2c^2\log^2(F)\right)\int \frac{F^{c(a+bx)}}{(d+ex)^3}\,dx}{12e^2}$$
$$= -\frac{F^{c(a+bx)}}{4e(d+ex)^4} - \frac{bcF^{c(a+bx)}\log(F)}{12e^2(d+ex)^3} - \frac{b^2c^2F^{c(a+bx)}\log^2(F)}{24e^3(d+ex)^2} + \frac{\left(b^3c^3\log^3(F)\right)\int \frac{F^{c(a+bx)}}{(d+ex)^2}\,dx}{24e^3}$$
$$= -\frac{F^{c(a+bx)}}{4e(d+ex)^4} - \frac{bcF^{c(a+bx)}\log(F)}{12e^2(d+ex)^3} - \frac{b^2c^2F^{c(a+bx)}\log^2(F)}{24e^3(d+ex)^2} - \frac{b^3c^3F^{c(a+bx)}\log^3(F)}{24e^4(d+ex)} + \frac{\left(b^4c^4\log^4(F\right.}{2}$$
$$= -\frac{F^{c(a+bx)}}{4e(d+ex)^4} - \frac{bcF^{c(a+bx)}\log(F)}{12e^2(d+ex)^3} - \frac{b^2c^2F^{c(a+bx)}\log^2(F)}{24e^3(d+ex)^2} - \frac{b^3c^3F^{c(a+bx)}\log^3(F)}{24e^4(d+ex)} + \frac{b^4c^4F^{c\left(a-\frac{bd}{e}\right)}}{}$$

Mathematica [A] time = 0.16, size = 121, normalized size = 0.75

$$\frac{F^{ac}\left(b^4c^4\log^4(F)F^{-\frac{bcd}{e}}\operatorname{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right) - \frac{eF^{bcx}\left(b^3c^3\log^3(F)(d+ex)^3+b^2c^2e\log^2(F)(d+ex)^2+2bce^2\log(F)(d+ex)+6e^3\right)}{(d+ex)^4}\right)}{24e^5}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(a*c)*((b^4*c^4*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F]^4)/F^((b*
c*d)/e) - (e*F^(b*c*x)*(6*e^3 + 2*b*c*e^2*(d + e*x)*Log[F] + b^2*c^2*e*(d +
 e*x)^2*Log[F]^2 + b^3*c^3*(d + e*x)^3*Log[F]^3))/(d + e*x)^4))/(24*e^5)
```

fricas [A] time = 0.45, size = 300, normalized size = 1.86

$$\frac{\frac{\left(b^4c^4e^4x^4+4\,b^4c^4de^3x^3+6\,b^4c^4d^2e^2x^2+4\,b^4c^4d^3ex+b^4c^4d^4\right)\operatorname{Ei}\left(\frac{(bcex+bcd)\log(F)}{e}\right)\log(F)^4}{F^{\frac{bcd-ace}{e}}} - \left(6\,e^4 + \left(b^3c^3e^4x^3 + 3\,b^3c^3de^3x^2 + 3\,b^3c^3d^2e^2\right.\right.}{24\left(e^9x^4 + 4\,de^8x^3 + 6\,d^2e^7x^2\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/24*((b^4*c^4*e^4*x^4 + 4*b^4*c^4*d*e^3*x^3 + 6*b^4*c^4*d^2*e^2*x^2 + 4*b^
4*c^4*d^3*e*x + b^4*c^4*d^4)*Ei((b*c*e*x + b*c*d)*log(F)/e)*log(F)^4/F^((b*
```

```
c*d - a*c*e)/e) - (6*e^4 + (b^3*c^3*e^4*x^3 + 3*b^3*c^3*d*e^3*x^2 + 3*b^3*c
^3*d^2*e^2*x + b^3*c^3*d^3*e)*log(F)^3 + (b^2*c^2*e^4*x^2 + 2*b^2*c^2*d*e^3
*x + b^2*c^2*d^2*e^2)*log(F)^2 + 2*(b*c*e^4*x + b*c*d*e^3)*log(F))*F^(b*c*x
 + a*c))/(e^9*x^4 + 4*d*e^8*x^3 + 6*d^2*e^7*x^2 + 4*d^3*e^6*x + d^4*e^5)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.08, size = 243, normalized size = 1.51

$$-\frac{b^4c^4F^{ac}F^{bcx}\ln(F)^4}{4\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^4 e^5}-\frac{b^4c^4F^{ac}F^{bcx}\ln(F)^4}{12\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^3 e^5}-\frac{b^4c^4F^{ac}F^{bcx}\ln(F)^4}{24\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^2 e^5}-\frac{b^4c^4F^{ac}F^{bcx}\ln(F)^4}{24\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/4*b^4*c^4*ln(F)^4/e^5*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+b*c*d/e*ln(F))^4-1/
12*b^4*c^4*ln(F)^4/e^5*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+b*c*d/e*ln(F))^3-1/24
*b^4*c^4*ln(F)^4/e^5*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+b*c*d/e*ln(F))^2-1/24*b
^4*c^4*ln(F)^4/e^5*F^(b*c*x)*F^(a*c)/(b*c*x*ln(F)+b*c*d/e*ln(F))-1/24*b^4*c
^4*ln(F)^4/e^5*F^((a*e-b*d)*c/e)*Ei(1,-b*c*x*ln(F)-a*c*ln(F)-(-a*c*e*ln(F)+
b*c*d*ln(F))/e)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{F^{c\,(a+b\,x)}}{{(d+e\,x)}^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(F^(c*(a + b*x))/(d + e*x)^5, x)
```

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

$$\int \frac{F^{c(a+bx)}}{(d+ex)^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.12 $\int F^{c(a+bx)}\left(d^4+4d^3ex+6d^2e^2x^2+4de^3x^3+e^4x^4\right)dx$

Optimal. Leaf size=141

$$\frac{24e^4F^{c(a+bx)}}{b^5c^5\log^5(F)}-\frac{24e^3(d+ex)F^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{12e^2(d+ex)^2F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{4e(d+ex)^3F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{(d+ex)^4F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] 24*e^4*F^(c*(b*x+a))/b^5/c^5/ln(F)^5-24*e^3*F^(c*(b*x+a))*(e*x+d)/b^4/c^4/l
n(F)^4+12*e^2*F^(c*(b*x+a))*(e*x+d)^2/b^3/c^3/ln(F)^3-4*e*F^(c*(b*x+a))*(e*
x+d)^3/b^2/c^2/ln(F)^2+F^(c*(b*x+a))*(e*x+d)^4/b/c/ln(F)
```

Rubi [A] time = 0.12, antiderivative size = 141, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, integrand size = 48, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.062, Rules used = {2187, 2176, 2194}

$$\frac{12e^2(d+ex)^2F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{24e^3(d+ex)F^{c(a+bx)}}{b^4c^4\log^4(F)}-\frac{4e(d+ex)^3F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{24e^4F^{c(a+bx)}}{b^5c^5\log^5(F)}+\frac{(d+ex)^4F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d^4 + 4*d^3*e*x + 6*d^2*e^2*x^2 + 4*d*e^3*x^3 + e^4*x^
4),x]
```

```
[Out] (24*e^4*F^(c*(a + b*x)))/(b^5*c^5*Log[F]^5) - (24*e^3*F^(c*(a + b*x))*(d +
e*x))/(b^4*c^4*Log[F]^4) + (12*e^2*F^(c*(a + b*x))*(d + e*x)^2)/(b^3*c^3*Lo
g[F]^3) - (4*e*F^(c*(a + b*x))*(d + e*x)^3)/(b^2*c^2*Log[F]^2) + (F^(c*(a +
 b*x))*(d + e*x)^4)/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2187

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Int[NormalizePowerOfLinear[u, x]^m*(a + b*(F^(g*ExpandToSum[v, x]))^n)^p,
 x] /; FreeQ[{F, a, b, g, n, p}, x] && LinearQ[v, x] && PowerOfLinearQ[u, x
] &&  !(LinearMatchQ[v, x] && PowerOfLinearMatchQ[u, x]) && IntegerQ[m]
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int F^{c(a+bx)}\left(d^4+4d^3ex+6d^2e^2x^2+4de^3x^3+e^4x^4\right)dx=\int F^{c(a+bx)}(d+ex)^4\,dx$$
$$=\frac{F^{c(a+bx)}(d+ex)^4}{bc\log(F)}-\frac{(4e)\int F^{c(a+bx)}(d+ex)^3\,dx}{bc\log(F)}$$
$$=-\frac{4eF^{c(a+bx)}(d+ex)^3}{b^2c^2\log^2(F)}+\frac{F^{c(a+bx)}(d+ex)^4}{bc\log(F)}+\frac{\left(12e^2\right)\int F^{c(}}{b^2c^2}$$
$$=\frac{12e^2F^{c(a+bx)}(d+ex)^2}{b^3c^3\log^3(F)}-\frac{4eF^{c(a+bx)}(d+ex)^3}{b^2c^2\log^2(F)}+\frac{F^{c(a+bx)}(d}{bc\log}$$
$$=-\frac{24e^3F^{c(a+bx)}(d+ex)}{b^4c^4\log^4(F)}+\frac{12e^2F^{c(a+bx)}(d+ex)^2}{b^3c^3\log^3(F)}-\frac{4eF^{c(a}}{b^2c}$$
$$=\frac{24e^4F^{c(a+bx)}}{b^5c^5\log^5(F)}-\frac{24e^3F^{c(a+bx)}(d+ex)}{b^4c^4\log^4(F)}+\frac{12e^2F^{c(a+bx)}(d+}{b^3c^3\log^3(F)}$$

Mathematica [A] time = 0.06, size = 100, normalized size = 0.71

$$\frac{F^{c(a+bx)}\left(b^4c^4\log^4(F)(d+ex)^4-4b^3c^3e\log^3(F)(d+ex)^3+12b^2c^2e^2\log^2(F)(d+ex)^2-24bce^3\log(F)(d+ex)+2\right.}{b^5c^5\log^5(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d^4 + 4*d^3*e*x + 6*d^2*e^2*x^2 + 4*d*e^3*x^3 +
e^4*x^4),x]
```

```
[Out] (F^(c*(a + b*x))*(24*e^4 - 24*b*c*e^3*(d + e*x)*Log[F] + 12*b^2*c^2*e^2*(d
+ e*x)^2*Log[F]^2 - 4*b^3*c^3*e*(d + e*x)^3*Log[F]^3 + b^4*c^4*(d + e*x)^4*
Log[F]^4))/(b^5*c^5*Log[F]^5)
```

fricas [A] time = 0.42, size = 227, normalized size = 1.61

$$\frac{\left(\left(b^4c^4e^4x^4+4\,b^4c^4de^3x^3+6\,b^4c^4d^2e^2x^2+4\,b^4c^4d^3ex+b^4c^4d^4\right)\log(F)^4+24\,e^4-4\left(b^3c^3e^4x^3+3\,b^3c^3de^3x^2+3\right.\right.}{b^5c^5\,\mathrm{l}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4),x
, algorithm="fricas")
```

```
[Out] ((b^4*c^4*e^4*x^4 + 4*b^4*c^4*d*e^3*x^3 + 6*b^4*c^4*d^2*e^2*x^2 + 4*b^4*c^4
*d^3*e*x + b^4*c^4*d^4)*log(F)^4 + 24*e^4 - 4*(b^3*c^3*e^4*x^3 + 3*b^3*c^3*
d*e^3*x^2 + 3*b^3*c^3*d^2*e^2*x + b^3*c^3*d^3*e)*log(F)^3 + 12*(b^2*c^2*e^4
*x^2 + 2*b^2*c^2*d*e^3*x + b^2*c^2*d^2*e^2)*log(F)^2 - 24*(b*c*e^4*x + b*c*
d*e^3)*log(F))*F^(b*c*x + a*c)/(b^5*c^5*log(F)^5)
```

giac [C] time = 1.60, size = 7867, normalized size = 55.79

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4),x
, algorithm="giac")
```

```
[Out] -((4*(pi^3*b^4*c^4*x^4*log(abs(F))*sgn(F) - pi*b^4*c^4*x^4*log(abs(F))^3*sg
n(F) - pi^3*b^4*c^4*x^4*log(abs(F)) + pi*b^4*c^4*x^4*log(abs(F))^3 - pi^3*b
^3*c^3*x^3*sgn(F) + 3*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) + pi^3*b^3*c^3*x^
3 - 3*pi*b^3*c^3*x^3*log(abs(F))^2 - 6*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) +
6*pi*b^2*c^2*x^2*log(abs(F)) + 6*pi*b*c*x*sgn(F) - 6*pi*b*c*x)*(pi^5*b^5*c^
5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^
4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F))^2 - 5*pi*b^5*c^5*log(
abs(F))^4)/((pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5
*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F
))^2 - 5*pi*b^5*c^5*log(abs(F))^4)^2 + (5*pi^4*b^5*c^5*log(abs(F))*sgn(F) -
 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^
2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(abs(F))^5)^2) - (pi^4*b^4*c^4*x^4*s
gn(F) - 6*pi^2*b^4*c^4*x^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4*x^4 + 6*pi^2
*b^4*c^4*x^4*log(abs(F))^2 - 2*b^4*c^4*x^4*log(abs(F))^4 + 12*pi^2*b^3*c^3*
x^3*log(abs(F))*sgn(F) - 12*pi^2*b^3*c^3*x^3*log(abs(F)) + 8*b^3*c^3*x^3*lo
g(abs(F))^3 - 12*pi^2*b^2*c^2*x^2*sgn(F) + 12*pi^2*b^2*c^2*x^2 - 24*b^2*c^2
*x^2*log(abs(F))^2 + 48*b*c*x*log(abs(F)) - 48)*(5*pi^4*b^5*c^5*log(abs(F))
*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F))
 + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(abs(F))^5)/((pi^5*b^5*c^5*
sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*
sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F))^2 - 5*pi*b^5*c^5*log(ab
s(F))^4)^2 + (5*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F
))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 -
2*b^5*c^5*log(abs(F))^5)^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*
pi*a*c*sgn(F) + 1/2*pi*a*c) - ((pi^4*b^4*c^4*x^4*sgn(F) - 6*pi^2*b^4*c^4*x^
4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4*x^4 + 6*pi^2*b^4*c^4*x^4*log(abs(F))^
2 - 2*b^4*c^4*x^4*log(abs(F))^4 + 12*pi^2*b^3*c^3*x^3*log(abs(F))*sgn(F) -
12*pi^2*b^3*c^3*x^3*log(abs(F)) + 8*b^3*c^3*x^3*log(abs(F))^3 - 12*pi^2*b^2
```

```
*c^2*x^2*sgn(F) + 12*pi^2*b^2*c^2*x^2 - 24*b^2*c^2*x^2*log(abs(F))^2 + 48*b
*c*x*log(abs(F)) - 48)*(pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2
*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^
5*log(abs(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)/((pi^5*b^5*c^5*sgn(F) - 10*pi
^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*
b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)^2 + (
5*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) -
5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(
abs(F))^5)^2) + 4*(pi^3*b^4*c^4*x^4*log(abs(F))*sgn(F) - pi*b^4*c^4*x^4*log
(abs(F))^3*sgn(F) - pi^3*b^4*c^4*x^4*log(abs(F)) + pi*b^4*c^4*x^4*log(abs(F
))^3 - pi^3*b^3*c^3*x^3*sgn(F) + 3*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) + pi
^3*b^3*c^3*x^3 - 3*pi*b^3*c^3*x^3*log(abs(F))^2 - 6*pi*b^2*c^2*x^2*log(abs(
F))*sgn(F) + 6*pi*b^2*c^2*x^2*log(abs(F)) + 6*pi*b*c*x*sgn(F) - 6*pi*b*c*x)
*(5*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F)
- 5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*lo
g(abs(F))^5)/((pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) +
 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs
(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)^2 + (5*pi^4*b^5*c^5*log(abs(F))*sgn(F)
 - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F)) + 10*p
i^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(abs(F))^5)^2))*sin(-1/2*pi*b*c*x*
sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F
)) + a*c*log(abs(F)) + 4) + 1/2*I*((-16*I*pi^4*b^4*c^4*x^4*sgn(F) + 64*pi^3
*b^4*c^4*x^4*log(abs(F))*sgn(F) + 96*I*pi^2*b^4*c^4*x^4*log(abs(F))^2*sgn(F
) - 64*pi*b^4*c^4*x^4*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4*c^4*x^4 - 64*pi^
3*b^4*c^4*x^4*log(abs(F)) - 96*I*pi^2*b^4*c^4*x^4*log(abs(F))^2 + 64*pi*b^4
*c^4*x^4*log(abs(F))^3 + 32*I*b^4*c^4*x^4*log(abs(F))^4 - 64*pi^3*b^3*c^3*x
^3*sgn(F) - 192*I*pi^2*b^3*c^3*x^3*log(abs(F))*sgn(F) + 192*pi*b^3*c^3*x^3*
log(abs(F))^2*sgn(F) + 64*pi^3*b^3*c^3*x^3 + 192*I*pi^2*b^3*c^3*x^3*log(abs
(F)) - 192*pi*b^3*c^3*x^3*log(abs(F))^2 - 128*I*b^3*c^3*x^3*log(abs(F))^3 +
 192*I*pi^2*b^2*c^2*x^2*sgn(F) - 384*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - 19
2*I*pi^2*b^2*c^2*x^2 + 384*pi*b^2*c^2*x^2*log(abs(F)) + 384*I*b^2*c^2*x^2*l
og(abs(F))^2 + 384*pi*b*c*x*sgn(F) - 384*pi*b*c*x - 768*I*b*c*x*log(abs(F))
 + 768*I)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) -
 1/2*I*pi*a*c)/(16*I*pi^5*b^5*c^5*sgn(F) - 80*pi^4*b^5*c^5*log(abs(F))*sgn(
F) - 160*I*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 160*pi^2*b^5*c^5*log(abs(F))
^3*sgn(F) + 80*I*pi*b^5*c^5*log(abs(F))^4*sgn(F) - 16*I*pi^5*b^5*c^5 + 80*p
i^4*b^5*c^5*log(abs(F)) + 160*I*pi^3*b^5*c^5*log(abs(F))^2 - 160*pi^2*b^5*c
^5*log(abs(F))^3 - 80*I*pi*b^5*c^5*log(abs(F))^4 + 32*b^5*c^5*log(abs(F))^5
) - (-16*I*pi^4*b^4*c^4*x^4*sgn(F) - 64*pi^3*b^4*c^4*x^4*log(abs(F))*sgn(F)
 + 96*I*pi^2*b^4*c^4*x^4*log(abs(F))^2*sgn(F) + 64*pi*b^4*c^4*x^4*log(abs(F
))^3*sgn(F) + 16*I*pi^4*b^4*c^4*x^4 + 64*pi^3*b^4*c^4*x^4*log(abs(F)) - 96*
I*pi^2*b^4*c^4*x^4*log(abs(F))^2 - 64*pi*b^4*c^4*x^4*log(abs(F))^3 + 32*I*b
^4*c^4*x^4*log(abs(F))^4 + 64*pi^3*b^3*c^3*x^3*sgn(F) - 192*I*pi^2*b^3*c^3*
x^3*log(abs(F))*sgn(F) - 192*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - 64*pi^3*
b^3*c^3*x^3 + 192*I*pi^2*b^3*c^3*x^3*log(abs(F)) + 192*pi*b^3*c^3*x^3*log(a
```

```
bs(F))^2 - 128*I*b^3*c^3*x^3*log(abs(F))^3 + 192*I*pi^2*b^2*c^2*x^2*sgn(F)
+ 384*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - 192*I*pi^2*b^2*c^2*x^2 - 384*pi*b
^2*c^2*x^2*log(abs(F)) + 384*I*b^2*c^2*x^2*log(abs(F))^2 - 384*pi*b*c*x*sgn
(F) + 384*pi*b*c*x - 768*I*b*c*x*log(abs(F)) + 768*I)*e^(-1/2*I*pi*b*c*x*sg
n(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(-16*I*pi^5*b^5
*c^5*sgn(F) - 80*pi^4*b^5*c^5*log(abs(F))*sgn(F) + 160*I*pi^3*b^5*c^5*log(a
bs(F))^2*sgn(F) + 160*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 80*I*pi*b^5*c^5*l
og(abs(F))^4*sgn(F) + 16*I*pi^5*b^5*c^5 + 80*pi^4*b^5*c^5*log(abs(F)) - 160
*I*pi^3*b^5*c^5*log(abs(F))^2 - 160*pi^2*b^5*c^5*log(abs(F))^3 + 80*I*pi*b^
5*c^5*log(abs(F))^4 + 32*b^5*c^5*log(abs(F))^5))*e^(b*c*x*log(abs(F)) + a*c
*log(abs(F)) + 4) - 4*(((3*pi^2*b^3*c^3*d*x^3*log(abs(F))*sgn(F) - 3*pi^2*b
^3*c^3*d*x^3*log(abs(F)) + 2*b^3*c^3*d*x^3*log(abs(F))^3 - 3*pi^2*b^2*c^2*d
*x^2*sgn(F) + 3*pi^2*b^2*c^2*d*x^2 - 6*b^2*c^2*d*x^2*log(abs(F))^2 + 12*b*c
*d*x*log(abs(F)) - 12*d)*(pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^
2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(
F))^4)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b
^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi
^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*
c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2) - 4*(pi^3*b^3*c^3*d*x^3*sgn(
F) - 3*pi*b^3*c^3*d*x^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3*d*x^3 + 3*pi*b^
3*c^3*d*x^3*log(abs(F))^2 + 6*pi*b^2*c^2*d*x^2*log(abs(F))*sgn(F) - 6*pi*b^
2*c^2*d*x^2*log(abs(F)) - 6*pi*b*c*d*x*sgn(F) + 6*pi*b*c*d*x)*(pi^3*b^4*c^4
*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(ab
s(F)) + pi*b^4*c^4*log(abs(F))^3)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*lo
g(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^
4*log(abs(F))^4)^2 + 16*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(a
bs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2))*
cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) -
 ((pi^3*b^3*c^3*d*x^3*sgn(F) - 3*pi*b^3*c^3*d*x^3*log(abs(F))^2*sgn(F) - pi
^3*b^3*c^3*d*x^3 + 3*pi*b^3*c^3*d*x^3*log(abs(F))^2 + 6*pi*b^2*c^2*d*x^2*lo
g(abs(F))*sgn(F) - 6*pi*b^2*c^2*d*x^2*log(abs(F)) - 6*pi*b*c*d*x*sgn(F) + 6
*pi*b*c*d*x)*(pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - p
i^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)/((pi^
4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*p
i^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*c^4*l
og(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(
F)) + pi*b^4*c^4*log(abs(F))^3)^2) + 4*(3*pi^2*b^3*c^3*d*x^3*log(abs(F))*sg
n(F) - 3*pi^2*b^3*c^3*d*x^3*log(abs(F)) + 2*b^3*c^3*d*x^3*log(abs(F))^3 - 3
*pi^2*b^2*c^2*d*x^2*sgn(F) + 3*pi^2*b^2*c^2*d*x^2 - 6*b^2*c^2*d*x^2*log(abs
(F))^2 + 12*b*c*d*x*log(abs(F)) - 12*d)*(pi^3*b^4*c^4*log(abs(F))*sgn(F) -
pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log
(abs(F))^3)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - p
i^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 1
6*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3
*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(
```

F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) +
 a*c*log(abs(F)) + 3) - 1/2*I*((32*pi^3*b^3*c^3*d*x^3*sgn(F) + 96*I*pi^2*b^
3*c^3*d*x^3*log(abs(F))*sgn(F) - 96*pi*b^3*c^3*d*x^3*log(abs(F))^2*sgn(F) -
 32*pi^3*b^3*c^3*d*x^3 - 96*I*pi^2*b^3*c^3*d*x^3*log(abs(F)) + 96*pi*b^3*c^
3*d*x^3*log(abs(F))^2 + 64*I*b^3*c^3*d*x^3*log(abs(F))^3 - 96*I*pi^2*b^2*c^
2*d*x^2*sgn(F) + 192*pi*b^2*c^2*d*x^2*log(abs(F))*sgn(F) + 96*I*pi^2*b^2*c^
2*d*x^2 - 192*pi*b^2*c^2*d*x^2*log(abs(F)) - 192*I*b^2*c^2*d*x^2*log(abs(F)
)^2 - 192*pi*b*c*d*x*sgn(F) + 192*pi*b*c*d*x + 384*I*b*c*d*x*log(abs(F)) -
384*I*d)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) -
1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn(F) + 32*I*pi^3*b^4*c^4*log(abs(F))*sgn(F)
 - 48*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - 32*I*pi*b^4*c^4*log(abs(F))^3*sgn
(F) - 8*pi^4*b^4*c^4 - 32*I*pi^3*b^4*c^4*log(abs(F)) + 48*pi^2*b^4*c^4*log(
abs(F))^2 + 32*I*pi*b^4*c^4*log(abs(F))^3 - 16*b^4*c^4*log(abs(F))^4) + (32
*pi^3*b^3*c^3*d*x^3*sgn(F) - 96*I*pi^2*b^3*c^3*d*x^3*log(abs(F))*sgn(F) - 9
6*pi*b^3*c^3*d*x^3*log(abs(F))^2*sgn(F) - 32*pi^3*b^3*c^3*d*x^3 + 96*I*pi^2
*b^3*c^3*d*x^3*log(abs(F)) + 96*pi*b^3*c^3*d*x^3*log(abs(F))^2 - 64*I*b^3*c
^3*d*x^3*log(abs(F))^3 + 96*I*pi^2*b^2*c^2*d*x^2*sgn(F) + 192*pi*b^2*c^2*d*
x^2*log(abs(F))*sgn(F) - 96*I*pi^2*b^2*c^2*d*x^2 - 192*pi*b^2*c^2*d*x^2*log
(abs(F)) + 192*I*b^2*c^2*d*x^2*log(abs(F))^2 - 192*pi*b*c*d*x*sgn(F) + 192*
pi*b*c*d*x - 384*I*b*c*d*x*log(abs(F)) + 384*I*d)*e^(-1/2*I*pi*b*c*x*sgn(F)
 + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn
(F) - 32*I*pi^3*b^4*c^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*c^4*log(abs(F))^2*
sgn(F) + 32*I*pi*b^4*c^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*c^4 + 32*I*pi^3*
b^4*c^4*log(abs(F)) + 48*pi^2*b^4*c^4*log(abs(F))^2 - 32*I*pi*b^4*c^4*log(a
bs(F))^3 - 16*b^4*c^4*log(abs(F))^4))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)
) + 3) - 6*((2*(pi*b^2*c^2*d^2*x^2*log(abs(F))*sgn(F) - pi*b^2*c^2*d^2*x^2*
log(abs(F)) - pi*b*c*d^2*x*sgn(F) + pi*b*c*d^2*x)*(pi^3*b^3*c^3*sgn(F) - 3*
pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2
)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3
+ 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi
^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2) - (pi^2*b^2*c^2*d^2*x^
2*sgn(F) - pi^2*b^2*c^2*d^2*x^2 + 2*b^2*c^2*d^2*x^2*log(abs(F))^2 - 4*b*c*d
^2*x*log(abs(F)) + 4*d^2)*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c
^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*
c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (
3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*
log(abs(F))^3)^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn
(F) + 1/2*pi*a*c) - ((pi^2*b^2*c^2*d^2*x^2*sgn(F) - pi^2*b^2*c^2*d^2*x^2 +
2*b^2*c^2*d^2*x^2*log(abs(F))^2 - 4*b*c*d^2*x*log(abs(F)) + 4*d^2)*(pi^3*b^
3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*
c^3*log(abs(F))^2)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F
) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(
F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2) + 2*(
pi*b^2*c^2*d^2*x^2*log(abs(F))*sgn(F) - pi*b^2*c^2*d^2*x^2*log(abs(F)) - pi
*b*c*d^2*x*sgn(F) + pi*b*c*d^2*x)*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi

```
^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)/((pi^3*b^3*c^3*sgn(F) - 3
*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^
2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*
b^3*c^3*log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi
*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 2) + 1/
2*I*((24*I*pi^2*b^2*c^2*d^2*x^2*sgn(F) - 48*pi*b^2*c^2*d^2*x^2*log(abs(F))*
sgn(F) - 24*I*pi^2*b^2*c^2*d^2*x^2 + 48*pi*b^2*c^2*d^2*x^2*log(abs(F)) + 48
*I*b^2*c^2*d^2*x^2*log(abs(F))^2 + 48*pi*b*c*d^2*x*sgn(F) - 48*pi*b*c*d^2*x
 - 96*I*b*c*d^2*x*log(abs(F)) + 96*I*d^2)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*
pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(-4*I*pi^3*b^3*c^3*sgn(F) +
12*pi^2*b^3*c^3*log(abs(F))*sgn(F) + 12*I*pi*b^3*c^3*log(abs(F))^2*sgn(F) +
 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) - 12*I*pi*b^3*c^3*log(abs(F
))^2 + 8*b^3*c^3*log(abs(F))^3) - (24*I*pi^2*b^2*c^2*d^2*x^2*sgn(F) + 48*pi
*b^2*c^2*d^2*x^2*log(abs(F))*sgn(F) - 24*I*pi^2*b^2*c^2*d^2*x^2 - 48*pi*b^2
*c^2*d^2*x^2*log(abs(F)) + 48*I*b^2*c^2*d^2*x^2*log(abs(F))^2 - 48*pi*b*c*d
^2*x*sgn(F) + 48*pi*b*c*d^2*x - 96*I*b*c*d^2*x*log(abs(F)) + 96*I*d^2)*e^(-
1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c
)/(4*I*pi^3*b^3*c^3*sgn(F) + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 12*I*pi*b
^3*c^3*log(abs(F))^2*sgn(F) - 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)
) + 12*I*pi*b^3*c^3*log(abs(F))^2 + 8*b^3*c^3*log(abs(F))^3))*e^(b*c*x*log(
abs(F)) + a*c*log(abs(F)) + 2) + 4*(2*((b*c*d^3*x*log(abs(F)) - d^3)*(pi^2*
b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)/((pi^2*b^2*c^2*sgn
(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))
*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) + (pi*b*c*d^3*x*sgn(F) - pi*b*c*d^3*x)
*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))/((pi^2*b^2*c^2*sg
n(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F)
)*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*
c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi*b*c*d^3*x*sgn(F) - pi*b*c*d^3*
x)*(pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)/((pi^2*b^
2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*lo
g(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) - 4*(b*c*d^3*x*log(abs(F)) -
d^3)*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))/((pi^2*b^2*c^
2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(ab
s(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*p
i*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(a
bs(F)) + 1) - 1/2*I*((8*pi*b*c*d^3*x*sgn(F) - 8*pi*b*c*d^3*x - 16*I*b*c*d^3
*x*log(abs(F)) + 16*I*d^3)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*
I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) + 4*I*pi*b^2*c^2*log
(abs(F))*sgn(F) - 2*pi^2*b^2*c^2 - 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*l
og(abs(F))^2) + (8*pi*b*c*d^3*x*sgn(F) - 8*pi*b*c*d^3*x + 16*I*b*c*d^3*x*lo
g(abs(F)) - 16*I*d^3)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi
*a*c*sgn(F) + 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*I*pi*b^2*c^2*log(abs
(F))*sgn(F) - 2*pi^2*b^2*c^2 + 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(a
bs(F))^2))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 1) + 2*(2*b*c*d^4*cos(-
1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)*log(ab
```

```
s(F))/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2) - (pi*b*c*sgn(
F) - pi*b*c)*d^4*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F
) + 1/2*pi*a*c)/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2))*e^(
b*c*x*log(abs(F)) + a*c*log(abs(F))) - 1/2*I*(-2*I*d^4*e^(1/2*I*pi*b*c*x*sg
n(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(I*pi*b*c*sgn(F
) - I*pi*b*c + 2*b*c*log(abs(F))) + 2*I*d^4*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2
*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(-I*pi*b*c*sgn(F) + I*pi*
b*c + 2*b*c*log(abs(F))))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)))
```

maple [A] time = 0.01, size = 260, normalized size = 1.84

$$\frac{\left(b^4c^4e^4x^4\ln(F)^4+4b^4c^4d\,e^3x^3\ln(F)^4+6b^4c^4d^2e^2x^2\ln(F)^4+4b^4c^4d^3ex\ln(F)^4+b^4c^4d^4\ln(F)^4-4b^3c^3e^4x^3\ln(F)\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4),x)
```

```
[Out] (b^4*c^4*e^4*x^4*ln(F)^4+4*b^4*c^4*d*e^3*x^3*ln(F)^4+6*b^4*c^4*d^2*e^2*x^2*
ln(F)^4+4*b^4*c^4*d^3*e*x*ln(F)^4+b^4*c^4*d^4*ln(F)^4-4*b^3*c^3*e^4*x^3*ln(
F)^3-12*b^3*c^3*d*e^3*x^2*ln(F)^3-12*b^3*c^3*d^2*e^2*x*ln(F)^3-4*b^3*c^3*d^
3*e*ln(F)^3+12*b^2*c^2*e^4*x^2*ln(F)^2+24*b^2*c^2*d*e^3*x*ln(F)^2+12*b^2*c^
2*d^2*e^2*ln(F)^2-24*b*c*e^4*x*ln(F)-24*b*c*d*e^3*ln(F)+24*e^4)/b^5/c^5*F^(
(b*x+a)*c)/ln(F)^5
```

maxima [B] time = 0.51, size = 309, normalized size = 2.19

$$\frac{F^{bcx+ac}d^4}{bc\log(F)}+\frac{4\left(F^{ac}bcx\log(F)-F^{ac}\right)F^{bcx}d^3e}{b^2c^2\log(F)^2}+\frac{6\left(F^{ac}b^2c^2x^2\log(F)^2-2F^{ac}bcx\log(F)+2F^{ac}\right)F^{bcx}d^2e^2}{b^3c^3\log(F)^3}+\frac{4\left(F^{ac}b^3c^3x\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4),x
, algorithm="maxima")
```

```
[Out] F^(b*c*x + a*c)*d^4/(b*c*log(F)) + 4*(F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*
c*x)*d^3*e/(b^2*c^2*log(F)^2) + 6*(F^(a*c)*b^2*c^2*x^2*log(F)^2 - 2*F^(a*c)
*b*c*x*log(F) + 2*F^(a*c))*F^(b*c*x)*d^2*e^2/(b^3*c^3*log(F)^3) + 4*(F^(a*c
)*b^3*c^3*x^3*log(F)^3 - 3*F^(a*c)*b^2*c^2*x^2*log(F)^2 + 6*F^(a*c)*b*c*x*l
og(F) - 6*F^(a*c))*F^(b*c*x)*d*e^3/(b^4*c^4*log(F)^4) + (F^(a*c)*b^4*c^4*x^
4*log(F)^4 - 4*F^(a*c)*b^3*c^3*x^3*log(F)^3 + 12*F^(a*c)*b^2*c^2*x^2*log(F)
^2 - 24*F^(a*c)*b*c*x*log(F) + 24*F^(a*c))*F^(b*c*x)*e^4/(b^5*c^5*log(F)^5)
```

mupad [B] time = 3.49, size = 260, normalized size = 1.84

$$\frac{F^{a\,c+b\,c\,x}\,\left(b^4\,c^4\,d^4\,\ln(F)^4+4\,b^4\,c^4\,d^3\,e\,x\,\ln(F)^4+6\,b^4\,c^4\,d^2\,e^2\,x^2\,\ln(F)^4+4\,b^4\,c^4\,d\,e^3\,x^3\,\ln(F)^4+b^4\,c^4\,e^4\,x^4\,\ln(F)^4\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d^4 + e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*
x),x)
```

```
[Out] (F^(a*c + b*c*x)*(24*e^4 + b^4*c^4*d^4*log(F)^4 - 24*b*c*e^4*x*log(F) - 4*b
^3*c^3*d^3*e*log(F)^3 + 12*b^2*c^2*d^2*e^2*log(F)^2 + 12*b^2*c^2*e^4*x^2*lo
g(F)^2 - 4*b^3*c^3*e^4*x^3*log(F)^3 + b^4*c^4*e^4*x^4*log(F)^4 - 24*b*c*d*e
^3*log(F) + 6*b^4*c^4*d^2*e^2*x^2*log(F)^4 + 24*b^2*c^2*d*e^3*x*log(F)^2 +
4*b^4*c^4*d^3*e*x*log(F)^4 - 12*b^3*c^3*d^2*e^2*x*log(F)^3 - 12*b^3*c^3*d*e
^3*x^2*log(F)^3 + 4*b^4*c^4*d*e^3*x^3*log(F)^4))/(b^5*c^5*log(F)^5)
```

sympy [A] time = 0.27, size = 350, normalized size = 2.48

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^4c^4d^4\log(F)^4+4b^4c^4d^3ex\log(F)^4+6b^4c^4d^2e^2x^2\log(F)^4+4b^4c^4de^3x^3\log(F)^4+b^4c^4e^4x^4\log(F)^4-4b^3c^3d^3e\log(F)^3-12b^3c^3d^2e^2x\log(F)^3-1\right.}{b^5c^5\log(} \\ d^4x + 2d^3ex^2 + 2d^2e^2x^3 + de^3x^4 + \frac{e^4x^5}{5} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e**4*x**4+4*d*e**3*x**3+6*d**2*e**2*x**2+4*d**3*e
*x+d**4),x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b**4*c**4*d**4*log(F)**4 + 4*b**4*c**4*d**3*e*
x*log(F)**4 + 6*b**4*c**4*d**2*e**2*x**2*log(F)**4 + 4*b**4*c**4*d*e**3*x**
3*log(F)**4 + b**4*c**4*e**4*x**4*log(F)**4 - 4*b**3*c**3*d**3*e*log(F)**3
- 12*b**3*c**3*d**2*e**2*x*log(F)**3 - 12*b**3*c**3*d*e**3*x**2*log(F)**3 -
 4*b**3*c**3*e**4*x**3*log(F)**3 + 12*b**2*c**2*d**2*e**2*log(F)**2 + 24*b*
*2*c**2*d*e**3*x*log(F)**2 + 12*b**2*c**2*e**4*x**2*log(F)**2 - 24*b*c*d*e*
*3*log(F) - 24*b*c*e**4*x*log(F) + 24*e**4)/(b**5*c**5*log(F)**5), Ne(b**5*
c**5*log(F)**5, 0)), (d**4*x + 2*d**3*e*x**2 + 2*d**2*e**2*x**3 + d*e**3*x*
*4 + e**4*x**5/5, True))
```

3.13 $\int F^{c(a+bx)} \left(d^3+3d^2ex+3de^2x^2+e^3x^3\right) dx$

Optimal. Leaf size=110

$$-\frac{6e^3F^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{6e^2(d+ex)F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{3e(d+ex)^2F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{(d+ex)^3F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] -6*e^3*F^(c*(b*x+a))/b^4/c^4/ln(F)^4+6*e^2*F^(c*(b*x+a))*(e*x+d)/b^3/c^3/ln
(F)^3-3*e*F^(c*(b*x+a))*(e*x+d)^2/b^2/c^2/ln(F)^2+F^(c*(b*x+a))*(e*x+d)^3/b
/c/ln(F)
```

Rubi [A] time = 0.09, antiderivative size = 110, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 37, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.081, Rules used = {2187, 2176, 2194}

$$\frac{6e^2(d+ex)F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{3e(d+ex)^2F^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{6e^3F^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{(d+ex)^3F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (-6*e^3*F^(c*(a + b*x)))/(b^4*c^4*Log[F]^4) + (6*e^2*F^(c*(a + b*x))*(d + e
*x))/(b^3*c^3*Log[F]^3) - (3*e*F^(c*(a + b*x))*(d + e*x)^2)/(b^2*c^2*Log[F]
^2) + (F^(c*(a + b*x))*(d + e*x)^3)/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2187

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Int[NormalizePowerOfLinear[u, x]^m*(a + b*(F^(g*ExpandToSum[v, x]))^n)^p,
 x] /; FreeQ[{F, a, b, g, n, p}, x] && LinearQ[v, x] && PowerOfLinearQ[u, x
] &&  !(LinearMatchQ[v, x] && PowerOfLinearMatchQ[u, x]) && IntegerQ[m]
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int F^{c(a+bx)}\left(d^3+3d^2ex+3de^2x^2+e^3x^3\right)dx=\int F^{c(a+bx)}(d+ex)^3\,dx$$
$$=\frac{F^{c(a+bx)}(d+ex)^3}{bc\log(F)}-\frac{(3e)\int F^{c(a+bx)}(d+ex)^2\,dx}{bc\log(F)}$$
$$=-\frac{3eF^{c(a+bx)}(d+ex)^2}{b^2c^2\log^2(F)}+\frac{F^{c(a+bx)}(d+ex)^3}{bc\log(F)}+\frac{\left(6e^2\right)\int F^{c(a+bx)}(d+ex)}{b^2c^2\log^2(F)}$$
$$=\frac{6e^2F^{c(a+bx)}(d+ex)}{b^3c^3\log^3(F)}-\frac{3eF^{c(a+bx)}(d+ex)^2}{b^2c^2\log^2(F)}+\frac{F^{c(a+bx)}(d+ex)^3}{bc\log(F)}-\frac{\left(6e^3\right.}{b}$$
$$=-\frac{6e^3F^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{6e^2F^{c(a+bx)}(d+ex)}{b^3c^3\log^3(F)}-\frac{3eF^{c(a+bx)}(d+ex)^2}{b^2c^2\log^2(F)}+\frac{F^{c(a+b}}{bc}$$

Mathematica [A] time = 0.08, size = 78, normalized size = 0.71

$$\frac{F^{c(a+bx)}\left(b^3c^3\log^3(F)(d+ex)^3-3b^2c^2e\log^2(F)(d+ex)^2+6bce^2\log(F)(d+ex)-6e^3\right)}{b^4c^4\log^4(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(c*(a + b*x))*(-6*e^3 + 6*b*c*e^2*(d + e*x)*Log[F] - 3*b^2*c^2*e*(d + e*
x)^2*Log[F]^2 + b^3*c^3*(d + e*x)^3*Log[F]^3))/(b^4*c^4*Log[F]^4)
```

fricas [A] time = 0.42, size = 147, normalized size = 1.34

$$\frac{\left(\left(b^3c^3e^3x^3+3\,b^3c^3de^2x^2+3\,b^3c^3d^2ex+b^3c^3d^3\right)\log(F)^3-6\,e^3-3\left(b^2c^2e^3x^2+2\,b^2c^2de^2x+b^2c^2d^2e\right)\log(F)^2+6\right.}{b^4c^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3),x, algorithm="f
ricas")
```

```
[Out] ((b^3*c^3*e^3*x^3 + 3*b^3*c^3*d*e^2*x^2 + 3*b^3*c^3*d^2*e*x + b^3*c^3*d^3)*
log(F)^3 - 6*e^3 - 3*(b^2*c^2*e^3*x^2 + 2*b^2*c^2*d*e^2*x + b^2*c^2*d^2*e)*
log(F)^2 + 6*(b*c*e^3*x + b*c*d*e^2)*log(F))*F^(b*c*x + a*c)/(b^4*c^4*log(F
)^4)
```

giac [C] time = 1.15, size = 4693, normalized size = 42.66

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3),x, algorithm="g
iac")
```

```
[Out] ((4*(pi^3*b^3*c^3*x^3*sgn(F) - 3*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - pi^3
*b^3*c^3*x^3 + 3*pi*b^3*c^3*x^3*log(abs(F))^2 + 6*pi*b^2*c^2*x^2*log(abs(F)
)*sgn(F) - 6*pi*b^2*c^2*x^2*log(abs(F)) - 6*pi*b*c*x*sgn(F) + 6*pi*b*c*x)*(
pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^
4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)/((pi^4*b^4*c^4*sgn(F) - 6*pi^
2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^
2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b
^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs
(F))^3)^2) - (pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - p
i^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)*(3*pi
^2*b^3*c^3*x^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*x^3*log(abs(F)) + 2*b^3*
c^3*x^3*log(abs(F))^3 - 3*pi^2*b^2*c^2*x^2*sgn(F) + 3*pi^2*b^2*c^2*x^2 - 6*
b^2*c^2*x^2*log(abs(F))^2 + 12*b*c*x*log(abs(F)) - 12)/((pi^4*b^4*c^4*sgn(F
) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log
(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*c^4*log(abs(F))*sgn(
F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^
4*log(abs(F))^3)^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*s
gn(F) + 1/2*pi*a*c) + ((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*
sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F)
)^4)*(pi^3*b^3*c^3*x^3*sgn(F) - 3*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - pi^
3*b^3*c^3*x^3 + 3*pi*b^3*c^3*x^3*log(abs(F))^2 + 6*pi*b^2*c^2*x^2*log(abs(F
))*sgn(F) - 6*pi*b^2*c^2*x^2*log(abs(F)) - 6*pi*b*c*x*sgn(F) + 6*pi*b*c*x)/
((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4
+ 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*
c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log
(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2) + 4*(pi^3*b^4*c^4*log(abs(F))*sgn(F
) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4
*log(abs(F))^3)*(3*pi^2*b^3*c^3*x^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*x^3
*log(abs(F)) + 2*b^3*c^3*x^3*log(abs(F))^3 - 3*pi^2*b^2*c^2*x^2*sgn(F) + 3*
pi^2*b^2*c^2*x^2 - 6*b^2*c^2*x^2*log(abs(F))^2 + 12*b*c*x*log(abs(F)) - 12)
/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4
 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4
*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*lo
g(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi
*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(ab
s(F)) + 3) - 1/2*I*((8*pi^3*b^3*c^3*x^3*sgn(F) + 24*I*pi^2*b^3*c^3*x^3*log(
```

abs(F))*sgn(F) - 24*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*c^3*x^
3 - 24*I*pi^2*b^3*c^3*x^3*log(abs(F)) + 24*pi*b^3*c^3*x^3*log(abs(F))^2 + 1
6*I*b^3*c^3*x^3*log(abs(F))^3 - 24*I*pi^2*b^2*c^2*x^2*sgn(F) + 48*pi*b^2*c^
2*x^2*log(abs(F))*sgn(F) + 24*I*pi^2*b^2*c^2*x^2 - 48*pi*b^2*c^2*x^2*log(ab
s(F)) - 48*I*b^2*c^2*x^2*log(abs(F))^2 - 48*pi*b*c*x*sgn(F) + 48*pi*b*c*x +
 96*I*b*c*x*log(abs(F)) - 96*I)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x +
 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn(F) + 32*I*pi^3*b^4
*c^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - 32*I*pi*b^
4*c^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*c^4 - 32*I*pi^3*b^4*c^4*log(abs(F))
 + 48*pi^2*b^4*c^4*log(abs(F))^2 + 32*I*pi*b^4*c^4*log(abs(F))^3 - 16*b^4*c
^4*log(abs(F))^4) + (8*pi^3*b^3*c^3*x^3*sgn(F) - 24*I*pi^2*b^3*c^3*x^3*log(
abs(F))*sgn(F) - 24*pi*b^3*c^3*x^3*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*c^3*x^
3 + 24*I*pi^2*b^3*c^3*x^3*log(abs(F)) + 24*pi*b^3*c^3*x^3*log(abs(F))^2 - 1
6*I*b^3*c^3*x^3*log(abs(F))^3 + 24*I*pi^2*b^2*c^2*x^2*sgn(F) + 48*pi*b^2*c^
2*x^2*log(abs(F))*sgn(F) - 24*I*pi^2*b^2*c^2*x^2 - 48*pi*b^2*c^2*x^2*log(ab
s(F)) + 48*I*b^2*c^2*x^2*log(abs(F))^2 - 48*pi*b*c*x*sgn(F) + 48*pi*b*c*x -
 96*I*b*c*x*log(abs(F)) + 96*I)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x
- 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn(F) - 32*I*pi^3*b^
4*c^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) + 32*I*pi*b
^4*c^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*c^4 + 32*I*pi^3*b^4*c^4*log(abs(F)
) + 48*pi^2*b^4*c^4*log(abs(F))^2 - 32*I*pi*b^4*c^4*log(abs(F))^3 - 16*b^4*
c^4*log(abs(F))^4))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 3) + 3*(((pi^2
*b^2*c^2*d*x^2*sgn(F) - pi^2*b^2*c^2*d*x^2 + 2*b^2*c^2*d*x^2*log(abs(F))^2
- 4*b*c*d*x*log(abs(F)) + 4*d)*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*
b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)/((pi^3*b^3*c^3*sgn(F) - 3*pi
*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^
2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3
*c^3*log(abs(F))^3)^2) - 2*(pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^
2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)*(pi*b^2*c^2*d*x^2*log
(abs(F))*sgn(F) - pi*b^2*c^2*d*x^2*log(abs(F)) - pi*b*c*d*x*sgn(F) + pi*b*c
*d*x)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*
c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) -
3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2))*cos(-1/2*pi*b*c*x
*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi^3*b^3*c^3*s
gn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log
(abs(F))^2)*(pi^2*b^2*c^2*d*x^2*sgn(F) - pi^2*b^2*c^2*d*x^2 + 2*b^2*c^2*d*x
^2*log(abs(F))^2 - 4*b*c*d*x*log(abs(F)) + 4*d)/((pi^3*b^3*c^3*sgn(F) - 3*p
i*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)
^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^
3*c^3*log(abs(F))^3)^2) + 2*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3
*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)*(pi*b^2*c^2*d*x^2*log(abs(F))*s
gn(F) - pi*b^2*c^2*d*x^2*log(abs(F)) - pi*b*c*d*x*sgn(F) + pi*b*c*d*x)/((pi
^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi
*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3
*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(F) +

```
1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*
log(abs(F)) + 2) + 1/2*I*((12*I*pi^2*b^2*c^2*d*x^2*sgn(F) - 24*pi*b^2*c^2*d
*x^2*log(abs(F))*sgn(F) - 12*I*pi^2*b^2*c^2*d*x^2 + 24*pi*b^2*c^2*d*x^2*log
(abs(F)) + 24*I*b^2*c^2*d*x^2*log(abs(F))^2 + 24*pi*b*c*d*x*sgn(F) - 24*pi*
b*c*d*x - 48*I*b*c*d*x*log(abs(F)) + 48*I*d)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2
*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(-4*I*pi^3*b^3*c^3*sgn(F)
 + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) + 12*I*pi*b^3*c^3*log(abs(F))^2*sgn(F
) + 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) - 12*I*pi*b^3*c^3*log(ab
s(F))^2 + 8*b^3*c^3*log(abs(F))^3) - (12*I*pi^2*b^2*c^2*d*x^2*sgn(F) + 24*p
i*b^2*c^2*d*x^2*log(abs(F))*sgn(F) - 12*I*pi^2*b^2*c^2*d*x^2 - 24*pi*b^2*c^
2*d*x^2*log(abs(F)) + 24*I*b^2*c^2*d*x^2*log(abs(F))^2 - 24*pi*b*c*d*x*sgn(
F) + 24*pi*b*c*d*x - 48*I*b*c*d*x*log(abs(F)) + 48*I*d)*e^(-1/2*I*pi*b*c*x*
sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(4*I*pi^3*b^3
*c^3*sgn(F) + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 12*I*pi*b^3*c^3*log(abs(
F))^2*sgn(F) - 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) + 12*I*pi*b^3
*c^3*log(abs(F))^2 + 8*b^3*c^3*log(abs(F))^3))*e^(b*c*x*log(abs(F)) + a*c*l
og(abs(F)) + 2) + 3*(2*((pi*b*c*d^2*x*sgn(F) - pi*b*c*d^2*x)*(pi*b^2*c^2*lo
g(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2
*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b
^2*c^2*log(abs(F)))^2) + (pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*lo
g(abs(F))^2)*(b*c*d^2*x*log(abs(F)) - d^2)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2
*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b
^2*c^2*log(abs(F)))^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*
c*sgn(F) + 1/2*pi*a*c) + ((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*l
og(abs(F))^2)*(pi*b*c*d^2*x*sgn(F) - pi*b*c*d^2*x)/((pi^2*b^2*c^2*sgn(F) -
pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F
) - pi*b^2*c^2*log(abs(F)))^2) - 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*
c^2*log(abs(F)))*(b*c*d^2*x*log(abs(F)) - d^2)/((pi^2*b^2*c^2*sgn(F) - pi^2
*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) -
pi*b^2*c^2*log(abs(F)))^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*p
i*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 1) - 1
/2*I*((6*pi*b*c*d^2*x*sgn(F) - 6*pi*b*c*d^2*x - 12*I*b*c*d^2*x*log(abs(F))
+ 12*I*d^2)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F)
 - 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) + 4*I*pi*b^2*c^2*log(abs(F))*sgn(F)
 - 2*pi^2*b^2*c^2 - 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2) +
 (6*pi*b*c*d^2*x*sgn(F) - 6*pi*b*c*d^2*x + 12*I*b*c*d^2*x*log(abs(F)) - 12*
I*d^2)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1
/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2
*pi^2*b^2*c^2 + 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2))*e^(b
*c*x*log(abs(F)) + a*c*log(abs(F)) + 1) + 2*(2*b*c*d^3*cos(-1/2*pi*b*c*x*sg
n(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)*log(abs(F))/(4*b^2*c^
2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2) - (pi*b*c*sgn(F) - pi*b*c)*d^
3*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)
/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2))*e^(b*c*x*log(abs(F
)) + a*c*log(abs(F))) - 1/2*I*(-2*I*d^3*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi
```

```
*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(I*pi*b*c*sgn(F) - I*pi*b*c +
2*b*c*log(abs(F))) + 2*I*d^3*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1
/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(-I*pi*b*c*sgn(F) + I*pi*b*c + 2*b*c*log
(abs(F))))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)))
```

maple [A] time = 0.01, size = 165, normalized size = 1.50

$$\frac{\left(b^3c^3e^3x^3\ln(F)^3+3b^3c^3d\,e^2x^2\ln(F)^3+3b^3c^3d^2ex\ln(F)^3+b^3c^3d^3\ln(F)^3-3b^2c^2e^3x^2\ln(F)^2-6b^2c^2d\,e^2x\ln(F)^2-\right.}{b^4c^4\ln(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (b^3*c^3*e^3*x^3*ln(F)^3+3*b^3*c^3*d*e^2*x^2*ln(F)^3+3*b^3*c^3*d^2*e*x*ln(F
)^3+b^3*c^3*d^3*ln(F)^3-3*b^2*c^2*e^3*x^2*ln(F)^2-6*b^2*c^2*d*e^2*x*ln(F)^2
-3*b^2*c^2*d^2*e*ln(F)^2+6*b*c*e^3*x*ln(F)+6*b*c*d*e^2*ln(F)-6*e^3)/b^4/c^4
*F^((b*x+a)*c)/ln(F)^4
```

maxima [A] time = 0.50, size = 206, normalized size = 1.87

$$\frac{F^{bcx+ac}d^3}{bc\log(F)}+\frac{3\left(F^{ac}bcx\log(F)-F^{ac}\right)F^{bcx}d^2e}{b^2c^2\log(F)^2}+\frac{3\left(F^{ac}b^2c^2x^2\log(F)^2-2\,F^{ac}bcx\log(F)+2\,F^{ac}\right)F^{bcx}de^2}{b^3c^3\log(F)^3}+\frac{\left(F^{ac}b^3c^3x^3\log\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3),x, algorithm="m
axima")
```

```
[Out] F^(b*c*x + a*c)*d^3/(b*c*log(F)) + 3*(F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*
c*x)*d^2*e/(b^2*c^2*log(F)^2) + 3*(F^(a*c)*b^2*c^2*x^2*log(F)^2 - 2*F^(a*c)
*b*c*x*log(F) + 2*F^(a*c))*F^(b*c*x)*d*e^2/(b^3*c^3*log(F)^3) + (F^(a*c)*b^
3*c^3*x^3*log(F)^3 - 3*F^(a*c)*b^2*c^2*x^2*log(F)^2 + 6*F^(a*c)*b*c*x*log(F
) - 6*F^(a*c))*F^(b*c*x)*e^3/(b^4*c^4*log(F)^4)
```

mupad [B] time = 3.43, size = 165, normalized size = 1.50

$$\frac{F^{a\,c+b\,c\,x}\,\left(b^3\,c^3\,d^3\ln(F)^3+3\,b^3\,c^3\,d^2\,e\,x\ln(F)^3+3\,b^3\,c^3\,d\,e^2\,x^2\ln(F)^3+b^3\,c^3\,e^3\,x^3\ln(F)^3-3\,b^2\,c^2\,d^2\,e\ln(F)^2-6\,b^2\right.}{b^4\,c^4\ln(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^(a*c + b*c*x)*(b^3*c^3*d^3*log(F)^3 - 6*e^3 + 6*b*c*e^3*x*log(F) - 3*b^2
*c^2*d^2*e*log(F)^2 - 3*b^2*c^2*e^3*x^2*log(F)^2 + b^3*c^3*e^3*x^3*log(F)^3
```

```
 + 6*b*c*d*e^2*log(F) - 6*b^2*c^2*d*e^2*x*log(F)^2 + 3*b^3*c^3*d^2*e*x*log(
F)^3 + 3*b^3*c^3*d*e^2*x^2*log(F)^3))/(b^4*c^4*log(F)^4)
```

sympy [A] time = 0.22, size = 231, normalized size = 2.10

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^3c^3d^3\log(F)^3+3b^3c^3d^2ex\log(F)^3+3b^3c^3de^2x^2\log(F)^3+b^3c^3e^3x^3\log(F)^3-3b^2c^2d^2e\log(F)^2-6b^2c^2de^2x\log(F)^2-3b^2c^2e^3x^2\log(F)^2+6bc\right.}{b^4c^4\log(F)^4} \\ d^3x+\frac{3d^2ex^2}{2}+de^2x^3+\frac{e^3x^4}{4} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e**3*x**3+3*d*e**2*x**2+3*d**2*e*x+d**3),x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b**3*c**3*d**3*log(F)**3 + 3*b**3*c**3*d**2*e*
x*log(F)**3 + 3*b**3*c**3*d*e**2*x**2*log(F)**3 + b**3*c**3*e**3*x**3*log(F
)**3 - 3*b**2*c**2*d**2*e*log(F)**2 - 6*b**2*c**2*d*e**2*x*log(F)**2 - 3*b*
*2*c**2*e**3*x**2*log(F)**2 + 6*b*c*d*e**2*log(F) + 6*b*c*e**3*x*log(F) - 6
*e**3)/(b**4*c**4*log(F)**4), Ne(b**4*c**4*log(F)**4, 0)), (d**3*x + 3*d**2
*e*x**2/2 + d*e**2*x**3 + e**3*x**4/4, True))
```

3.14 $\int F^{c(a+bx)}\left(d^2+2dex+e^2x^2\right)\,dx$

Optimal. Leaf size=79

$$\frac{2e^2F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{2e(d+ex)F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{(d+ex)^2F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] 2*e^2*F^(c*(b*x+a))/b^3/c^3/ln(F)^3-2*e*F^(c*(b*x+a))*(e*x+d)/b^2/c^2/ln(F)
^2+F^(c*(b*x+a))*(e*x+d)^2/b/c/ln(F)
```

Rubi [A] time = 0.05, antiderivative size = 79, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 26, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.115, Rules used = {27, 2176, 2194}

$$-\frac{2e(d+ex)F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{2e^2F^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{(d+ex)^2F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (2*e^2*F^(c*(a + b*x)))/(b^3*c^3*Log[F]^3) - (2*e*F^(c*(a + b*x))*(d + e*x)
)/(b^2*c^2*Log[F]^2) + (F^(c*(a + b*x))*(d + e*x)^2)/(b*c*Log[F])
```

Rule 27

```
Int[(u_.)*((a_) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_.), x_Symbol] :> Int[u*Canc
el[(b/2 + c*x)^(2*p)/c^p], x] /; FreeQ[{a, b, c}, x] && EqQ[b^2 - 4*a*c, 0]
 && IntegerQ[p]
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int F^{c(a+bx)}\left(d^2+2dex+e^2x^2\right)\,dx = \int F^{c(a+bx)}(d+ex)^2\,dx$$
$$= \frac{F^{c(a+bx)}(d+ex)^2}{bc\log(F)} - \frac{(2e)\int F^{c(a+bx)}(d+ex)\,dx}{bc\log(F)}$$
$$= -\frac{2eF^{c(a+bx)}(d+ex)}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^2}{bc\log(F)} + \frac{\left(2e^2\right)\int F^{c(a+bx)}\,dx}{b^2c^2\log^2(F)}$$
$$= \frac{2e^2F^{c(a+bx)}}{b^3c^3\log^3(F)} - \frac{2eF^{c(a+bx)}(d+ex)}{b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^2}{bc\log(F)}$$

Mathematica [A] time = 0.04, size = 56, normalized size = 0.71

$$\frac{F^{c(a+bx)}\left(b^2c^2\log^2(F)(d+ex)^2-2bce\log(F)(d+ex)+2e^2\right)}{b^3c^3\log^3(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(c*(a + b*x))*(2*e^2 - 2*b*c*e*(d + e*x)*Log[F] + b^2*c^2*(d + e*x)^2*Lo
g[F]^2))/(b^3*c^3*Log[F]^3)
```

fricas [A] time = 0.42, size = 84, normalized size = 1.06

$$\frac{\left(\left(b^2c^2e^2x^2+2\,b^2c^2dex+b^2c^2d^2\right)\log(F)^2+2\,e^2-2\left(bce^2x+bcde\right)\log(F)\right)F^{bcx+ac}}{b^3c^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^2*c^2*e^2*x^2 + 2*b^2*c^2*d*e*x + b^2*c^2*d^2)*log(F)^2 + 2*e^2 - 2*(b*
c*e^2*x + b*c*d*e)*log(F))*F^(b*c*x + a*c)/(b^3*c^3*log(F)^3)
```

giac [C] time = 0.90, size = 2494, normalized size = 31.57

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (((3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c
^3*log(abs(F))^3)*(pi^2*b^2*c^2*x^2*sgn(F) - pi^2*b^2*c^2*x^2 + 2*b^2*c^2*x
^2*log(abs(F))^2 - 4*b*c*x*log(abs(F)) + 4)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^
3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 +
 (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^
3*log(abs(F))^3)^2) - 2*(pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*s
gn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)*(pi*b^2*c^2*x^2*log(abs(
F))*sgn(F) - pi*b^2*c^2*x^2*log(abs(F)) - pi*b*c*x*sgn(F) + pi*b*c*x)/((pi^
3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*
b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*
c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1
/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi^3*b^3*c^3*sgn(F) - 3*p
i*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)
*(pi^2*b^2*c^2*x^2*sgn(F) - pi^2*b^2*c^2*x^2 + 2*b^2*c^2*x^2*log(abs(F))^2
- 4*b*c*x*log(abs(F)) + 4)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))
^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*
log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^
2) + 2*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*
b^3*c^3*log(abs(F))^3)*(pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - pi*b^2*c^2*x^2*
log(abs(F)) - pi*b*c*x*sgn(F) + pi*b*c*x)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*
c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (
3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*
log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn
(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 2) + 1/2*I*((4*
I*pi^2*b^2*c^2*x^2*sgn(F) - 8*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - 4*I*pi^2*
b^2*c^2*x^2 + 8*pi*b^2*c^2*x^2*log(abs(F)) + 8*I*b^2*c^2*x^2*log(abs(F))^2
+ 8*pi*b*c*x*sgn(F) - 8*pi*b*c*x - 16*I*b*c*x*log(abs(F)) + 16*I)*e^(1/2*I*
pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(-4*
I*pi^3*b^3*c^3*sgn(F) + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) + 12*I*pi*b^3*c^
3*log(abs(F))^2*sgn(F) + 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) - 1
2*I*pi*b^3*c^3*log(abs(F))^2 + 8*b^3*c^3*log(abs(F))^3) - (4*I*pi^2*b^2*c^2
*x^2*sgn(F) + 8*pi*b^2*c^2*x^2*log(abs(F))*sgn(F) - 4*I*pi^2*b^2*c^2*x^2 -
8*pi*b^2*c^2*x^2*log(abs(F)) + 8*I*b^2*c^2*x^2*log(abs(F))^2 - 8*pi*b*c*x*s
gn(F) + 8*pi*b*c*x - 16*I*b*c*x*log(abs(F)) + 16*I)*e^(-1/2*I*pi*b*c*x*sgn(
F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(4*I*pi^3*b^3*c^3
*sgn(F) + 12*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 12*I*pi*b^3*c^3*log(abs(F))^
2*sgn(F) - 4*I*pi^3*b^3*c^3 - 12*pi^2*b^3*c^3*log(abs(F)) + 12*I*pi*b^3*c^3
*log(abs(F))^2 + 8*b^3*c^3*log(abs(F))^3))*e^(b*c*x*log(abs(F)) + a*c*log(a
bs(F)) + 2) + 2*(2*((pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F))
)*(pi*b*c*d*x*sgn(F) - pi*b*c*d*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2
*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*l
og(abs(F)))^2) + (pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F)
)^2)*(b*c*d*x*log(abs(F)) - d)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2
*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(a
bs(F)))^2))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1
```

```
/2*pi*a*c) + ((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2
)*(pi*b*c*d*x*sgn(F) - pi*b*c*d*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2
*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*l
og(abs(F)))^2) - 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))
*(b*c*d*x*log(abs(F)) - d)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2
*log(abs(F))^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F
)))^2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*p
i*a*c))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 1) - 1/2*I*((4*pi*b*c*d*x*
sgn(F) - 4*pi*b*c*d*x - 8*I*b*c*d*x*log(abs(F)) + 8*I*d)*e^(1/2*I*pi*b*c*x*
sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(2*pi^2*b^2*c
^2*sgn(F) + 4*I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2*pi^2*b^2*c^2 - 4*I*pi*b^2
*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2) + (4*pi*b*c*d*x*sgn(F) - 4*pi*b
*c*d*x + 8*I*b*c*d*x*log(abs(F)) - 8*I*d)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I
*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*
I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2*pi^2*b^2*c^2 + 4*I*pi*b^2*c^2*log(abs(F
)) + 4*b^2*c^2*log(abs(F))^2))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)) + 1)
+ 2*(2*b*c*d^2*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F)
+ 1/2*pi*a*c)*log(abs(F))/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*
c)^2) - (pi*b*c*sgn(F) - pi*b*c)*d^2*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*
x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)/(4*b^2*c^2*log(abs(F))^2 + (pi*b*c*sgn(
F) - pi*b*c)^2))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F))) - 1/2*I*(-2*I*d^2*
e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*
a*c)/(I*pi*b*c*sgn(F) - I*pi*b*c + 2*b*c*log(abs(F))) + 2*I*d^2*e^(-1/2*I*p
i*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(-I*p
i*b*c*sgn(F) + I*pi*b*c + 2*b*c*log(abs(F))))*e^(b*c*x*log(abs(F)) + a*c*lo
g(abs(F)))
```

maple [A] time = 0.01, size = 91, normalized size = 1.15

$$\frac{\left(b^2c^2e^2x^2\ln(F)^2+2b^2c^2dex\ln(F)^2+b^2c^2d^2\ln(F)^2-2bc\,e^2x\ln(F)-2bcde\ln(F)+2e^2\right)F^{(bx+a)c}}{b^3c^3\ln(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (b^2*c^2*e^2*x^2*ln(F)^2+2*b^2*c^2*d*e*x*ln(F)^2+b^2*c^2*d^2*ln(F)^2-2*b*c*
e^2*x*ln(F)-2*b*c*d*e*ln(F)+2*e^2)/b^3/c^3*F^((b*x+a)*c)/ln(F)^3
```

maxima [A] time = 0.50, size = 123, normalized size = 1.56

$$\frac{F^{bcx+ac}d^2}{bc\log(F)}+\frac{2\left(F^{ac}bcx\log(F)-F^{ac}\right)F^{bcx}de}{b^2c^2\log(F)^2}+\frac{\left(F^{ac}b^2c^2x^2\log(F)^2-2\,F^{ac}bcx\log(F)+2\,F^{ac}\right)F^{bcx}e^2}{b^3c^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*c*x + a*c)*d^2/(b*c*log(F)) + 2*(F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*
c*x)*d*e/(b^2*c^2*log(F)^2) + (F^(a*c)*b^2*c^2*x^2*log(F)^2 - 2*F^(a*c)*b*c
*x*log(F) + 2*F^(a*c))*F^(b*c*x)*e^2/(b^3*c^3*log(F)^3)
```

mupad [B] time = 3.40, size = 91, normalized size = 1.15

$$\frac{F^{a\,c+b\,c\,x}\,\left(b^2\,c^2\,d^2\,\ln(F)^2+2\,b^2\,c^2\,d\,e\,x\,\ln(F)^2+b^2\,c^2\,e^2\,x^2\,\ln(F)^2-2\,b\,c\,d\,e\,\ln(F)-2\,b\,c\,e^2\,x\,\ln(F)+2\,e^2\right)}{b^3\,c^3\,\ln(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^(a*c + b*c*x)*(2*e^2 + b^2*c^2*d^2*log(F)^2 - 2*b*c*e^2*x*log(F) + b^2*c
^2*e^2*x^2*log(F)^2 - 2*b*c*d*e*log(F) + 2*b^2*c^2*d*e*x*log(F)^2))/(b^3*c^
3*log(F)^3)
```

sympy [A] time = 0.18, size = 133, normalized size = 1.68

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^2c^2d^2\log{(F)}^2+2b^2c^2dex\log{(F)}^2+b^2c^2e^2x^2\log{(F)}^2-2bcde\log{(F)}-2bce^2x\log{(F)}+2e^2\right)}{b^3c^3\log{(F)}^3} & \text{for } b^3c^3\log{(F)}^3 \neq 0 \\ d^2x+dex^2+\frac{e^2x^3}{3} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e**2*x**2+2*d*e*x+d**2),x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b**2*c**2*d**2*log(F)**2 + 2*b**2*c**2*d*e*x*l
og(F)**2 + b**2*c**2*e**2*x**2*log(F)**2 - 2*b*c*d*e*log(F) - 2*b*c*e**2*x*
log(F) + 2*e**2)/(b**3*c**3*log(F)**3), Ne(b**3*c**3*log(F)**3, 0)), (d**2*
x + d*e*x**2 + e**2*x**3/3, True))
```

3.15 $\int \frac{F^{c(a+bx)}}{d^2+2dex+e^2x^2} dx$

Optimal. Leaf size=57

$$\frac{bc\log(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{e^2}-\frac{F^{c(a+bx)}}{e(d+ex)}$$

```
[Out] -F^(c*(b*x+a))/e/(e*x+d)+b*c*F^(c*(a-b*d/e))*Ei(b*c*(e*x+d)*ln(F)/e)*ln(F)/
e^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 = 28, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.107, Rules used = {27, 2177, 2178}

$$\frac{bc\log(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{e^2}-\frac{F^{c(a+bx)}}{e(d+ex)}$$

Antiderivative was successfully verified.

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

```
[Out] -(F^(c*(a + b*x))/(e*(d + e*x))) + (b*c*F^(c*(a - (b*d)/e))*ExpIntegralEi[(
b*c*(d + e*x)*Log[F])/e]*Log[F])/e^2
```

Rule 27

```
Int[(u_.)*((a_) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_.), x_Symbol] :> Int[u*Canc
el[(b/2 + c*x)^(2*p)/c^p], x] /; FreeQ[{a, b, c}, x] && EqQ[b^2 - 4*a*c, 0]
 && IntegerQ[p]
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
```

```
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{d^2+2dex+e^2x^2}\,dx = \int \frac{F^{c(a+bx)}}{(d+ex)^2}\,dx$$
$$= -\frac{F^{c(a+bx)}}{e(d+ex)} + \frac{(bc\log(F))\int \frac{F^{c(a+bx)}}{d+ex}\,dx}{e}$$
$$= -\frac{F^{c(a+bx)}}{e(d+ex)} + \frac{bcF^{c\left(a-\frac{bd}{e}\right)}\operatorname{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)\log(F)}{e^2}$$

Mathematica [A] time = 0.06, size = 55, normalized size = 0.96

$$\frac{F^{ac}\left(bc\log(F)F^{-\frac{bcd}{e}}\operatorname{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)-\frac{eF^{bcx}}{d+ex}\right)}{e^2}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(a*c)*(-((e*F^(b*c*x))/(d + e*x)) + (b*c*ExpIntegralEi[(b*c*(d + e*x)*Lo
g[F])/e]*Log[F])/F^((b*c*d)/e)))/e^2
```

fricas [A] time = 0.44, size = 77, normalized size = 1.35

$$-\frac{F^{bcx+ac}e-\frac{(bcex+bcd)\operatorname{Ei}\left(\frac{(bcex+bcd)\log(F)}{e}\right)\log(F)}{F^{\frac{bcd-ace}{e}}}}{e^3x+de^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(F^(b*c*x + a*c)*e - (b*c*e*x + b*c*d)*Ei((b*c*e*x + b*c*d)*log(F)/e)*log(
F)/F^((b*c*d - a*c*e)/e))/(e^3*x + d*e^2)
```

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

$$\int \frac{F^{(bx+a)c}}{e^2x^2+2\,dex+d^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.07, size = 99, normalized size = 1.74

$$-\frac{bc\,F^{ac}F^{bcx}\ln(F)}{\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)e^{2}}-\frac{bc\,F^{\frac{(ae-bd)c}{e}}\,\mathrm{Ei}\left(1,-bcx\ln(F)-ac\ln(F)-\frac{-ace\ln(F)+bcd\ln(F)}{e}\right)\ln(F)}{e^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/(e^2*x^2+2*d*e*x+d^2),x)
[Out] -1/(b*c*x*ln(F)+b*c*d/e*ln(F))*b*c/e^2*F^(a*c)*F^(b*c*x)*ln(F)-b*c*ln(F)/e^
2*F^((a*e-b*d)*c/e)*Ei(1,-b*c*x*ln(F)-a*c*ln(F)-(-a*c*e*ln(F)+b*c*d*ln(F))/
e)
```

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

$$\int\frac{F^{(bx+a)c}}{e^{2}x^{2}+2\,dex+d^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

$$\int\frac{F^{c\,(a+b\,x)}}{d^{2}+2\,d\,e\,x+e^{2}\,x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d^2 + e^2*x^2 + 2*d*e*x),x)
[Out] int(F^(c*(a + b*x))/(d^2 + e^2*x^2 + 2*d*e*x), x)
```

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

$$\int\frac{F^{c(a+bx)}}{(d+ex)^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

[Out] Integral(F**(c*(a + b*x))/(d + e*x)**2, x)
```

3.16 $\int \frac{F^{c(a+bx)}}{d^3+3d^2ex+3de^2x^2+e^3x^3} dx$

Optimal. Leaf size=95

$$\frac{b^2c^2\log^2(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{2e^3}-\frac{bc\log(F)F^{c(a+bx)}}{2e^2(d+ex)}-\frac{F^{c(a+bx)}}{2e(d+ex)^2}$$

```
[Out] -1/2*F^(c*(b*x+a))/e/(e*x+d)^2-1/2*b*c*F^(c*(b*x+a))*ln(F)/e^2/(e*x+d)+1/2*
b^2*c^2*F^(c*(a-b*d/e))*Ei(b*c*(e*x+d)*ln(F)/e)*ln(F)^2/e^3
```

Rubi [A] time = 0.10, antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 39, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.077, Rules used = {2187, 2177, 2178}

$$\frac{b^2c^2\log^2(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{2e^3}-\frac{bc\log(F)F^{c(a+bx)}}{2e^2(d+ex)}-\frac{F^{c(a+bx)}}{2e(d+ex)^2}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d^3 + 3*d^2*e*x + 3*d*e^2*x^2 + e^3*x^3),x]
```

```
[Out] -F^(c*(a + b*x))/(2*e*(d + e*x)^2) - (b*c*F^(c*(a + b*x))*Log[F])/(2*e^2*(d
 + e*x)) + (b^2*c^2*F^(c*(a - (b*d)/e))*ExpIntegralEi[(b*c*(d + e*x)*Log[F]
)/e]*Log[F]^2)/(2*e^3)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2187

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Int[NormalizePowerOfLinear[u, x]^m*(a + b*(F^(g*ExpandToSum[v, x]))^n)^p,
```

```
x] /; FreeQ[{F, a, b, g, n, p}, x] && LinearQ[v, x] && PowerOfLinearQ[u, x
] && !(LinearMatchQ[v, x] && PowerOfLinearMatchQ[u, x]) && IntegerQ[m]
```

Rubi steps

$$\begin{aligned}
\int \frac{F^{c(a+bx)}}{d^3+3d^2ex+3de^2x^2+e^3x^3}\,dx &= \int \frac{F^{c(a+bx)}}{(d+ex)^3}\,dx\\
&= -\frac{F^{c(a+bx)}}{2e(d+ex)^2}+\frac{(bc\log(F))\int \frac{F^{c(a+bx)}}{(d+ex)^2}\,dx}{2e}\\
&= -\frac{F^{c(a+bx)}}{2e(d+ex)^2}-\frac{bcF^{c(a+bx)}\log(F)}{2e^2(d+ex)}+\frac{\left(b^2c^2\log^2(F)\right)\int \frac{F^{c(a+bx)}}{d+ex}\,dx}{2e^2}\\
&= -\frac{F^{c(a+bx)}}{2e(d+ex)^2}-\frac{bcF^{c(a+bx)}\log(F)}{2e^2(d+ex)}+\frac{b^2c^2F^{c\left(a-\frac{bd}{e}\right)}\mathrm{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)\log^2(F)}{2e^3}
\end{aligned}$$

Mathematica [A] time = 0.05, size = 88, normalized size = 0.93

$$\frac{F^{c\left(a-\frac{bd}{e}\right)}\left(b^2c^2\log^2(F)(d+ex)^2\mathrm{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)-eF^{\frac{bc(d+ex)}{e}}(bc\log(F)(d+ex)+e)\right)}{2e^3(d+ex)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d^3 + 3*d^2*e*x + 3*d*e^2*x^2 + e^3*x^3),x]
```

```
[Out] (F^(c*(a - (b*d)/e))*(b^2*c^2*(d + e*x)^2*ExpIntegralEi[(b*c*(d + e*x)*Log[
F])/e]*Log[F]^2 - e*F^((b*c*(d + e*x))/e)*(e + b*c*(d + e*x)*Log[F])))/(2*e
^3*(d + e*x)^2)
```

fricas [A] time = 0.45, size = 134, normalized size = 1.41

$$\frac{\frac{\left(b^2c^2e^2x^2+2\,b^2c^2dex+b^2c^2d^2\right)\mathrm{Ei}\left(\frac{(bcex+bcd)\log(F)}{e}\right)\log(F)^2}{F^{\frac{bcd-ace}{e}}}-\left(e^2+\left(bce^2x+bcde\right)\log(F)\right)F^{bcx+ac}}{2\left(e^5x^2+2\,de^4x+d^2e^3\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3),x, algorithm="f
ricas")
```

```
[Out] 1/2*((b^2*c^2*e^2*x^2 + 2*b^2*c^2*d*e*x + b^2*c^2*d^2)*Ei((b*c*e*x + b*c*d)
*log(F)/e)*log(F)^2/F^((b*c*d - a*c*e)/e) - (e^2 + (b*c*e^2*x + b*c*d*e)*lo
g(F))*F^(b*c*x + a*c))/(e^5*x^2 + 2*d*e^4*x + d^2*e^3)
```

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

$$\int \frac{F^{(bx+a)c}}{e^3x^3 + 3\,de^2x^2 + 3\,d^2ex + d^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3),x, algorithm="g
iac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x + d^3), x)
```

maple [A] time = 0.08, size = 155, normalized size = 1.63

$$-\frac{b^2c^2F^{ac}F^{bcx}\ln(F)^2}{2\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^2e^3}-\frac{b^2c^2F^{ac}F^{bcx}\ln(F)^2}{2\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)e^3}-\frac{b^2c^2F^{\frac{(ae-bd)c}{e}}\operatorname{Ei}\left(1,-bcx\ln(F)-ac\ln(F)-\frac{-ace\ln(F)+bcd\ln(F)}{e}\right)}{2e^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3),x)
```

```
[Out] -1/2/(b*c*x*ln(F)+b*c*d/e*ln(F))^2*b^2*c^2/e^3*F^(a*c)*F^(b*c*x)*ln(F)^2-1/
2/(b*c*x*ln(F)+b*c*d/e*ln(F))*b^2*c^2/e^3*F^(a*c)*F^(b*c*x)*ln(F)^2-1/2*b^2
*c^2*ln(F)^2/e^3*F^((a*e-b*d)*c/e)*Ei(1,-b*c*x*ln(F)-a*c*ln(F)-(-a*c*e*ln(F
)+b*c*d*ln(F))/e)
```

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

$$\int \frac{F^{(bx+a)c}}{e^3x^3 + 3\,de^2x^2 + 3\,d^2ex + d^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3),x, algorithm="m
axima")
```

```
[Out] integrate(F^((b*x + a)*c)/(e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x + d^3), x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{d^3 + 3\,d^2\,e\,x + 3\,d\,e^2\,x^2 + e^3\,x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d^3 + e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x),x)
```

```
[Out] int(F^(c*(a + b*x))/(d^3 + e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x), x)
```

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

$$\int \frac{F^{c(a+bx)}}{(d+ex)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/(e**3*x**3+3*d*e**2*x**2+3*d**2*e*x+d**3),x)
```

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

3.17 $\int \frac{F^{c(a+bx)}}{d^4+4d^3ex+6d^2e^2x^2+4de^3x^3+e^4x^4}\,dx$

Optimal. Leaf size=128

$$\frac{b^3c^3\log^3(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{6e^4}-\frac{b^2c^2\log^2(F)F^{c(a+bx)}}{6e^3(d+ex)}-\frac{bc\log(F)F^{c(a+bx)}}{6e^2(d+ex)^2}-\frac{F^{c(a+bx)}}{3e(d+ex)^3}$$

```
[Out] -1/3*F^(c*(b*x+a))/e/(e*x+d)^3-1/6*b*c*F^(c*(b*x+a))*ln(F)/e^2/(e*x+d)^2-1/
6*b^2*c^2*F^(c*(b*x+a))*ln(F)^2/e^3/(e*x+d)+1/6*b^3*c^3*F^(c*(a-b*d/e))*Ei(
b*c*(e*x+d)*ln(F)/e)*ln(F)^3/e^4
```

Rubi [A] time = 0.13, antiderivative size = 128, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 50, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.060, Rules used = {2187, 2177, 2178}

$$\frac{b^3c^3\log^3(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{6e^4}-\frac{b^2c^2\log^2(F)F^{c(a+bx)}}{6e^3(d+ex)}-\frac{bc\log(F)F^{c(a+bx)}}{6e^2(d+ex)^2}-\frac{F^{c(a+bx)}}{3e(d+ex)^3}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d^4 + 4*d^3*e*x + 6*d^2*e^2*x^2 + 4*d*e^3*x^3 + e^4*x^
4),x]
```

```
[Out] -F^(c*(a + b*x))/(3*e*(d + e*x)^3) - (b*c*F^(c*(a + b*x))*Log[F])/(6*e^2*(d
 + e*x)^2) - (b^2*c^2*F^(c*(a + b*x))*Log[F]^2)/(6*e^3*(d + e*x)) + (b^3*c^
3*F^(c*(a - (b*d)/e))*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F]^3)/(6*
e^4)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2187

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Int[NormalizePowerOfLinear[u, x]^m*(a + b*(F^(g*ExpandToSum[v, x]))^n)^p,
 x] /; FreeQ[{F, a, b, g, n, p}, x] && LinearQ[v, x] && PowerOfLinearQ[u, x
] &&  !(LinearMatchQ[v, x] && PowerOfLinearMatchQ[u, x]) && IntegerQ[m]
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{d^4+4d^3ex+6d^2e^2x^2+4de^3x^3+e^4x^4}\,dx = \int \frac{F^{c(a+bx)}}{(d+ex)^4}\,dx$$

$$= -\frac{F^{c(a+bx)}}{3e(d+ex)^3} + \frac{(bc\log(F))\int \frac{F^{c(a+bx)}}{(d+ex)^3}\,dx}{3e}$$

$$= -\frac{F^{c(a+bx)}}{3e(d+ex)^3} - \frac{bcF^{c(a+bx)}\log(F)}{6e^2(d+ex)^2} + \frac{\left(b^2c^2\log^2(F)\right)\int \frac{F^{c(a+bx)}}{(d+ex)^2}\,dx}{6e^2}$$

$$= -\frac{F^{c(a+bx)}}{3e(d+ex)^3} - \frac{bcF^{c(a+bx)}\log(F)}{6e^2(d+ex)^2} - \frac{b^2c^2F^{c(a+bx)}\log^2(F)}{6e^3(d+ex)} + \frac{\left(b^3c^3\,\mathrm{lo}\right.}{}$$

$$= -\frac{F^{c(a+bx)}}{3e(d+ex)^3} - \frac{bcF^{c(a+bx)}\log(F)}{6e^2(d+ex)^2} - \frac{b^2c^2F^{c(a+bx)}\log^2(F)}{6e^3(d+ex)} + \frac{b^3c^3F^{c(}}{}$$

Mathematica [A] time = 0.04, size = 99, normalized size = 0.77

$$\frac{F^{ac}\left(b^3c^3\log^3(F)F^{-\frac{bcd}{e}}\,\mathrm{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)-\frac{eF^{bcx}\left(b^2c^2\log^2(F)(d+ex)^2+bce\log(F)(d+ex)+2e^2\right)}{(d+ex)^3}\right)}{6e^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d^4 + 4*d^3*e*x + 6*d^2*e^2*x^2 + 4*d*e^3*x^3 +
e^4*x^4),x]
```

```
[Out] (F^(a*c)*((b^3*c^3*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F]^3)/F^((b*
c*d)/e) - (e*F^(b*c*x)*(2*e^2 + b*c*e*(d + e*x)*Log[F] + b^2*c^2*(d + e*x)^
2*Log[F]^2))/(d + e*x)^3))/(6*e^4)
```

fricas [A] time = 0.47, size = 209, normalized size = 1.63

$$\frac{\frac{\left(b^3c^3e^3x^3+3\,b^3c^3de^2x^2+3\,b^3c^3d^2ex+b^3c^3d^3\right)\mathrm{Ei}\left(\frac{(bcex+bcd)\log(F)}{e}\right)\log(F)^3}{F^{\frac{bcd-ace}{e}}} - \left(2\,e^3+\left(b^2c^2e^3x^2+2\,b^2c^2de^2x+b^2c^2d^2e\right)\log(F)^2+\left(bce\right.\right.}{6\left(e^7x^3+3\,de^6x^2+3\,d^2e^5x+d^3e^4\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4),x
, algorithm="fricas")
```

```
[Out] 1/6*((b^3*c^3*e^3*x^3 + 3*b^3*c^3*d*e^2*x^2 + 3*b^3*c^3*d^2*e*x + b^3*c^3*d
^3)*Ei((b*c*e*x + b*c*d)*log(F)/e)*log(F)^3/F^((b*c*d - a*c*e)/e) - (2*e^3
+ (b^2*c^2*e^3*x^2 + 2*b^2*c^2*d*e^2*x + b^2*c^2*d^2*e)*log(F)^2 + (b*c*e^3
*x + b*c*d*e^2)*log(F))*F^(b*c*x + a*c))/(e^7*x^3 + 3*d*e^6*x^2 + 3*d^2*e^5
*x + d^3*e^4)
```

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

$$\int \frac{F^{(bx+a)c}}{e^4x^4 + 4\,de^3x^3 + 6\,d^2e^2x^2 + 4\,d^3ex + d^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4),x
, algorithm="giac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*
x + d^4), x)
```

maple [A] time = 0.10, size = 199, normalized size = 1.55

$$-\frac{b^3c^3F^{ac}F^{bcx}\ln(F)^3}{3\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^3e^4}-\frac{b^3c^3F^{ac}F^{bcx}\ln(F)^3}{6\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^2e^4}-\frac{b^3c^3F^{ac}F^{bcx}\ln(F)^3}{6\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)e^4}-\frac{b^3c^3F^{\frac{(ae-bd)c}{e}}\,\mathrm{Ei}\left(1,-bcx\ln(\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4),x)
```

```
[Out] -1/3/(b*c*x*ln(F)+b*c*d/e*ln(F))^3*b^3*c^3/e^4*F^(a*c)*F^(b*c*x)*ln(F)^3-1/
6/(b*c*x*ln(F)+b*c*d/e*ln(F))^2*b^3*c^3/e^4*F^(a*c)*F^(b*c*x)*ln(F)^3-1/6/(
b*c*x*ln(F)+b*c*d/e*ln(F))*b^3*c^3/e^4*F^(a*c)*F^(b*c*x)*ln(F)^3-1/6*b^3*c^
3*ln(F)^3/e^4*F^((a*e-b*d)*c/e)*Ei(1,-b*c*x*ln(F)-a*c*ln(F)-(-a*c*e*ln(F)+b
*c*d*ln(F))/e)
```

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

$$\int \frac{F^{(bx+a)c}}{e^4x^4 + 4\,de^3x^3 + 6\,d^2e^2x^2 + 4\,d^3ex + d^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4),x
, algorithm="maxima")
```

```
[Out] integrate(F^((b*x + a)*c)/(e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*
x + d^4), x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{d^4+4\,d^3\,e\,x+6\,d^2\,e^2\,x^2+4\,d\,e^3\,x^3+e^4\,x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d^4 + e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*
x),x)
```

```
[Out] int(F^(c*(a + b*x))/(d^4 + e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*
x), x)
```

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

$$\int \frac{F^{c(a+bx)}}{(d+ex)^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/(e**4*x**4+4*d*e**3*x**3+6*d**2*e**2*x**2+4*d**3*e
*x+d**4),x)
```

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

3.18 $\int \frac{F^{c(a+bx)}}{d^5+5d^4ex+10d^3e^2x^2+10d^2e^3x^3+5de^4x^4+e^5x^5}\,dx$

Optimal. Leaf size=161

$$\frac{b^4c^4\log^4(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{24e^5}-\frac{b^3c^3\log^3(F)F^{c(a+bx)}}{24e^4(d+ex)}-\frac{b^2c^2\log^2(F)F^{c(a+bx)}}{24e^3(d+ex)^2}-\frac{bc\log(F)F^{c(a+bx)}}{12e^2(d+ex)^3}-\frac{F^{c(a+bx)}}{4e(d+ex)^4}$$

```
[Out] -1/4*F^(c*(b*x+a))/e/(e*x+d)^4-1/12*b*c*F^(c*(b*x+a))*ln(F)/e^2/(e*x+d)^3-1
/24*b^2*c^2*F^(c*(b*x+a))*ln(F)^2/e^3/(e*x+d)^2-1/24*b^3*c^3*F^(c*(b*x+a))*
ln(F)^3/e^4/(e*x+d)+1/24*b^4*c^4*F^(c*(a-b*d/e))*Ei(b*c*(e*x+d)*ln(F)/e)*ln
(F)^4/e^5
```

Rubi [A] time = 0.18, antiderivative size = 161, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, integrand size = 61, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.049, Rules used = {2187, 2177, 2178}

$$\frac{b^4c^4\log^4(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)}{24e^5}-\frac{b^3c^3\log^3(F)F^{c(a+bx)}}{24e^4(d+ex)}-\frac{b^2c^2\log^2(F)F^{c(a+bx)}}{24e^3(d+ex)^2}-\frac{bc\log(F)F^{c(a+bx)}}{12e^2(d+ex)^3}-\frac{F^{c(a+bx)}}{4e(d+ex)^4}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d^5 + 5*d^4*e*x + 10*d^3*e^2*x^2 + 10*d^2*e^3*x^3 + 5*
d*e^4*x^4 + e^5*x^5),x]
```

```
[Out] -F^(c*(a + b*x))/(4*e*(d + e*x)^4) - (b*c*F^(c*(a + b*x))*Log[F])/(12*e^2*(
d + e*x)^3) - (b^2*c^2*F^(c*(a + b*x))*Log[F]^2)/(24*e^3*(d + e*x)^2) - (b^
3*c^3*F^(c*(a + b*x))*Log[F]^3)/(24*e^4*(d + e*x)) + (b^4*c^4*F^(c*(a - (b*
d)/e))*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F]^4)/(24*e^5)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2187

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Int[NormalizePowerOfLinear[u, x]^m*(a + b*(F^(g*ExpandToSum[v, x]))^n)^p,
 x] /; FreeQ[{F, a, b, g, n, p}, x] && LinearQ[v, x] && PowerOfLinearQ[u, x
] &&  !(LinearMatchQ[v, x] && PowerOfLinearMatchQ[u, x]) && IntegerQ[m]
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{d^5+5d^4ex+10d^3e^2x^2+10d^2e^3x^3+5de^4x^4+e^5x^5}\,dx=\int \frac{F^{c(a+bx)}}{(d+ex)^5}\,dx$$

$$=-\frac{F^{c(a+bx)}}{4e(d+ex)^4}+\frac{(bc\log(F))\int \frac{F^{c(a+bx)}}{(d+ex)^4}\,dx}{4e}$$

$$=-\frac{F^{c(a+bx)}}{4e(d+ex)^4}-\frac{bcF^{c(a+bx)}\log(F)}{12e^2(d+ex)^3}+\frac{\left(b^2c^2\log^2(F)\right)\int}{12e^2}$$

$$=-\frac{F^{c(a+bx)}}{4e(d+ex)^4}-\frac{bcF^{c(a+bx)}\log(F)}{12e^2(d+ex)^3}-\frac{b^2c^2F^{c(a+bx)}\log^2(}{24e^3(d+ex)^2}$$

$$=-\frac{F^{c(a+bx)}}{4e(d+ex)^4}-\frac{bcF^{c(a+bx)}\log(F)}{12e^2(d+ex)^3}-\frac{b^2c^2F^{c(a+bx)}\log^2(}{24e^3(d+ex)^2}$$

$$=-\frac{F^{c(a+bx)}}{4e(d+ex)^4}-\frac{bcF^{c(a+bx)}\log(F)}{12e^2(d+ex)^3}-\frac{b^2c^2F^{c(a+bx)}\log^2(}{24e^3(d+ex)^2}$$

Mathematica [A] time = 0.03, size = 121, normalized size = 0.75

$$\frac{F^{ac}\left(b^4c^4\log^4(F)F^{-\frac{bcd}{e}}\operatorname{Ei}\left(\frac{bc(d+ex)\log(F)}{e}\right)-\frac{eF^{bcx}\left(b^3c^3\log^3(F)(d+ex)^3+b^2c^2e\log^2(F)(d+ex)^2+2bce^2\log(F)(d+ex)+6e^3\right)}{(d+ex)^4}\right)}{24e^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d^5 + 5*d^4*e*x + 10*d^3*e^2*x^2 + 10*d^2*e^3*x^
3 + 5*d*e^4*x^4 + e^5*x^5),x]
```

```
[Out] (F^(a*c)*((b^4*c^4*ExpIntegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F]^4)/F^((b*
c*d)/e) - (e*F^(b*c*x)*(6*e^3 + 2*b*c*e^2*(d + e*x)*Log[F] + b^2*c^2*e*(d +
 e*x)^2*Log[F]^2 + b^3*c^3*(d + e*x)^3*Log[F]^3))/(d + e*x)^4))/(24*e^5)
```

fricas [A] time = 0.45, size = 300, normalized size = 1.86

$$\frac{\frac{\left(b^4c^4e^4x^4+4\,b^4c^4de^3x^3+6\,b^4c^4d^2e^2x^2+4\,b^4c^4d^3ex+b^4c^4d^4\right)\mathrm{Ei}\left(\frac{(bcex+bcd)\log(F)}{e}\right)\log(F)^4}{F^{\frac{bcd-ace}{e}}}-\left(6\,e^4+\left(b^3c^3e^4x^3+3\,b^3c^3de^3x^2+3\,b^3c^3d^2e^2\right.\right.}{24\left(e^9x^4+4\,de^8x^3+6\,d^2e^7x^2\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e^5*x^5+5*d*e^4*x^4+10*d^2*e^3*x^3+10*d^3*e^2*x^2+
5*d^4*e*x+d^5),x, algorithm="fricas")
```

```
[Out] 1/24*((b^4*c^4*e^4*x^4 + 4*b^4*c^4*d*e^3*x^3 + 6*b^4*c^4*d^2*e^2*x^2 + 4*b^
4*c^4*d^3*e*x + b^4*c^4*d^4)*Ei((b*c*e*x + b*c*d)*log(F)/e)*log(F)^4/F^((b*
c*d - a*c*e)/e) - (6*e^4 + (b^3*c^3*e^4*x^3 + 3*b^3*c^3*d*e^3*x^2 + 3*b^3*c
^3*d^2*e^2*x + b^3*c^3*d^3*e)*log(F)^3 + (b^2*c^2*e^4*x^2 + 2*b^2*c^2*d*e^3
*x + b^2*c^2*d^2*e^2)*log(F)^2 + 2*(b*c*e^4*x + b*c*d*e^3)*log(F))*F^(b*c*x
 + a*c))/(e^9*x^4 + 4*d*e^8*x^3 + 6*d^2*e^7*x^2 + 4*d^3*e^6*x + d^4*e^5)
```

giac [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e^5*x^5+5*d*e^4*x^4+10*d^2*e^3*x^3+10*d^3*e^2*x^2+
5*d^4*e*x+d^5),x, algorithm="giac")
```

```
[Out] Timed out
```

maple [A] time = 0.12, size = 243, normalized size = 1.51

$$-\frac{b^4c^4F^{ac}F^{bcx}\ln(F)^4}{4\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^4e^5}-\frac{b^4c^4F^{ac}F^{bcx}\ln(F)^4}{12\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^3e^5}-\frac{b^4c^4F^{ac}F^{bcx}\ln(F)^4}{24\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right)^2e^5}-\frac{b^4c^4F^{ac}F^{bcx}\ln(F)^4}{24\left(bcx\ln(F)+\frac{bcd\ln(F)}{e}\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/(e^5*x^5+5*d*e^4*x^4+10*d^2*e^3*x^3+10*d^3*e^2*x^2+5*d^4*
e*x+d^5),x)
```

```
[Out] -1/4/(b*c*x*ln(F)+b*c*d/e*ln(F))^4*b^4*c^4/e^5*F^(a*c)*F^(b*c*x)*ln(F)^4-1/
12/(b*c*x*ln(F)+b*c*d/e*ln(F))^3*b^4*c^4/e^5*F^(a*c)*F^(b*c*x)*ln(F)^4-1/24
/(b*c*x*ln(F)+b*c*d/e*ln(F))^2*b^4*c^4/e^5*F^(a*c)*F^(b*c*x)*ln(F)^4-1/24/(
b*c*x*ln(F)+b*c*d/e*ln(F))*b^4*c^4/e^5*F^(a*c)*F^(b*c*x)*ln(F)^4-1/24*b^4*c
```

```
^4*ln(F)^4/e^5*F^((a*e-b*d)*c/e)*Ei(1,-b*c*x*ln(F)-a*c*ln(F)-(-a*c*e*ln(F)+
b*c*d*ln(F))/e)
```

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

$$\int \frac{F^{(bx+a)c}}{e^5x^5 + 5\,de^4x^4 + 10\,d^2e^3x^3 + 10\,d^3e^2x^2 + 5\,d^4ex + d^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e^5*x^5+5*d*e^4*x^4+10*d^2*e^3*x^3+10*d^3*e^2*x^2+
5*d^4*e*x+d^5),x, algorithm="maxima")
```

```
[Out] integrate(F^((b*x + a)*c)/(e^5*x^5 + 5*d*e^4*x^4 + 10*d^2*e^3*x^3 + 10*d^3*
e^2*x^2 + 5*d^4*e*x + d^5), x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{d^5 + 5\,d^4\,e\,x + 10\,d^3\,e^2\,x^2 + 10\,d^2\,e^3\,x^3 + 5\,d\,e^4\,x^4 + e^5\,x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d^5 + e^5*x^5 + 5*d*e^4*x^4 + 10*d^3*e^2*x^2 + 10*d^2*
e^3*x^3 + 5*d^4*e*x),x)
```

```
[Out] int(F^(c*(a + b*x))/(d^5 + e^5*x^5 + 5*d*e^4*x^4 + 10*d^3*e^2*x^2 + 10*d^2*
e^3*x^3 + 5*d^4*e*x), x)
```

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

$$\int \frac{F^{c(a+bx)}}{(d+ex)^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/(e**5*x**5+5*d*e**4*x**4+10*d**2*e**3*x**3+10*d**3
*e**2*x**2+5*d**4*e*x+d**5),x)
```

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

3.19 $\int F^{c(a+bx)}\left((d+ex)^n\right)^m\,dx$

Optimal. Leaf size=72

$$\frac{\left((d+ex)^n\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-mn}\Gamma\left(mn+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

```
[Out] F^(c*(a-b*d/e))*((e*x+d)^n)^m*GAMMA(m*n+1,-b*c*(e*x+d)*ln(F)/e)/b/c/ln(F)/(
(-b*c*(e*x+d)*ln(F)/e)^(m*n))
```

Rubi [A] time = 0.05, antiderivative size = 72, 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 = {2188, 2181}

$$\frac{\left((d+ex)^n\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-mn}\text{Gamma}\left(mn+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*((d + e*x)^n)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*((d + e*x)^n)^m*Gamma[1 + m*n, -((b*c*(d + e*x)*Log[F]
)/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^(m*n))
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] && !I
ntegerQ[m]
```

Rule 2188

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Module[{uu = NormalizePowerOfLinear[u, x], z}, Simp[z = If[PowerQ[uu] &&
FreeQ[uu[[2]], x], uu[[1]]^(m*uu[[2]]), uu^m]; (uu^m*Int[z*(a + b*(F^(g*Exp
andToSum[v, x]))^n)^p, x])/z, x]] /; FreeQ[{F, a, b, g, m, n, p}, x] && Lin
earQ[v, x] && PowerOfLinearQ[u, x] && !(LinearMatchQ[v, x] && PowerOfLinea
rMatchQ[u, x]) && !IntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}\left((d+ex)^n\right)^m\,dx = (d+ex)^{-mn}\left((d+ex)^n\right)^m\int F^{ac+bcx}(d+ex)^{mn}\,dx$$
$$= \frac{F^{c\left(a-\frac{bd}{e}\right)}\left((d+ex)^n\right)^m\Gamma\left(1+mn,-\frac{bc(d+ex)\log(F)}{e}\right)\left(-\frac{bc(d+ex)\log(F)}{e}\right)^{-mn}}{bc\log(F)}$$

Mathematica [A] time = 0.01, size = 72, normalized size = 1.00

$$\frac{\left((d+ex)^n\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-mn}\Gamma\left(mn+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*((d + e*x)^n)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*((d + e*x)^n)^m*Gamma[1 + m*n, -((b*c*(d + e*x)*Log[F]
)/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^(m*n))
```

fricas [A] time = 0.43, size = 68, normalized size = 0.94

$$\frac{e^{\left(-\frac{emn\log\left(-\frac{bc\log(F)}{e}\right)+(bcd-ace)\log(F)}{e}\right)}\Gamma\left(mn+1,-\frac{(bcex+bcd)\log(F)}{e}\right)}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*((e*x+d)^n)^m,x, algorithm="fricas")
```

```
[Out] e^(-(e*m*n*log(-b*c*log(F)/e) + (b*c*d - a*c*e)*log(F))/e)*gamma(m*n + 1, -
(b*c*e*x + b*c*d)*log(F)/e)/(b*c*log(F))
```

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

$$\int\left((ex+d)^n\right)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*((e*x+d)^n)^m,x, algorithm="giac")
```

```
[Out] integrate(((e*x + d)^n)^m*F^((b*x + a)*c), x)
```

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

$$\int F^{(bx+a)c} \left((ex+d)^{n}\right)^{m}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*((e*x+d)^n)^m,x)
[Out] int(F^((b*x+a)*c)*((e*x+d)^n)^m,x)
```

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

$$\int \left((ex+d)^{n}\right)^{m} F^{(bx+a)c}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*((e*x+d)^n)^m,x, algorithm="maxima")
[Out] integrate(((e*x + d)^n)^m*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)} \left((d+e\,x)^{n}\right)^{m}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*((d + e*x)^n)^m,x)
[Out] int(F^(c*(a + b*x))*((d + e*x)^n)^m, x)
```

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

$$\int F^{c(a+bx)} \left((d+ex)^{n}\right)^{m}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*((e*x+d)**n)**m,x)
[Out] Integral(F**(c*(a + b*x))*((d + e*x)**n)**m, x)
```

3.20 $\int F^{c(a+bx)} \left(d^4+4d^3ex+6d^2e^2x^2+4de^3x^3+e^4x^4\right)^m \, dx$

Optimal. Leaf size=71

$$\frac{\left((d+ex)^4\right)^m F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-4m} \Gamma\left(4m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

```
[Out] F^(c*(a-b*d/e))*((e*x+d)^4)^m*GAMMA(1+4*m,-b*c*(e*x+d)*ln(F)/e)/b/c/ln(F)/(
(-b*c*(e*x+d)*ln(F)/e)^(4*m))
```

Rubi [A] time = 0.07, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 50, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.040, Rules used = {2188, 2181}

$$\frac{\left((d+ex)^4\right)^m F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-4m} \text{Gamma}\left(4m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d^4 + 4*d^3*e*x + 6*d^2*e^2*x^2 + 4*d*e^3*x^3 + e^4*x^
4)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*((d + e*x)^4)^m*Gamma[1 + 4*m, -((b*c*(d + e*x)*Log[F]
)/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^(4*m))
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] && !I
ntegerQ[m]
```

Rule 2188

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Module[{uu = NormalizePowerOfLinear[u, x], z}, Simp[z = If[PowerQ[uu] &&
FreeQ[uu[[2]], x], uu[[1]]^(m*uu[[2]]), uu^m]; (uu^m*Int[z*(a + b*(F^(g*Exp
andToSum[v, x]))^n)^p, x])/z, x]] /; FreeQ[{F, a, b, g, m, n, p}, x] && Lin
earQ[v, x] && PowerOfLinearQ[u, x] && !(LinearMatchQ[v, x] && PowerOfLinea
rMatchQ[u, x]) && !IntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}\left(d^4+4d^3ex+6d^2e^2x^2+4de^3x^3+e^4x^4\right)^m\,dx=(d+ex)^{-4m}\left((d+ex)^4\right)^m\int F^{c(a+bx)}(d+ex)^{4m}\,dx$$

$$=\frac{F^{c\left(a-\frac{bd}{e}\right)}\left((d+ex)^4\right)^m\Gamma\left(1+4m,-\frac{bc(d+ex)\log(F)}{e}\right)\left(-\frac{bc(d}{}\right.}{bc\log(F)}$$

Mathematica [A] time = 0.01, size = 71, normalized size = 1.00

$$\frac{\left((d+ex)^4\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-4m}\Gamma\left(4m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d^4 + 4*d^3*e*x + 6*d^2*e^2*x^2 + 4*d*e^3*x^3 +
e^4*x^4)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*((d + e*x)^4)^m*Gamma[1 + 4*m, -((b*c*(d + e*x)*Log[F]
)/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^(4*m))
```

fricas [F] time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(e^4x^4+4\,de^3x^3+6\,d^2e^2x^2+4\,d^3ex+d^4\right)^m F^{bcx+ac},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4)^m
,x, algorithm="fricas")
```

```
[Out] integral((e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*x + d^4)^m*F^(b*c
*x + a*c), x)
```

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

$$\int\left(e^4x^4+4\,de^3x^3+6\,d^2e^2x^2+4\,d^3ex+d^4\right)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4)^m
,x, algorithm="giac")
```

```
[Out] integrate((e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*x + d^4)^m*F^((b
*x + a)*c), x)
```

maple [F] time = 0.17, size = 0, normalized size = 0.00

$$\int F^{(bx+a)c} \left(e^4x^4 + 4d\,e^3x^3 + 6d^2e^2x^2 + 4d^3ex + d^4\right)^m \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4)^m,x)
```

```
[Out] int(F^((b*x+a)*c)*(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4)^m,x)
```

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

$$\int \left(e^4x^4 + 4\,de^3x^3 + 6\,d^2e^2x^2 + 4\,d^3ex + d^4\right)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^4*x^4+4*d*e^3*x^3+6*d^2*e^2*x^2+4*d^3*e*x+d^4)^m
,x, algorithm="maxima")
```

```
[Out] integrate((e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*x + d^4)^m*F^((b
*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)} \left(d^4 + 4\,d^3\,e\,x + 6\,d^2\,e^2\,x^2 + 4\,d\,e^3\,x^3 + e^4\,x^4\right)^m \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d^4 + e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*
x)^m,x)
```

```
[Out] int(F^(c*(a + b*x))*(d^4 + e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*e^2*x^2 + 4*d^3*e*
x)^m, x)
```

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

$$\int F^{c(a+bx)} \left((d + ex)^4\right)^m \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e**4*x**4+4*d*e**3*x**3+6*d**2*e**2*x**2+4*d**3*e
*x+d**4)**m,x)
```

```
[Out] Integral(F**(c*(a + b*x))*((d + e*x)**4)**m, x)
```

3.21 $\int F^{c(a+bx)} \left(d^3+3d^2ex+3de^2x^2+e^3x^3\right)^m \, dx$

Optimal. Leaf size=71

$$\frac{\left((d+ex)^3\right)^m F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-3m} \Gamma\left(3m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

```
[Out] F^(c*(a-b*d/e))*((e*x+d)^3)^m*GAMMA(1+3*m,-b*c*(e*x+d)*ln(F)/e)/b/c/ln(F)/(
(-b*c*(e*x+d)*ln(F)/e)^(3*m))
```

Rubi [A] time = 0.06, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 39, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.051, Rules used = {2188, 2181}

$$\frac{\left((d+ex)^3\right)^m F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-3m} \text{Gamma}\left(3m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d^3 + 3*d^2*e*x + 3*d*e^2*x^2 + e^3*x^3)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*((d + e*x)^3)^m*Gamma[1 + 3*m, -((b*c*(d + e*x)*Log[F]
)/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^(3*m))
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&  !I
ntegerQ[m]
```

Rule 2188

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Module[{uu = NormalizePowerOfLinear[u, x], z}, Simp[z = If[PowerQ[uu] &&
FreeQ[uu[[2]], x], uu[[1]]^(m*uu[[2]]), uu^m]; (uu^m*Int[z*(a + b*(F^(g*Exp
andToSum[v, x]))^n)^p, x])/z, x]] /; FreeQ[{F, a, b, g, m, n, p}, x] && Lin
earQ[v, x] && PowerOfLinearQ[u, x] &&  !(LinearMatchQ[v, x] && PowerOfLinea
rMatchQ[u, x]) &&  !IntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}\left(d^3+3d^2ex+3de^2x^2+e^3x^3\right)^m\,dx=(d+ex)^{-3m}\left((d+ex)^3\right)^m\int F^{c(a+bx)}(d+ex)^{3m}\,dx$$
$$=\frac{F^{c\left(a-\frac{bd}{e}\right)}\left((d+ex)^3\right)^m\Gamma\left(1+3m,-\frac{bc(d+ex)\log(F)}{e}\right)\left(-\frac{bc(d+ex)\log(F)}{e}\right)^{-3}}{bc\log(F)}$$

Mathematica [A] time = 0.01, size = 71, normalized size = 1.00

$$\frac{\left((d+ex)^3\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-3m}\Gamma\left(3m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d^3 + 3*d^2*e*x + 3*d*e^2*x^2 + e^3*x^3)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*((d + e*x)^3)^m*Gamma[1 + 3*m, -((b*c*(d + e*x)*Log[F]
)/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^(3*m))
```

fricas [F] time = 0.46, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(e^3x^3+3\,de^2x^2+3\,d^2ex+d^3\right)^m F^{bcx+ac},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral((e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x + d^3)^m*F^(b*c*x + a*c), x)
```

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

$$\int\left(e^3x^3+3\,de^2x^2+3\,d^2ex+d^3\right)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate((e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x + d^3)^m*F^((b*x + a)*c), x)
```

maple [F] time = 0.12, size = 0, normalized size = 0.00

$$\int F^{(bx+a)c}\left(e^3x^3+3d\,e^2x^2+3d^2ex+d^3\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3)^m,x)
```

```
[Out] int(F^((b*x+a)*c)*(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3)^m,x)
```

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

$$\int \left(e^3x^3 + 3\,de^2x^2 + 3\,d^2ex + d^3\right)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3)^m,x, algorithm=
"maxima")
```

```
[Out] integrate((e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x + d^3)^m*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)}\,\left(d^3+3\,d^2\,e\,x+3\,d\,e^2\,x^2+e^3\,x^3\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d^3 + e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x)^m,x)
```

```
[Out] int(F^(c*(a + b*x))*(d^3 + e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x)^m, x)
```

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

$$\int F^{c(a+bx)}\left((d+ex)^3\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e**3*x**3+3*d*e**2*x**2+3*d**2*e*x+d**3)**m,x)
```

```
[Out] Integral(F**(c*(a + b*x))*((d + e*x)**3)**m, x)
```

3.22 $\int F^{c(a+bx)} \left(d^2+2dex+e^2x^2\right)^m \, dx$

Optimal. Leaf size=71

$$\frac{\left((d+ex)^2\right)^m F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-2m} \Gamma\left(2m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

```
[Out] F^(c*(a-b*d/e))*((e*x+d)^2)^m*GAMMA(1+2*m,-b*c*(e*x+d)*ln(F)/e)/b/c/ln(F)/(
(-b*c*(e*x+d)*ln(F)/e)^(2*m))
```

Rubi [A] time = 0.06, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 28, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.071, Rules used = {2188, 2181}

$$\frac{\left((d+ex)^2\right)^m F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-2m} \text{Gamma}\left(2m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d^2 + 2*d*e*x + e^2*x^2)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*((d + e*x)^2)^m*Gamma[1 + 2*m, -((b*c*(d + e*x)*Log[F]
)/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^(2*m))
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&  !I
ntegerQ[m]
```

Rule 2188

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Module[{uu = NormalizePowerOfLinear[u, x], z}, Simp[z = If[PowerQ[uu] &&
FreeQ[uu[[2]], x], uu[[1]]^(m*uu[[2]]), uu^m]; (uu^m*Int[z*(a + b*(F^(g*Exp
andToSum[v, x]))^n)^p, x])/z, x]] /; FreeQ[{F, a, b, g, m, n, p}, x] && Lin
earQ[v, x] && PowerOfLinearQ[u, x] &&  !(LinearMatchQ[v, x] && PowerOfLinea
rMatchQ[u, x]) &&  !IntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}\left(d^2+2dex+e^2x^2\right)^m\,dx=(d+ex)^{-2m}\left((d+ex)^2\right)^m\int F^{c(a+bx)}(d+ex)^{2m}\,dx$$
$$=\frac{F^{c\left(a-\frac{bd}{e}\right)}\left((d+ex)^2\right)^m\Gamma\left(1+2m,-\frac{bc(d+ex)\log(F)}{e}\right)\left(-\frac{bc(d+ex)\log(F)}{e}\right)^{-2m}}{bc\log(F)}$$

Mathematica [A] time = 0.01, size = 71, normalized size = 1.00

$$\frac{\left((d+ex)^2\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-2m}\Gamma\left(2m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d^2 + 2*d*e*x + e^2*x^2)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*((d + e*x)^2)^m*Gamma[1 + 2*m, -((b*c*(d + e*x)*Log[F]
)/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^(2*m))
```

fricas [F] time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(e^2x^2+2\,dex+d^2\right)^m F^{bcx+ac},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral((e^2*x^2 + 2*d*e*x + d^2)^m*F^(b*c*x + a*c), x)
```

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

$$\int\left(e^2x^2+2\,dex+d^2\right)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate((e^2*x^2 + 2*d*e*x + d^2)^m*F^((b*x + a)*c), x)
```

maple [F] time = 0.14, size = 0, normalized size = 0.00

$$\int F^{(bx+a)c}\left(e^2x^2+2dex+d^2\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e^2*x^2+2*d*e*x+d^2)^m,x)
```

```
[Out] int(F^((b*x+a)*c)*(e^2*x^2+2*d*e*x+d^2)^m,x)
```

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

$$\int \left(e^2x^2 + 2\,dex + d^2\right)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate((e^2*x^2 + 2*d*e*x + d^2)^m*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)}\left(d^2 + 2\,d\,e\,x + e^2\,x^2\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d^2 + e^2*x^2 + 2*d*e*x)^m,x)
```

```
[Out] int(F^(c*(a + b*x))*(d^2 + e^2*x^2 + 2*d*e*x)^m, x)
```

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

$$\int F^{c(a+bx)}\left((d + ex)^2\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e**2*x**2+2*d*e*x+d**2)**m,x)
```

```
[Out] Integral(F**(c*(a + b*x))*((d + e*x)**2)**m, x)
```

3.23 $\int F^{c(a+bx)}(d+ex)^m\,dx$

Optimal. Leaf size=67

$$\frac{(d+ex)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-m}\Gamma\left(m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

```
[Out] F^(c*(a-b*d/e))*(e*x+d)^m*GAMMA(1+m,-b*c*(e*x+d)*ln(F)/e)/b/c/ln(F)/((-b*c*
(e*x+d)*ln(F)/e)^m)
```

Rubi [A] time = 0.02, antiderivative size = 67, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.059, Rules used = {2181}

$$\frac{(d+ex)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-m}\text{Gamma}\left(m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*(d + e*x)^m*Gamma[1 + m, -((b*c*(d + e*x)*Log[F])/e)])
/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^m)
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] && !I
ntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}(d+ex)^m\,dx=\frac{F^{c\left(a-\frac{bd}{e}\right)}(d+ex)^m\Gamma\left(1+m,-\frac{bc(d+ex)\log(F)}{e}\right)\left(-\frac{bc(d+ex)\log(F)}{e}\right)^{-m}}{bc\log(F)}$$

Mathematica [A] time = 0.01, size = 67, normalized size = 1.00

$$\frac{(d+ex)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-m}\Gamma\left(m+1,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*(d + e*x)^m*Gamma[1 + m, -((b*c*(d + e*x)*Log[F])/e)])
/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^m)
```

fricas [A] time = 0.44, size = 65, normalized size = 0.97

$$\frac{e^{\left(-\frac{em\log\left(-\frac{bc\log(F)}{e}\right)+(bcd-ace)\log(F)}{e}\right)}\Gamma\left(m+1,-\frac{(bcex+bcd)\log(F)}{e}\right)}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^m,x, algorithm="fricas")
```

```
[Out] e^(-(e*m*log(-b*c*log(F)/e) + (b*c*d - a*c*e)*log(F))/e)*gamma(m + 1, -(b*c
*e*x + b*c*d)*log(F)/e)/(b*c*log(F))
```

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

$$\int (ex+d)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^m,x, algorithm="giac")
```

```
[Out] integrate((e*x + d)^m*F^((b*x + a)*c), x)
```

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

$$\int F^{(bx+a)c}\,(ex+d)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e*x+d)^m,x)
```

```
[Out] int(F^((b*x+a)*c)*(e*x+d)^m,x)
```

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

$$\int (ex+d)^m F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^m,x, algorithm="maxima")
```

```
[Out] integrate((e*x + d)^m*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)}\,{\left(d+e\,x\right)}^m \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x)^m,x)
```

```
[Out] int(F^(c*(a + b*x))*(d + e*x)^m, x)
```

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

$$\int F^{c(a+bx)}\left(d+ex\right)^{m}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**m,x)
```

```
[Out] Integral(F**(c*(a + b*x))*(d + e*x)**m, x)
```

3.24 $\int F^{c(a+bx)}(d+ex)^{-m}\,dx$

Optimal. Leaf size=69

$$\frac{(d+ex)^{-m}F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^m\Gamma\left(1-m,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

```
[Out] F^(c*(a-b*d/e))*GAMMA(1-m,-b*c*(e*x+d)*ln(F)/e)*(-b*c*(e*x+d)*ln(F)/e)^m/b/
c/((e*x+d)^m)/ln(F)
```

Rubi [A] time = 0.02, antiderivative size = 69, 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 = {2181}

$$\frac{(d+ex)^{-m}F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^m\text{Gamma}\left(1-m,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d + e*x)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*Gamma[1 - m, -((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d +
 e*x)*Log[F])/e))^m)/(b*c*(d + e*x)^m*Log[F])
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&  !I
ntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}(d+ex)^{-m}\,dx=\frac{F^{c\left(a-\frac{bd}{e}\right)}(d+ex)^{-m}\Gamma\left(1-m,-\frac{bc(d+ex)\log(F)}{e}\right)\left(-\frac{bc(d+ex)\log(F)}{e}\right)^m}{bc\log(F)}$$

Mathematica [A] time = 0.01, size = 69, normalized size = 1.00

$$\frac{(d+ex)^{-m}F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^m\Gamma\left(1-m,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d + e*x)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*Gamma[1 - m, -((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d +
 e*x)*Log[F])/e))^m)/(b*c*(d + e*x)^m*Log[F])
```

fricas [A] time = 0.45, size = 67, normalized size = 0.97

$$\frac{e^{\left(\frac{em\log\left(-\frac{bc\log(F)}{e}\right)-(bcd-ace)\log(F)}{e}\right)}\Gamma\left(-m+1,-\frac{(bcex+bcd)\log(F)}{e}\right)}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/((e*x+d)^m),x, algorithm="fricas")
```

```
[Out] e^((e*m*log(-b*c*log(F)/e) - (b*c*d - a*c*e)*log(F))/e)*gamma(-m + 1, -(b*c
*e*x + b*c*d)*log(F)/e)/(b*c*log(F))
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^m}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/((e*x+d)^m),x, algorithm="giac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^m, x)
```

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

$$\int F^{(bx+a)c}\,(ex+d)^{-m}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/((e*x+d)^m),x)
```

```
[Out] int(F^((b*x+a)*c)/((e*x+d)^m),x)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^m}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/((e*x+d)^m),x, algorithm="maxima")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^m, x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{{\left(d+e\,x\right)}^m}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d + e*x)^m,x)
```

```
[Out] int(F^(c*(a + b*x))/(d + e*x)^m, x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/((e*x+d)**m),x)
```

```
[Out] Timed out
```

3.25 $\int F^{c(a+bx)} \left(d^2+2dex+e^2x^2\right)^{-m} dx$

Optimal. Leaf size=73

$$\frac{\left((d+ex)^2\right)^{-m} F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{2m} \Gamma\left(1-2m,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

```
[Out] F^(c*(a-b*d/e))*GAMMA(1-2*m,-b*c*(e*x+d)*ln(F)/e)*(-b*c*(e*x+d)*ln(F)/e)^(2
*m)/b/c/(((e*x+d)^2)^m)/ln(F)
```

Rubi [A] time = 0.06, antiderivative size = 73, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 30, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.067, Rules used = {2188, 2181}

$$\frac{\left((d+ex)^2\right)^{-m} F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{2m} \text{Gamma}\left(1-2m,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d^2 + 2*d*e*x + e^2*x^2)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*Gamma[1 - 2*m, -((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d
 + e*x)*Log[F])/e))^(2*m))/(b*c*((d + e*x)^2)^m*Log[F])
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&  !I
ntegerQ[m]
```

Rule 2188

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Module[{uu = NormalizePowerOfLinear[u, x], z}, Simp[z = If[PowerQ[uu] &&
FreeQ[uu[[2]], x], uu[[1]]^(m*uu[[2]]), uu^m]; (uu^m*Int[z*(a + b*(F^(g*Exp
andToSum[v, x]))^n)^p, x])/z, x]] /; FreeQ[{F, a, b, g, m, n, p}, x] && Lin
earQ[v, x] && PowerOfLinearQ[u, x] &&  !(LinearMatchQ[v, x] && PowerOfLinea
rMatchQ[u, x]) &&  !IntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}\left(d^2+2dex+e^2x^2\right)^{-m}\,dx=(d+ex)^{2m}\left((d+ex)^2\right)^{-m}\int F^{c(a+bx)}(d+ex)^{-2m}\,dx$$
$$=\frac{F^{c\left(a-\frac{bd}{e}\right)}\left((d+ex)^2\right)^{-m}\Gamma\left(1-2m,-\frac{bc(d+ex)\log(F)}{e}\right)\left(-\frac{bc(d+ex)\log(F)}{e}\right)^{2m}}{bc\log(F)}$$

Mathematica [**A**] time = 0.01, size = 73, normalized size = 1.00

$$\frac{\left((d+ex)^2\right)^{-m}F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{2m}\Gamma\left(1-2m,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d^2 + 2*d*e*x + e^2*x^2)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*Gamma[1 - 2*m, -((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d
 + e*x)*Log[F])/e))^(2*m))/(b*c*((d + e*x)^2)^m*Log[F])
```

fricas [**F**] time = 0.43, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{F^{bcx+ac}}{\left(e^2x^2+2\,dex+d^2\right)^m},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integral(F^(b*c*x + a*c)/(e^2*x^2 + 2*d*e*x + d^2)^m, x)
```

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

$$\int \frac{F^{(bx+a)c}}{\left(e^2x^2+2\,dex+d^2\right)^m}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(F^((b*x + a)*c)/(e^2*x^2 + 2*d*e*x + d^2)^m, x)
```

maple [**F**] time = 0.14, size = 0, normalized size = 0.00

$$\int F^{(bx+a)c}\left(e^2x^2+2dex+d^2\right)^{-m}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/((e^2*x^2+2*d*e*x+d^2)^m),x)
```

```
[Out] int(F^((b*x+a)*c)/((e^2*x^2+2*d*e*x+d^2)^m),x)
```

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

$$\int \frac{F^{(bx+a)c}}{\left(e^2x^2 + 2\,dex + d^2\right)^m}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(F^((b*x + a)*c)/(e^2*x^2 + 2*d*e*x + d^2)^m, x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{\left(d^2 + 2\,d\,e\,x + e^2\,x^2\right)^m}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d^2 + e^2*x^2 + 2*d*e*x)^m,x)
```

```
[Out] int(F^(c*(a + b*x))/(d^2 + e^2*x^2 + 2*d*e*x)^m, x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/((e**2*x**2+2*d*e*x+d**2)**m),x)
```

```
[Out] Timed out
```

3.26 $\int F^{c(a+bx)} \left(d^3+3d^2ex+3de^2x^2+e^3x^3\right)^{-m} \, dx$

Optimal. Leaf size=73

$$\frac{\left((d+ex)^3\right)^{-m} F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3m} \Gamma\left(1-3m,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

```
[Out] F^(c*(a-b*d/e))*GAMMA(1-3*m,-b*c*(e*x+d)*ln(F)/e)*(-b*c*(e*x+d)*ln(F)/e)^(3
*m)/b/c/(((e*x+d)^3)^m)/ln(F)
```

Rubi [A] time = 0.06, antiderivative size = 73, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 41, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.049, Rules used = {2188, 2181}

$$\frac{\left((d+ex)^3\right)^{-m} F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3m} \text{Gamma}\left(1-3m,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d^3 + 3*d^2*e*x + 3*d*e^2*x^2 + e^3*x^3)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*Gamma[1 - 3*m, -((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d
 + e*x)*Log[F])/e))^(3*m))/(b*c*((d + e*x)^3)^m*Log[F])
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&  !I
ntegerQ[m]
```

Rule 2188

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Module[{uu = NormalizePowerOfLinear[u, x], z}, Simp[z = If[PowerQ[uu] &&
FreeQ[uu[[2]], x], uu[[1]]^(m*uu[[2]]), uu^m]; (uu^m*Int[z*(a + b*(F^(g*Exp
andToSum[v, x]))^n)^p, x])/z, x]] /; FreeQ[{F, a, b, g, m, n, p}, x] && Lin
earQ[v, x] && PowerOfLinearQ[u, x] &&  !(LinearMatchQ[v, x] && PowerOfLinea
rMatchQ[u, x]) &&  !IntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}\left(d^3+3d^2ex+3de^2x^2+e^3x^3\right)^{-m}dx=(d+ex)^{3m}\left((d+ex)^3\right)^{-m}\int F^{c(a+bx)}(d+ex)^{-3m}\,dx$$
$$=\frac{F^{c\left(a-\frac{bd}{e}\right)}\left((d+ex)^3\right)^{-m}\Gamma\left(1-3m,-\frac{bc(d+ex)\log(F)}{e}\right)\left(-\frac{bc(d+ex)\log(F)}{e}\right.}{bc\log(F)}$$

Mathematica [A] time = 0.01, size = 73, normalized size = 1.00

$$\frac{\left((d+ex)^3\right)^{-m}F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3m}\Gamma\left(1-3m,-\frac{bc(d+ex)\log(F)}{e}\right)}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d^3 + 3*d^2*e*x + 3*d*e^2*x^2 + e^3*x^3)^m,x]
```

```
[Out] (F^(c*(a - (b*d)/e))*Gamma[1 - 3*m, -((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d
 + e*x)*Log[F])/e))^(3*m))/(b*c*((d + e*x)^3)^m*Log[F])
```

fricas [F] time = 0.45, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{F^{bcx+ac}}{\left(e^3x^3+3\,de^2x^2+3\,d^2ex+d^3\right)^m},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/((e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3)^m),x, algorith
m="fricas")
```

```
[Out] integral(F^(b*c*x + a*c)/(e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x + d^3)^m, x)
```

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

$$\int\frac{F^{(bx+a)c}}{\left(e^3x^3+3\,de^2x^2+3\,d^2ex+d^3\right)^m}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/((e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3)^m),x, algorith
m="giac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x + d^3)^m, x)
```

maple [F] time = 0.12, size = 0, normalized size = 0.00

$$\int F^{(bx+a)c} \left(e^3x^3 + 3d\,e^2x^2 + 3d^2ex + d^3\right)^{-m}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/((e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3)^m),x)
[Out] int(F^((b*x+a)*c)/((e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3)^m),x)
```

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

$$\int \frac{F^{(bx+a)c}}{\left(e^3x^3 + 3\,de^2x^2 + 3\,d^2ex + d^3\right)^m}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/((e^3*x^3+3*d*e^2*x^2+3*d^2*e*x+d^3)^m),x, algorith
m="maxima")
[Out] integrate(F^((b*x + a)*c)/(e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x + d^3)^m, x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{\left(d^3 + 3\,d^2\,e\,x + 3\,d\,e^2\,x^2 + e^3\,x^3\right)^m}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d^3 + e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x)^m,x)
[Out] int(F^(c*(a + b*x))/(d^3 + e^3*x^3 + 3*d*e^2*x^2 + 3*d^2*e*x)^m, x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/((e**3*x**3+3*d*e**2*x**2+3*d**2*e*x+d**3)**m),x)
[Out] Timed out
```

3.27 $\int F^{2+5x}\,dx$

Optimal. Leaf size=15

$$\frac{F^{5x+2}}{5\log(F)}$$

```
[Out] 1/5*F^(2+5*x)/ln(F)
```

Rubi [A] time = 0.00, antiderivative size = 15, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143, Rules used = {2194}

$$\frac{F^{5x+2}}{5\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(2 + 5*x),x]
[Out] F^(2 + 5*x)/(5*Log[F])
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int F^{2+5x}\,dx = \frac{F^{2+5x}}{5\log(F)}$$

Mathematica [A] time = 0.00, size = 15, normalized size = 1.00

$$\frac{F^{5x+2}}{5\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(2 + 5*x),x]
[Out] F^(2 + 5*x)/(5*Log[F])
```

fricas [A] time = 0.41, size = 13, normalized size = 0.87

$$\frac{F^{5\,x+2}}{5\,\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(2+5*x),x, algorithm="fricas")
```

```
[Out] 1/5*F^(5*x + 2)/log(F)
```

giac [A] time = 0.26, size = 13, normalized size = 0.87

$$\frac{F^{5x+2}}{5\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(2+5*x),x, algorithm="giac")
```

```
[Out] 1/5*F^(5*x + 2)/log(F)
```

maple [A] time = 0.01, size = 14, normalized size = 0.93

$$\frac{F^{5x+2}}{5\ln(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(5*x+2),x)
```

```
[Out] 1/5*F^(5*x+2)/ln(F)
```

maxima [A] time = 0.43, size = 13, normalized size = 0.87

$$\frac{F^{5x+2}}{5\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(2+5*x),x, algorithm="maxima")
```

```
[Out] 1/5*F^(5*x + 2)/log(F)
```

mupad [B] time = 3.54, size = 13, normalized size = 0.87

$$\frac{F^{5x+2}}{5\ln(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(5*x + 2),x)
```

```
[Out] F^(5*x + 2)/(5*log(F))
```

sympy [A] time = 0.09, size = 15, normalized size = 1.00

$$\begin{cases} \frac{F^{5x+2}}{5\log(F)} & \text{for } 5\log(F) \neq 0 \\ x & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(2+5*x),x)
[Out] Piecewise((F**(5*x + 2)/(5*log(F)), Ne(5*log(F), 0)), (x, True))
```

3.28 $\int F^{a+bx}\,dx$

Optimal. Leaf size=15

$$\frac{F^{a+bx}}{b\log(F)}$$

```
[Out] F^(b*x+a)/b/ln(F)
```

Rubi [A] time = 0.00, antiderivative size = 15, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143, Rules used = {2194}

$$\frac{F^{a+bx}}{b\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(a + b*x),x]
```

```
[Out] F^(a + b*x)/(b*Log[F])
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int F^{a+bx}\,dx=\frac{F^{a+bx}}{b\log(F)}$$

Mathematica [A] time = 0.00, size = 15, normalized size = 1.00

$$\frac{F^{a+bx}}{b\log(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*x),x]
```

```
[Out] F^(a + b*x)/(b*Log[F])
```

fricas [A] time = 0.42, size = 15, normalized size = 1.00

$$\frac{F^{bx+a}}{b\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*x + a)/(b*log(F))
```

giac [A] time = 0.26, size = 15, normalized size = 1.00

$$\frac{F^{bx+a}}{b\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*x + a)/(b*log(F))
```

maple [A] time = 0.00, size = 16, normalized size = 1.07

$$\frac{F^{bx+a}}{b\ln(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(b*x+a),x)
```

```
[Out] F^(b*x+a)/b/ln(F)
```

maxima [A] time = 0.43, size = 15, normalized size = 1.00

$$\frac{F^{bx+a}}{b\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*x + a)/(b*log(F))
```

mupad [B] time = 3.44, size = 15, normalized size = 1.00

$$\frac{F^{a+b\,x}}{b\,\ln(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a + b*x),x)
```

```
[Out] F^(a + b*x)/(b*log(F))
```

sympy [A] time = 0.10, size = 15, normalized size = 1.00

$$\begin{cases} \frac{F^{a+bx}}{b\log(F)} & \text{for } b\log(F) \neq 0 \\ x & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(b*x+a),x)
[Out] Piecewise((F**(a + b*x)/(b*log(F)), Ne(b*log(F), 0)), (x, True))
```

3.29 $\int 10^{2+5x}\,dx$

Optimal. Leaf size=19

$$\frac{2^{5x+2}5^{5x+1}}{\log(10)}$$

[Out] 2^(2+5*x)*5^(1+5*x)/ln(10)

Rubi [A] time = 0.01, antiderivative size = 19, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143, Rules used = {2194}

$$\frac{2^{5x+2}5^{5x+1}}{\log(10)}$$

Antiderivative was successfully verified.

[In] Int[10^(2 + 5*x),x]

[Out] (2^(2 + 5*x)*5^(1 + 5*x))/Log[10]

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int 10^{2+5x}\,dx = \frac{2^{2+5x}5^{1+5x}}{\log(10)}$$

Mathematica [A] time = 0.00, size = 19, normalized size = 1.00

$$\frac{2^{5x+2}5^{5x+1}}{\log(10)}$$

Antiderivative was successfully verified.

[In] Integrate[10^(2 + 5*x),x]

[Out] (2^(2 + 5*x)*5^(1 + 5*x))/Log[10]

fricas [A] time = 0.40, size = 13, normalized size = 0.68

$$\frac{10^{5x+2}}{5\log(10)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(10^(2+5*x),x, algorithm="fricas")
[Out] 1/5*10^(5*x + 2)/log(10)
```

giac [A] time = 0.36, size = 13, normalized size = 0.68

$$\frac{10^{5\,x+2}}{5\,\log\left(10\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(10^(2+5*x),x, algorithm="giac")
[Out] 1/5*10^(5*x + 2)/log(10)
```

maple [A] time = 0.01, size = 14, normalized size = 0.74

$$\frac{10^{5x+2}}{5\ln\left(10\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(10^(5*x+2),x)
[Out] 1/5/ln(10)*10^(5*x+2)
```

maxima [A] time = 0.43, size = 13, normalized size = 0.68

$$\frac{10^{5\,x+2}}{5\,\log\left(10\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(10^(2+5*x),x, algorithm="maxima")
[Out] 1/5*10^(5*x + 2)/log(10)
```

mupad [B] time = 0.09, size = 11, normalized size = 0.58

$$\frac{20\,10^{5\,x}}{\ln\left(10\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(10^(5*x + 2),x)
```

```
[Out] (20*10^(5*x))/log(10)
```

sympy [A] time = 0.09, size = 10, normalized size = 0.53

$$\frac{10^{5x+2}}{5\log(10)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(10**(2+5*x),x)
[Out] 10**(5*x + 2)/(5*log(10))
```

3.30 $\int F^{a+bx}x^{7/2}\,dx$

Optimal. Leaf size=131

$$\frac{105\sqrt{\pi}\,F^a\operatorname{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{16b^{9/2}\log^{\frac{9}{2}}(F)}-\frac{105\sqrt{x}\,F^{a+bx}}{8b^4\log^4(F)}+\frac{35x^{3/2}F^{a+bx}}{4b^3\log^3(F)}-\frac{7x^{5/2}F^{a+bx}}{2b^2\log^2(F)}+\frac{x^{7/2}F^{a+bx}}{b\log(F)}$$

```
[Out] 35/4*F^(b*x+a)*x^(3/2)/b^3/ln(F)^3-7/2*F^(b*x+a)*x^(5/2)/b^2/ln(F)^2+F^(b*x
+a)*x^(7/2)/b/ln(F)+105/16*F^a*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2))*Pi^(1/2)/b
^(9/2)/ln(F)^(9/2)-105/8*F^(b*x+a)*x^(1/2)/b^4/ln(F)^4
```

Rubi [A] time = 0.15, antiderivative size = 131, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2176, 2180, 2204}

$$\frac{105\sqrt{\pi}\,F^a\operatorname{Erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{16b^{9/2}\log^{\frac{9}{2}}(F)}-\frac{7x^{5/2}F^{a+bx}}{2b^2\log^2(F)}+\frac{35x^{3/2}F^{a+bx}}{4b^3\log^3(F)}-\frac{105\sqrt{x}\,F^{a+bx}}{8b^4\log^4(F)}+\frac{x^{7/2}F^{a+bx}}{b\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (105*F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]])/(16*b^(9/2)*Log[F]^(9
/2)) - (105*F^(a + b*x)*Sqrt[x])/(8*b^4*Log[F]^4) + (35*F^(a + b*x)*x^(3/2)
)/(4*b^3*Log[F]^3) - (7*F^(a + b*x)*x^(5/2))/(2*b^2*Log[F]^2) + (F^(a + b*x
)*x^(7/2))/(b*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$
\begin{aligned}
\int F^{a+bx}x^{7/2}\,dx &= \frac{F^{a+bx}x^{7/2}}{b\log(F)}-\frac{7\int F^{a+bx}x^{5/2}\,dx}{2b\log(F)}\\
&= -\frac{7F^{a+bx}x^{5/2}}{2b^2\log^2(F)}+\frac{F^{a+bx}x^{7/2}}{b\log(F)}+\frac{35\int F^{a+bx}x^{3/2}\,dx}{4b^2\log^2(F)}\\
&= \frac{35F^{a+bx}x^{3/2}}{4b^3\log^3(F)}-\frac{7F^{a+bx}x^{5/2}}{2b^2\log^2(F)}+\frac{F^{a+bx}x^{7/2}}{b\log(F)}-\frac{105\int F^{a+bx}\sqrt{x}\,dx}{8b^3\log^3(F)}\\
&= -\frac{105F^{a+bx}\sqrt{x}}{8b^4\log^4(F)}+\frac{35F^{a+bx}x^{3/2}}{4b^3\log^3(F)}-\frac{7F^{a+bx}x^{5/2}}{2b^2\log^2(F)}+\frac{F^{a+bx}x^{7/2}}{b\log(F)}+\frac{105\int\frac{F^{a+bx}}{\sqrt{x}}\,dx}{16b^4\log^4(F)}\\
&= -\frac{105F^{a+bx}\sqrt{x}}{8b^4\log^4(F)}+\frac{35F^{a+bx}x^{3/2}}{4b^3\log^3(F)}-\frac{7F^{a+bx}x^{5/2}}{2b^2\log^2(F)}+\frac{F^{a+bx}x^{7/2}}{b\log(F)}+\frac{105\,\text{Subst}\left(\int F^{a+bx^2}\,dx,x,\sqrt{x}\right)}{8b^4\log^4(F)}\\
&= \frac{105F^a\sqrt{\pi}\,\text{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{16b^{9/2}\log^{\frac{9}{2}}(F)}-\frac{105F^{a+bx}\sqrt{x}}{8b^4\log^4(F)}+\frac{35F^{a+bx}x^{3/2}}{4b^3\log^3(F)}-\frac{7F^{a+bx}x^{5/2}}{2b^2\log^2(F)}+\frac{F^{a+bx}x^{7/2}}{b\log(F)}
\end{aligned}
$$

Mathematica [A] time = 0.01, size = 36, normalized size = 0.27

$$\frac{F^a\sqrt{-bx\log(F)}\,\Gamma\left(\frac{9}{2},-bx\log(F)\right)}{b^5\sqrt{x}\,\log^5(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*x)*x^(7/2),x]
[Out] (F^a*Gamma[9/2, -(b*x*Log[F])]*Sqrt[-(b*x*Log[F])])/(b^5*Sqrt[x]*Log[F]^5)
```

fricas [A] time = 0.47, size = 89, normalized size = 0.68

$$-\frac{105\sqrt{\pi}\sqrt{-b\log(F)}\,F^a\,\text{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)-2\left(8\,b^4x^3\log(F)^4-28\,b^3x^2\log(F)^3+70\,b^2x\log(F)^2-105\,b\log\right.}{16\,b^5\log(F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/16*(105*sqrt(pi)*sqrt(-b*log(F))*F^a*erf(sqrt(-b*log(F))*sqrt(x)) - 2*(8
*b^4*x^3*log(F)^4 - 28*b^3*x^2*log(F)^3 + 70*b^2*x*log(F)^2 - 105*b*log(F))
*F^(b*x + a)*sqrt(x))/(b^5*log(F)^5)
```

giac [A] time = 0.31, size = 94, normalized size = 0.72

$$-\frac{105\,\sqrt{\pi}\,F^{a}\,\mathrm{erf}\left(-\sqrt{-b\log(F)}\,\sqrt{x}\right)}{16\,\sqrt{-b\log(F)}\,b^{4}\log(F)^{4}}+\frac{\left(8\,b^{3}x^{\frac{7}{2}}\log(F)^{3}-28\,b^{2}x^{\frac{5}{2}}\log(F)^{2}+70\,bx^{\frac{3}{2}}\log(F)-105\,\sqrt{x}\right)e^{\left(bx\log(F)+a\log(F)\right)}}{8\,b^{4}\log(F)^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -105/16*sqrt(pi)*F^a*erf(-sqrt(-b*log(F))*sqrt(x))/(sqrt(-b*log(F))*b^4*log
(F)^4) + 1/8*(8*b^3*x^(7/2)*log(F)^3 - 28*b^2*x^(5/2)*log(F)^2 + 70*b*x^(3/
2)*log(F) - 105*sqrt(x))*e^(b*x*log(F) + a*log(F))/(b^4*log(F)^4)
```

maple [A] time = 0.03, size = 99, normalized size = 0.76

$$-\frac{\left(-\frac{(-b)^{\frac{9}{2}}\left(-72b^{3}x^{3}\ln(F)^{3}+252b^{2}x^{2}\ln(F)^{2}-630bx\ln(F)+945\right)\sqrt{x}\,\mathrm{e}^{bx\ln(F)}\sqrt{\ln(F)}}{72b^{4}}+\frac{105(-b)^{\frac{9}{2}}\sqrt{\pi}\,\mathrm{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\ln(F)}\right)}{16b^{\frac{9}{2}}}\right)F^{a}}{(-b)^{\frac{7}{2}}\,b\ln(F)^{\frac{9}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a/(-b)^(7/2)/ln(F)^(9/2)/b*(-1/72*x^(1/2)*(-b)^(9/2)*ln(F)^(1/2)*(-72*b^
3*x^3*ln(F)^3+252*b^2*x^2*ln(F)^2-630*b*ln(F)*x+945)/b^4*exp(b*ln(F)*x)+105
/16*(-b)^(9/2)/b^(9/2)*Pi^(1/2)*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2)))
```

maxima [A] time = 0.64, size = 24, normalized size = 0.18

$$-\frac{F^{a}x^{\frac{9}{2}}\Gamma\left(\frac{9}{2},-bx\log(F)\right)}{\left(-bx\log(F)\right)^{\frac{9}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a*x^(9/2)*gamma(9/2, -b*x*log(F))/(-b*x*log(F))^(9/2)
```

mupad [B] time = 3.43, size = 82, normalized size = 0.63

$$\frac{F^a\,x^{7/2}\,\left(\frac{105\,\sqrt{\pi}\,\mathrm{erfc}\left(\sqrt{-b\,x\,\ln(F)}\right)}{16}+F^{b\,x}\,\left(\frac{105\,\sqrt{-b\,x\,\ln(F)}}{8}+\frac{35\,{(-b\,x\,\ln(F))}^{3/2}}{4}+\frac{7\,{(-b\,x\,\ln(F))}^{5/2}}{2}+{(-b\,x\,\ln(F))}^{7/2}\right)\right)}{b\,\ln(F)\,{(-b\,x\,\ln(F))}^{7/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^a*x^(7/2)*((105*pi^(1/2)*erfc((-b*x*log(F))^(1/2)))/16 + F^(b*x)*((105*(
-b*x*log(F))^(1/2))/8 + (35*(-b*x*log(F))^(3/2))/4 + (7*(-b*x*log(F))^(5/2)
)/2 + (-b*x*log(F))^(7/2))))/(b*log(F)*(-b*x*log(F))^(7/2))
```

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(F**(b*x+a)*x**(7/2),x)
```

```
[Out] Timed out
```

3.31 $\int F^{a+bx}x^{5/2}\,dx$

Optimal. Leaf size=108

$$-\frac{15\sqrt{\pi}\,F^a\text{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{8b^{7/2}\log^{\frac{7}{2}}(F)}+\frac{15\sqrt{x}\,F^{a+bx}}{4b^3\log^3(F)}-\frac{5x^{3/2}F^{a+bx}}{2b^2\log^2(F)}+\frac{x^{5/2}F^{a+bx}}{b\log(F)}$$

```
[Out] -5/2*F^(b*x+a)*x^(3/2)/b^2/ln(F)^2+F^(b*x+a)*x^(5/2)/b/ln(F)-15/8*F^a*erfi(
b^(1/2)*x^(1/2)*ln(F)^(1/2))*Pi^(1/2)/b^(7/2)/ln(F)^(7/2)+15/4*F^(b*x+a)*x^
(1/2)/b^3/ln(F)^3
```

Rubi [A] time = 0.09, antiderivative size = 108, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2176, 2180, 2204}

$$-\frac{15\sqrt{\pi}\,F^a\text{Erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{8b^{7/2}\log^{\frac{7}{2}}(F)}-\frac{5x^{3/2}F^{a+bx}}{2b^2\log^2(F)}+\frac{15\sqrt{x}\,F^{a+bx}}{4b^3\log^3(F)}+\frac{x^{5/2}F^{a+bx}}{b\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (-15*F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]])/(8*b^(7/2)*Log[F]^(7/
2)) + (15*F^(a + b*x)*Sqrt[x])/(4*b^3*Log[F]^3) - (5*F^(a + b*x)*x^(3/2))/(
2*b^2*Log[F]^2) + (F^(a + b*x)*x^(5/2))/(b*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\int F^{a+bx}x^{5/2}\,dx = \frac{F^{a+bx}x^{5/2}}{b\log(F)} - \frac{5\int F^{a+bx}x^{3/2}\,dx}{2b\log(F)}$$
$$= -\frac{5F^{a+bx}x^{3/2}}{2b^2\log^2(F)} + \frac{F^{a+bx}x^{5/2}}{b\log(F)} + \frac{15\int F^{a+bx}\sqrt{x}\,dx}{4b^2\log^2(F)}$$
$$= \frac{15F^{a+bx}\sqrt{x}}{4b^3\log^3(F)} - \frac{5F^{a+bx}x^{3/2}}{2b^2\log^2(F)} + \frac{F^{a+bx}x^{5/2}}{b\log(F)} - \frac{15\int \frac{F^{a+bx}}{\sqrt{x}}\,dx}{8b^3\log^3(F)}$$
$$= \frac{15F^{a+bx}\sqrt{x}}{4b^3\log^3(F)} - \frac{5F^{a+bx}x^{3/2}}{2b^2\log^2(F)} + \frac{F^{a+bx}x^{5/2}}{b\log(F)} - \frac{15\,\text{Subst}\left(\int F^{a+bx^2}\,dx, x, \sqrt{x}\right)}{4b^3\log^3(F)}$$
$$= -\frac{15F^a\sqrt{\pi}\,\text{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{8b^{7/2}\log^{\frac{7}{2}}(F)} + \frac{15F^{a+bx}\sqrt{x}}{4b^3\log^3(F)} - \frac{5F^{a+bx}x^{3/2}}{2b^2\log^2(F)} + \frac{F^{a+bx}x^{5/2}}{b\log(F)}$$

Mathematica [A] time = 0.01, size = 36, normalized size = 0.33

$$\frac{\sqrt{x}\,F^a\Gamma\left(\frac{7}{2}, -bx\log(F)\right)}{b^3\log^3(F)\sqrt{-bx\log(F)}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*x)*x^(5/2),x]
[Out] (F^a*Sqrt[x]*Gamma[7/2, -(b*x*Log[F])])/(b^3*Log[F]^3*Sqrt[-(b*x*Log[F])])
```

fricas [A] time = 0.42, size = 77, normalized size = 0.71

$$\frac{15\sqrt{\pi}\sqrt{-b\log(F)}\,F^a\,\text{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right) + 2\left(4\,b^3x^2\log(F)^3 - 10\,b^2x\log(F)^2 + 15\,b\log(F)\right)F^{bx+a}\sqrt{x}}{8\,b^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(b*x+a)*x^(5/2),x, algorithm="fricas")
[Out] 1/8*(15*sqrt(pi)*sqrt(-b*log(F))*F^a*erf(sqrt(-b*log(F))*sqrt(x)) + 2*(4*b^
3*x^2*log(F)^3 - 10*b^2*x*log(F)^2 + 15*b*log(F))*F^(b*x + a)*sqrt(x))/(b^4
*log(F)^4)
```

giac [A] time = 0.48, size = 82, normalized size = 0.76

$$\frac{15\,\sqrt{\pi}\,F^{a}\,\mathrm{erf}\left(-\sqrt{-b\log(F)}\,\sqrt{x}\right)}{8\,\sqrt{-b\log(F)}\,b^{3}\log(F)^{3}}+\frac{\left(4\,b^{2}x^{\frac{5}{2}}\log(F)^{2}-10\,bx^{\frac{3}{2}}\log(F)+15\,\sqrt{x}\right)e^{\left(bx\log(F)+a\log(F)\right)}}{4\,b^{3}\log(F)^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.02, size = 87, normalized size = 0.81

$$-\frac{\left(\frac{(-b)^{\frac{7}{2}}\left(28b^{2}x^{2}\ln(F)^{2}-70bx\ln(F)+105\right)\sqrt{x}\;\mathrm{e}^{bx\ln(F)}\sqrt{\ln(F)}}{28b^{3}}-\frac{15(-b)^{\frac{7}{2}}\sqrt{\pi}\;\mathrm{erfi}\left(\sqrt{b}\;\sqrt{x}\;\sqrt{\ln(F)}\right)}{8b^{\frac{7}{2}}}\right)F^{a}}{(-b)^{\frac{5}{2}}\,b\ln(F)^{\frac{7}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a/(-b)^(5/2)/ln(F)^(7/2)/b*(1/28*x^(1/2)*(-b)^(7/2)*ln(F)^(1/2)*(28*b^2*
x^2*ln(F)^2-70*b*x*ln(F)+105)/b^3*exp(b*x*ln(F))-15/8*(-b)^(7/2)/b^(7/2)*Pi
^(1/2)*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2)))
```

maxima [A] time = 0.70, size = 24, normalized size = 0.22

$$-\frac{F^{a}x^{\frac{7}{2}}\Gamma\left(\frac{7}{2},-bx\log(F)\right)}{\left(-bx\log(F)\right)^{\frac{7}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a*x^(7/2)*gamma(7/2, -b*x*log(F))/(-b*x*log(F))^(7/2)
```

mupad [B] time = 3.46, size = 72, normalized size = 0.67

$$\frac{F^{a}\,x^{5/2}\,\left(F^{b\,x}\,\left(\frac{15\,\sqrt{-b\,x\,\ln(F)}}{4}+\frac{5\,{\left(-b\,x\,\ln(F)\right)}^{3/2}}{2}+{\left(-b\,x\,\ln(F)\right)}^{5/2}\right)+\frac{15\,\sqrt{\pi}\,\mathrm{erfc}\left(\sqrt{-b\,x\,\ln(F)}\right)}{8}\right)}{b\,\ln(F)\,{\left(-b\,x\,\ln(F)\right)}^{5/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^a*x^(5/2)*(F^(b*x)*((15*(-b*x*log(F))^(1/2))/4 + (5*(-b*x*log(F))^(3/2))
/2 + (-b*x*log(F))^(5/2)) + (15*pi^(1/2)*erfc((-b*x*log(F))^(1/2)))/8))/(b*
log(F)*(-b*x*log(F))^(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(F**(b*x+a)*x**(5/2),x)
```

```
[Out] Timed out
```

3.32 $\int F^{a+bx}x^{3/2}\,dx$

Optimal. Leaf size=85

$$\frac{3\sqrt{\pi}\,F^a\text{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{4b^{5/2}\log^{\frac{5}{2}}(F)}-\frac{3\sqrt{x}\,F^{a+bx}}{2b^2\log^2(F)}+\frac{x^{3/2}F^{a+bx}}{b\log(F)}$$

```
[Out] F^(b*x+a)*x^(3/2)/b/ln(F)+3/4*F^a*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2))*Pi^(1/2
)/b^(5/2)/ln(F)^(5/2)-3/2*F^(b*x+a)*x^(1/2)/b^2/ln(F)^2
```

Rubi [A] time = 0.07, antiderivative size = 85, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2176, 2180, 2204}

$$\frac{3\sqrt{\pi}\,F^a\text{Erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{4b^{5/2}\log^{\frac{5}{2}}(F)}-\frac{3\sqrt{x}\,F^{a+bx}}{2b^2\log^2(F)}+\frac{x^{3/2}F^{a+bx}}{b\log(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (3*F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]])/(4*b^(5/2)*Log[F]^(5/2)
) - (3*F^(a + b*x)*Sqrt[x])/(2*b^2*Log[F]^2) + (F^(a + b*x)*x^(3/2))/(b*Log
[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\int F^{a+bx}x^{3/2}\,dx=\frac{F^{a+bx}x^{3/2}}{b\log(F)}-\frac{3\int F^{a+bx}\sqrt{x}\,dx}{2b\log(F)}$$
$$=-\frac{3F^{a+bx}\sqrt{x}}{2b^2\log^2(F)}+\frac{F^{a+bx}x^{3/2}}{b\log(F)}+\frac{3\int\frac{F^{a+bx}}{\sqrt{x}}\,dx}{4b^2\log^2(F)}$$
$$=-\frac{3F^{a+bx}\sqrt{x}}{2b^2\log^2(F)}+\frac{F^{a+bx}x^{3/2}}{b\log(F)}+\frac{3\,\mathrm{Subst}\left(\int F^{a+bx^2}\,dx,x,\sqrt{x}\right)}{2b^2\log^2(F)}$$
$$=\frac{3F^a\sqrt{\pi}\,\mathrm{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{4b^{5/2}\log^{\frac{5}{2}}(F)}-\frac{3F^{a+bx}\sqrt{x}}{2b^2\log^2(F)}+\frac{F^{a+bx}x^{3/2}}{b\log(F)}$$

Mathematica [A] time = 0.01, size = 36, normalized size = 0.42

$$\frac{F^a\sqrt{-bx\log(F)}\,\Gamma\left(\frac{5}{2},-bx\log(F)\right)}{b^3\sqrt{x}\,\log^3(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*x)*x^(3/2),x]
[Out] (F^a*Gamma[5/2, -(b*x*Log[F])]*Sqrt[-(b*x*Log[F])])/(b^3*Sqrt[x]*Log[F]^3)
```

fricas [A] time = 0.44, size = 65, normalized size = 0.76

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(b*x+a)*x^(3/2),x, algorithm="fricas")
[Out] -1/4*(3*sqrt(pi)*sqrt(-b*log(F))*F^a*erf(sqrt(-b*log(F))*sqrt(x)) - 2*(2*b^
2*x*log(F)^2 - 3*b*log(F))*F^(b*x + a)*sqrt(x))/(b^3*log(F)^3)
```

giac [A] time = 0.42, size = 70, normalized size = 0.82

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -3/4*sqrt(pi)*F^a*erf(-sqrt(-b*log(F))*sqrt(x))/(sqrt(-b*log(F))*b^2*log(F)
^2) + 1/2*(2*b*x^(3/2)*log(F) - 3*sqrt(x))*e^(b*x*log(F) + a*log(F))/(b^2*l
og(F)^2)
```

maple [A] time = 0.02, size = 75, normalized size = 0.88

$$-\frac{\left(-\frac{(-b)^{\frac{5}{2}}(-10bx\ln(F)+15)\sqrt{x}\,\mathrm{e}^{bx\ln(F)}\sqrt{\ln(F)}}{10b^{2}}+\frac{3(-b)^{\frac{5}{2}}\sqrt{\pi}\,\operatorname{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\ln(F)}\right)}{4b^{\frac{5}{2}}}\right)F^{a}}{(-b)^{\frac{3}{2}}\,b\ln(F)^{\frac{5}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a/(-b)^(3/2)/ln(F)^(5/2)/b*(-1/10*x^(1/2)*(-b)^(5/2)*ln(F)^(1/2)*(-10*b*
x*ln(F)+15)/b^2*exp(b*x*ln(F))+3/4*(-b)^(5/2)/b^(5/2)*Pi^(1/2)*erfi(b^(1/2)
*x^(1/2)*ln(F)^(1/2)))
```

maxima [A] time = 0.65, size = 24, normalized size = 0.28

$$-\frac{F^{a}x^{\frac{5}{2}}\Gamma\left(\frac{5}{2},-bx\log(F)\right)}{\left(-bx\log(F)\right)^{\frac{5}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a*x^(5/2)*gamma(5/2, -b*x*log(F))/(-b*x*log(F))^(5/2)
```

mupad [B] time = 3.42, size = 75, normalized size = 0.88

$$\frac{F^{a}\,F^{b\,x}\,x^{3/2}}{b\,\ln(F)}-\frac{3\,F^{a}\,F^{b\,x}\,\sqrt{x}}{2\,b^{2}\ln(F)^{2}}+\frac{3\,F^{a}\,x^{3/2}\,\sqrt{\pi}\,\operatorname{erfc}\left(\sqrt{-b\,x\,\ln(F)}\right)}{4\,b\,\ln(F)\,(-b\,x\,\ln(F))^{3/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^a*F^(b*x)*x^(3/2))/(b*log(F)) - (3*F^a*F^(b*x)*x^(1/2))/(2*b^2*log(F)^2)
 + (3*F^a*x^(3/2)*pi^(1/2)*erfc((-b*x*log(F))^(1/2)))/(4*b*log(F)*(-b*x*log
(F))^(3/2))
```

sympy [A] time = 130.97, size = 37, normalized size = 0.44

$$-\frac{4F^aF^{bx}bx^{\frac{7}{2}}\log(F)}{35}+\frac{2F^aF^{bx}x^{\frac{5}{2}}}{5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -4*F**a*F**(b*x)*b*x**(7/2)*log(F)/35 + 2*F**a*F**(b*x)*x**(5/2)/5
```

3.33 $\int F^{a+bx}\sqrt{x}\,dx$

Optimal. Leaf size=62

$$\frac{\sqrt{x}\,F^{a+bx}}{b\log(F)}-\frac{\sqrt{\pi}\,F^{a}\mathrm{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{2b^{3/2}\log^{\frac{3}{2}}(F)}$$

```
[Out] -1/2*F^a*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2))*Pi^(1/2)/b^(3/2)/ln(F)^(3/2)+F^(
b*x+a)*x^(1/2)/b/ln(F)
```

Rubi [A] time = 0.04, antiderivative size = 62, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2176, 2180, 2204}

$$\frac{\sqrt{x}\,F^{a+bx}}{b\log(F)}-\frac{\sqrt{\pi}\,F^{a}\mathrm{Erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{2b^{3/2}\log^{\frac{3}{2}}(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(a + b*x)*Sqrt[x],x]
```

```
[Out] -(F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]])/(2*b^(3/2)*Log[F]^(3/2))
 + (F^(a + b*x)*Sqrt[x])/(b*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\int F^{a+bx}\sqrt{x}\,dx = \frac{F^{a+bx}\sqrt{x}}{b\log(F)} - \frac{\int \frac{F^{a+bx}}{\sqrt{x}}\,dx}{2b\log(F)}$$
$$= \frac{F^{a+bx}\sqrt{x}}{b\log(F)} - \frac{\text{Subst}\left(\int F^{a+bx^2}\,dx, x, \sqrt{x}\right)}{b\log(F)}$$
$$= -\frac{F^a\sqrt{\pi}\,\text{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{2b^{3/2}\log^{\frac{3}{2}}(F)} + \frac{F^{a+bx}\sqrt{x}}{b\log(F)}$$

Mathematica [**A**] time = 0.01, size = 30, normalized size = 0.48

$$-\frac{x^{3/2}F^a\Gamma\left(\frac{3}{2}, -bx\log(F)\right)}{(-bx\log(F))^{3/2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*x)*Sqrt[x],x]
```

```
[Out] -((F^a*x^(3/2)*Gamma[3/2, -(b*x*Log[F])])/(-(b*x*Log[F]))^(3/2))
```

fricas [**A**] time = 0.43, size = 51, normalized size = 0.82

$$\frac{2\,F^{bx+a}b\sqrt{x}\,\log(F) + \sqrt{\pi}\,\sqrt{-b\log(F)}\,F^a\,\text{erf}\left(\sqrt{-b\log(F)}\,\sqrt{x}\right)}{2\,b^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [**A**] time = 0.33, size = 58, normalized size = 0.94

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.02, size = 66, normalized size = 1.06

$$-\frac{\left(\frac{(-b)^{\frac{3}{2}}\sqrt{x}\,\mathrm{e}^{bx\ln(F)}\sqrt{\ln(F)}}{b}-\frac{(-b)^{\frac{3}{2}}\sqrt{\pi}\,\operatorname{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\ln(F)}\right)}{2b^{\frac{3}{2}}}\right)F^{a}}{\sqrt{-b}\,b\ln(F)^{\frac{3}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a/(-b)^(1/2)/ln(F)^(3/2)/b*(x^(1/2)*(-b)^(3/2)*ln(F)^(1/2)/b*exp(b*x*ln(
F))-1/2*(-b)^(3/2)/b^(3/2)*Pi^(1/2)*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2)))
```

maxima [A] time = 0.64, size = 24, normalized size = 0.39

$$-\frac{F^{a}x^{\frac{3}{2}}\Gamma\left(\frac{3}{2},-bx\log(F)\right)}{\left(-bx\log(F)\right)^{\frac{3}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a*x^(3/2)*gamma(3/2, -b*x*log(F))/(-b*x*log(F))^(3/2)
```

mupad [B] time = 3.41, size = 55, normalized size = 0.89

$$\frac{F^{a}\,F^{b\,x}\,\sqrt{x}}{b\,\ln(F)}+\frac{F^{a}\,\sqrt{x}\,\sqrt{\pi}\,\operatorname{erfc}\left(\sqrt{-b\,x\,\ln(F)}\right)}{2\,b\,\ln(F)\,\sqrt{-b\,x\,\ln(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int F^{a+bx}\sqrt{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(b*x+a)*x**(1/2),x)
[Out] Integral(F**(a + b*x)*sqrt(x), x)
```

3.34 $\int \frac{F^{a+bx}}{\sqrt{x}} \, dx$

Optimal. Leaf size=38

$$\frac{\sqrt{\pi}\, F^a \text{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{\sqrt{b}\,\sqrt{\log(F)}}$$

```
[Out] F^a*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2))*Pi^(1/2)/b^(1/2)/ln(F)^(1/2)
```

Rubi [A] time = 0.03, antiderivative size = 38, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2180, 2204}

$$\frac{\sqrt{\pi}\, F^a \text{Erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{\sqrt{b}\,\sqrt{\log(F)}}$$

Antiderivative was successfully verified.

```
[In] Int[F^(a + b*x)/Sqrt[x],x]
```

```
[Out] (F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]])/(Sqrt[b]*Sqrt[Log[F]])
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] && !$UseGamma === True
```

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]
```

Rubi steps

$$\begin{aligned}\int \frac{F^{a+bx}}{\sqrt{x}} \, dx &= 2\,\text{Subst}\left(\int F^{a+bx^2} \, dx, x, \sqrt{x}\right)\\ &= \frac{F^a\sqrt{\pi}\,\text{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)}{\sqrt{b}\,\sqrt{\log(F)}}\end{aligned}$$

Mathematica [A] time = 0.01, size = 30, normalized size = 0.79

$$-\frac{\sqrt{x}F^a\Gamma\left(\frac{1}{2},-bx\log(F)\right)}{\sqrt{-bx\log(F)}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*x)/Sqrt[x],x]
[Out] -((F^a*Sqrt[x]*Gamma[1/2, -(b*x*Log[F])])/Sqrt[-(b*x*Log[F])])
```

fricas [A] time = 0.42, size = 34, normalized size = 0.89

$$-\frac{\sqrt{\pi}\sqrt{-b\log(F)}F^a\operatorname{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)}{b\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

giac [A] time = 0.28, size = 28, normalized size = 0.74

$$-\frac{\sqrt{\pi}F^a\operatorname{erf}\left(-\sqrt{-b\log(F)}\sqrt{x}\right)}{\sqrt{-b\log(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

maple [A] time = 0.02, size = 27, normalized size = 0.71

$$\frac{\sqrt{\pi}\,F^a\operatorname{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\ln(F)}\right)}{\sqrt{b}\,\sqrt{\ln(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(b*x+a)/x^(1/2),x)
[Out] F^a*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2))*Pi^(1/2)/b^(1/2)/ln(F)^(1/2)
```

maxima [A] time = 0.64, size = 29, normalized size = 0.76

$$\frac{\sqrt{\pi}\,F^{a}\sqrt{x}\left(\operatorname{erf}\left(\sqrt{-bx\log\left(F\right)}\right)-1\right)}{\sqrt{-bx\log\left(F\right)}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] sqrt(pi)*F^a*sqrt(x)*(erf(sqrt(-b*x*log(F))) - 1)/sqrt(-b*x*log(F))
```

mupad [B] time = 3.50, size = 32, normalized size = 0.84

$$\frac{F^{a}\operatorname{erfc}\left(\sqrt{-b\,x\,\ln\left(F\right)}\right)\,\sqrt{-\pi\,b\,x\,\ln\left(F\right)}}{b\,\sqrt{x}\,\ln\left(F\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^a*erfc((-b*x*log(F))^(1/2))*(-b*x*pi*log(F))^(1/2))/(b*x^(1/2)*log(F))
```

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

$$\int \frac{F^{a+bx}}{\sqrt{x}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(F**(a + b*x)/sqrt(x), x)
```

3.35 $\int \frac{F^{a+bx}}{x^{3/2}}\,dx$

Optimal. Leaf size=54

$$2\sqrt{\pi}\,\sqrt{b}\,F^a\sqrt{\log(F)}\,\mathrm{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)-\frac{2F^{a+bx}}{\sqrt{x}}$$

```
[Out] -2*F^(b*x+a)/x^(1/2)+2*F^a*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2))*b^(1/2)*Pi^(1/
2)*ln(F)^(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 = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2177, 2180, 2204}

$$2\sqrt{\pi}\,\sqrt{b}\,F^a\sqrt{\log(F)}\,\mathrm{Erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)-\frac{2F^{a+bx}}{\sqrt{x}}$$

Antiderivative was successfully verified.

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

```
[Out] (-2*F^(a + b*x))/Sqrt[x] + 2*Sqrt[b]*F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt
[Log[F]]]*Sqrt[Log[F]]
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\begin{aligned}\int \frac{F^{a+bx}}{x^{3/2}}\,dx &= -\frac{2F^{a+bx}}{\sqrt{x}} + (2b\log(F))\int \frac{F^{a+bx}}{\sqrt{x}}\,dx\\ &= -\frac{2F^{a+bx}}{\sqrt{x}} + (4b\log(F))\,\text{Subst}\left(\int F^{a+bx^2}\,dx, x, \sqrt{x}\right)\\ &= -\frac{2F^{a+bx}}{\sqrt{x}} + 2\sqrt{b}\,F^a\sqrt{\pi}\,\text{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)\sqrt{\log(F)}\end{aligned}$$

Mathematica [A] time = 0.02, size = 38, normalized size = 0.70

$$-\frac{2F^a\left(F^{bx}-\sqrt{-bx\log(F)}\,\Gamma\left(\frac{1}{2},-bx\log(F)\right)\right)}{\sqrt{x}}$$

Antiderivative was successfully verified.

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

```
[Out] (-2*F^a*(F^(b*x) - Gamma[1/2, -(b*x*Log[F])]*Sqrt[-(b*x*Log[F])]))/Sqrt[x]
```

fricas [A] time = 0.45, size = 44, normalized size = 0.81

$$-\frac{2\left(\sqrt{\pi}\,\sqrt{-b\log(F)}\,F^a x\,\text{erf}\left(\sqrt{-b\log(F)}\,\sqrt{x}\right)+F^{bx+a}\sqrt{x}\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -2*(sqrt(pi)*sqrt(-b*log(F))*F^a*x*erf(sqrt(-b*log(F))*sqrt(x)) + F^(b*x +
a)*sqrt(x))/x
```

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

$$\int \frac{F^{bx+a}}{x^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [**A**] time = 0.02, size = 64, normalized size = 1.19

$$-\frac{(-b)^{\frac{3}{2}}\left(\frac{2\sqrt{\pi}\,\sqrt{b}\,\operatorname{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\ln(F)}\right)}{\sqrt{-b}}-\frac{2\,e^{bx\ln(F)}}{\sqrt{-b}\,\sqrt{x}\,\sqrt{\ln(F)}}\right)F^{a}\sqrt{\ln(F)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a*(-b)^(3/2)*ln(F)^(1/2)/b*(-2/x^(1/2)/(-b)^(1/2)/ln(F)^(1/2)*exp(b*x*ln
(F))+2/(-b)^(1/2)*b^(1/2)*Pi^(1/2)*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2)))
```

maxima [**A**] time = 0.63, size = 24, normalized size = 0.44

$$-\frac{\sqrt{-bx\log(F)}\,F^{a}\Gamma\left(-\frac{1}{2},-bx\log(F)\right)}{\sqrt{x}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -sqrt(-b*x*log(F))*F^a*gamma(-1/2, -b*x*log(F))/sqrt(x)
```

mupad [**B**] time = 3.49, size = 42, normalized size = 0.78

$$\frac{2\,F^{a}\,\sqrt{\pi}\,\operatorname{erfc}\left(\sqrt{-b\,x\,\ln(F)}\right)\,\sqrt{-b\,x\,\ln(F)}}{\sqrt{x}}-\frac{2\,F^{a}\,F^{b\,x}}{\sqrt{x}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (2*F^a*pi^(1/2)*erfc((-b*x*log(F))^(1/2))*(-b*x*log(F))^(1/2))/x^(1/2) - (2
*F^a*F^(b*x))/x^(1/2)
```

sympy [**A**] time = 4.51, size = 34, normalized size = 0.63

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 4*F**a*F**(b*x)*b*sqrt(x)*log(F) - 2*F**a*F**(b*x)/sqrt(x)
```

3.36 $\int \frac{F^{a+bx}}{x^{5/2}} dx$

Optimal. Leaf size=77

$$\frac{4}{3}\sqrt{\pi}\, b^{3/2} F^a \log^{\frac{3}{2}}(F)\text{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right) - \frac{2F^{a+bx}}{3x^{3/2}} - \frac{4b\log(F)F^{a+bx}}{3\sqrt{x}}$$

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

Rubi [A] time = 0.06, antiderivative size = 77, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2177, 2180, 2204}

$$\frac{4}{3}\sqrt{\pi}\, b^{3/2} F^a \log^{\frac{3}{2}}(F)\text{Erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right) - \frac{2F^{a+bx}}{3x^{3/2}} - \frac{4b\log(F)F^{a+bx}}{3\sqrt{x}}$$

Antiderivative was successfully verified.

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

```
[Out] (-2*F^(a + b*x))/(3*x^(3/2)) - (4*b*F^(a + b*x)*Log[F])/(3*Sqrt[x]) + (4*b^
(3/2)*F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]]*Log[F]^(3/2))/3
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$
\begin{aligned}
\int \frac{F^{a+bx}}{x^{5/2}}\,dx &= -\frac{2F^{a+bx}}{3x^{3/2}}+\frac{1}{3}(2b\log(F))\int \frac{F^{a+bx}}{x^{3/2}}\,dx\\
&= -\frac{2F^{a+bx}}{3x^{3/2}}-\frac{4bF^{a+bx}\log(F)}{3\sqrt{x}}+\frac{1}{3}\left(4b^2\log^2(F)\right)\int \frac{F^{a+bx}}{\sqrt{x}}\,dx\\
&= -\frac{2F^{a+bx}}{3x^{3/2}}-\frac{4bF^{a+bx}\log(F)}{3\sqrt{x}}+\frac{1}{3}\left(8b^2\log^2(F)\right)\text{Subst}\left(\int F^{a+bx^2}\,dx,x,\sqrt{x}\right)\\
&= -\frac{2F^{a+bx}}{3x^{3/2}}-\frac{4bF^{a+bx}\log(F)}{3\sqrt{x}}+\frac{4}{3}b^{3/2}F^a\sqrt{\pi}\,\text{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)\log^{\frac{3}{2}}(F)
\end{aligned}
$$

Mathematica [A] time = 0.04, size = 49, normalized size = 0.64

$$
-\frac{2F^a\left(F^{bx}(2bx\log(F)+1)+2(-bx\log(F))^{3/2}\Gamma\left(\frac{1}{2},-bx\log(F)\right)\right)}{3x^{3/2}}
$$

Antiderivative was successfully verified.

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

```
[Out] (-2*F^a*(2*Gamma[1/2, -(b*x*Log[F])]*(-(b*x*Log[F]))^(3/2) + F^(b*x)*(1 + 2
*b*x*Log[F])))/(3*x^(3/2))
```

fricas [A] time = 0.44, size = 58, normalized size = 0.75

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$
\int \frac{F^{bx+a}}{x^{\frac{5}{2}}}\,dx
$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(F^(b*x + a)/x^(5/2), x)
```

maple [A] time = 0.02, size = 72, normalized size = 0.94

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a*(-b)^(5/2)*ln(F)^(3/2)/b*(-2/3/x^(3/2)/(-b)^(3/2)/ln(F)^(3/2)*(2*b*x*l
n(F)+1)*exp(b*x*ln(F))+4/3/(-b)^(3/2)*b^(3/2)*Pi^(1/2)*erfi(b^(1/2)*x^(1/2)
*ln(F)^(1/2)))
```

maxima [A] time = 0.64, size = 24, normalized size = 0.31

$$-\frac{\left(-bx\log(F)\right)^{\frac{3}{2}}F^{a}\Gamma\left(-\frac{3}{2},-bx\log(F)\right)}{x^{\frac{3}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(-b*x*log(F))^(3/2)*F^a*gamma(-3/2, -b*x*log(F))/x^(3/2)
```

mupad [B] time = 3.51, size = 61, normalized size = 0.79

$$\frac{4\,F^a\,b\,\sqrt{\pi}\,\mathrm{erfc}\left(\sqrt{-b\,x\,\ln(F)}\right)\,\ln(F)\,\sqrt{-b\,x\,\ln(F)}}{3\,\sqrt{x}}-\frac{4\,F^a\,F^{b\,x}\,b\,\ln(F)}{3\,\sqrt{x}}-\frac{2\,F^a\,F^{b\,x}}{3\,x^{3/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (4*F^a*b*pi^(1/2)*erfc((-b*x*log(F))^(1/2))*log(F)*(-b*x*log(F))^(1/2))/(3*
x^(1/2)) - (4*F^a*F^(b*x)*b*log(F))/(3*x^(1/2)) - (2*F^a*F^(b*x))/(3*x^(3/2
))
```

sympy [A] time = 53.17, size = 39, normalized size = 0.51

$$-\frac{4F^{a}F^{bx}b\log{(F)}}{3\sqrt{x}}-\frac{2F^{a}F^{bx}}{3x^{\frac{3}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(b*x+a)/x**(5/2),x)
[Out] -4*F**a*F**(b*x)*b*log(F)/(3*sqrt(x)) - 2*F**a*F**(b*x)/(3*x**(3/2))
```

3.37 $\int \frac{F^{a+bx}}{x^{7/2}}\,dx$

Optimal. Leaf size=100

$$\frac{8}{15}\sqrt{\pi}\,b^{5/2}F^a\log^{\frac{5}{2}}(F)\text{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)-\frac{8b^2\log^2(F)F^{a+bx}}{15\sqrt{x}}-\frac{2F^{a+bx}}{5x^{5/2}}-\frac{4b\log(F)F^{a+bx}}{15x^{3/2}}$$

```
[Out] -2/5*F^(b*x+a)/x^(5/2)-4/15*b*F^(b*x+a)*ln(F)/x^(3/2)+8/15*b^(5/2)*F^a*erfi
(b^(1/2)*x^(1/2)*ln(F)^(1/2))*ln(F)^(5/2)*Pi^(1/2)-8/15*b^2*F^(b*x+a)*ln(F)
^2/x^(1/2)
```

Rubi [A] time = 0.09, antiderivative size = 100, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2177, 2180, 2204}

$$\frac{8}{15}\sqrt{\pi}\,b^{5/2}F^a\log^{\frac{5}{2}}(F)\text{Erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\log(F)}\right)-\frac{8b^2\log^2(F)F^{a+bx}}{15\sqrt{x}}-\frac{2F^{a+bx}}{5x^{5/2}}-\frac{4b\log(F)F^{a+bx}}{15x^{3/2}}$$

Antiderivative was successfully verified.

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

```
[Out] (-2*F^(a + b*x))/(5*x^(5/2)) - (4*b*F^(a + b*x)*Log[F])/(15*x^(3/2)) - (8*b
^2*F^(a + b*x)*Log[F]^2)/(15*Sqrt[x]) + (8*b^(5/2)*F^a*Sqrt[Pi]*Erfi[Sqrt[b
]*Sqrt[x]*Sqrt[Log[F]]]*Log[F]^(5/2))/15
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$
\begin{aligned}
\int \frac{F^{a+bx}}{x^{7/2}}\,dx &= -\frac{2F^{a+bx}}{5x^{5/2}} + \frac{1}{5}(2b\log(F))\int \frac{F^{a+bx}}{x^{5/2}}\,dx\\
&= -\frac{2F^{a+bx}}{5x^{5/2}} - \frac{4bF^{a+bx}\log(F)}{15x^{3/2}} + \frac{1}{15}\left(4b^2\log^2(F)\right)\int \frac{F^{a+bx}}{x^{3/2}}\,dx\\
&= -\frac{2F^{a+bx}}{5x^{5/2}} - \frac{4bF^{a+bx}\log(F)}{15x^{3/2}} - \frac{8b^2F^{a+bx}\log^2(F)}{15\sqrt{x}} + \frac{1}{15}\left(8b^3\log^3(F)\right)\int \frac{F^{a+bx}}{\sqrt{x}}\,dx\\
&= -\frac{2F^{a+bx}}{5x^{5/2}} - \frac{4bF^{a+bx}\log(F)}{15x^{3/2}} - \frac{8b^2F^{a+bx}\log^2(F)}{15\sqrt{x}} + \frac{1}{15}\left(16b^3\log^3(F)\right)\text{Subst}\left(\int F^{a+bx^2}\,dx, x, \sqrt{x}\right)\\
&= -\frac{2F^{a+bx}}{5x^{5/2}} - \frac{4bF^{a+bx}\log(F)}{15x^{3/2}} - \frac{8b^2F^{a+bx}\log^2(F)}{15\sqrt{x}} + \frac{8}{15}b^{5/2}F^a\sqrt{\pi}\,\text{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)\log^{\frac{5}{2}}(F)
\end{aligned}
$$

Mathematica [A] time = 0.05, size = 61, normalized size = 0.61

$$
-\frac{2F^a\left(F^{bx}\left(4b^2x^2\log^2(F)+2bx\log(F)+3\right)-4(-bx\log(F))^{5/2}\Gamma\left(\frac{1}{2},-bx\log(F)\right)\right)}{15x^{5/2}}
$$

Antiderivative was successfully verified.

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

```
[Out] (-2*F^a*(-4*Gamma[1/2, -(b*x*Log[F])]*(-(b*x*Log[F]))^(5/2) + F^(b*x)*(3 +
2*b*x*Log[F] + 4*b^2*x^2*Log[F]^2)))/(15*x^(5/2))
```

fricas [A] time = 0.44, size = 74, normalized size = 0.74

$$
-\frac{2\left(4\sqrt{\pi}\sqrt{-b\log(F)}\,F^ab^2x^3\,\text{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)\log(F)^2+\left(4\,b^2x^2\log(F)^2+2\,bx\log(F)+3\right)F^{bx+a}\sqrt{x}\right)}{15\,x^3}
$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -2/15*(4*sqrt(pi)*sqrt(-b*log(F))*F^a*b^2*x^3*erf(sqrt(-b*log(F))*sqrt(x))*
log(F)^2 + (4*b^2*x^2*log(F)^2 + 2*b*x*log(F) + 3)*F^(b*x + a)*sqrt(x))/x^3
```

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

$$
\int \frac{F^{bx+a}}{x^{\frac{7}{2}}}\,dx
$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(F^(b*x + a)/x^(7/2), x)
```

maple [A] time = 0.02, size = 84, normalized size = 0.84

$$-\frac{(-b)^{\frac{7}{2}}\left(\frac{8\sqrt{\pi}\, b^{\frac{5}{2}}\operatorname{erfi}\left(\sqrt{b}\ \sqrt{x}\ \sqrt{\ln(F)}\right)}{15(-b)^{\frac{5}{2}}}-\frac{2\left(\frac{4b^2x^2\ln(F)^2}{3}+\frac{2bx\ln(F)}{3}+1\right)e^{bx\ln(F)}}{5(-b)^{\frac{5}{2}}x^{\frac{5}{2}}\ln(F)^{\frac{5}{2}}}\right)F^a\ln(F)^{\frac{5}{2}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^a*(-b)^(7/2)*ln(F)^(5/2)/b*(-2/5/x^(5/2)/(-b)^(5/2)/ln(F)^(5/2)*(4/3*b^2
*x^2*ln(F)^2+2/3*b*x*ln(F)+1)*exp(b*x*ln(F))+8/15/(-b)^(5/2)*b^(5/2)*Pi^(1/
2)*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2)))
```

maxima [A] time = 0.64, size = 24, normalized size = 0.24

$$-\frac{\left(-bx\log(F)\right)^{\frac{5}{2}}F^a\Gamma\left(-\frac{5}{2},-bx\log(F)\right)}{x^{\frac{5}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(-b*x*log(F))^(5/2)*F^a*gamma(-5/2, -b*x*log(F))/x^(5/2)
```

mupad [B] time = 3.45, size = 80, normalized size = 0.80

$$-\frac{\frac{2F^{a+bx}}{5}+\frac{4F^{a+bx}\,b\,x\,\ln(F)}{15}+\frac{8F^{a+bx}\,b^2x^2\ln(F)^2}{15}-\frac{8F^a\,b^2x^2\operatorname{erfc}\left(\sqrt{-b\,x\,\ln(F)}\right)\ln(F)^2\sqrt{-\pi\,b\,x\,\ln(F)}}{15}}{x^{5/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -((2*F^(a + b*x))/5 + (4*F^(a + b*x)*b*x*log(F))/15 + (8*F^(a + b*x)*b^2*x^
2*log(F)^2)/15 - (8*F^a*b^2*x^2*erfc((-b*x*log(F))^(1/2))*log(F)^2*(-b*x*pi
*log(F))^(1/2))/15)/x^(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(F**(b*x+a)/x**(7/2),x)
```

```
[Out] Timed out
```

3.38 $\int \frac{F^{a+bx}}{x^{9/2}} dx$

Optimal. Leaf size=123

$$\frac{16}{105}\sqrt{\pi} b^{7/2} F^a \log^{\frac{7}{2}}(F)\text{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right) - \frac{16b^3\log^3(F)F^{a+bx}}{105\sqrt{x}} - \frac{8b^2\log^2(F)F^{a+bx}}{105x^{3/2}} - \frac{2F^{a+bx}}{7x^{7/2}} - \frac{4b\log(F)F^{a+bx}}{35x^{5/2}}$$

```
[Out] -2/7*F^(b*x+a)/x^(7/2)-4/35*b*F^(b*x+a)*ln(F)/x^(5/2)-8/105*b^2*F^(b*x+a)*l
n(F)^2/x^(3/2)+16/105*b^(7/2)*F^a*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2))*ln(F)^(
7/2)*Pi^(1/2)-16/105*b^3*F^(b*x+a)*ln(F)^3/x^(1/2)
```

Rubi [A] time = 0.11, antiderivative size = 123, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2177, 2180, 2204}

$$\frac{16}{105}\sqrt{\pi} b^{7/2} F^a \log^{\frac{7}{2}}(F)\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right) - \frac{8b^2\log^2(F)F^{a+bx}}{105x^{3/2}} - \frac{16b^3\log^3(F)F^{a+bx}}{105\sqrt{x}} - \frac{2F^{a+bx}}{7x^{7/2}} - \frac{4b\log(F)F^{a+bx}}{35x^{5/2}}$$

Antiderivative was successfully verified.

```
[In] Int[F^(a + b*x)/x^(9/2),x]
```

```
[Out] (-2*F^(a + b*x))/(7*x^(7/2)) - (4*b*F^(a + b*x)*Log[F])/(35*x^(5/2)) - (8*b
^2*F^(a + b*x)*Log[F]^2)/(105*x^(3/2)) - (16*b^3*F^(a + b*x)*Log[F]^3)/(105
*Sqrt[x]) + (16*b^(7/2)*F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]]*Log
[F]^(7/2))/105
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\begin{aligned}\int \frac{F^{a+bx}}{x^{9/2}}\,dx &= -\frac{2F^{a+bx}}{7x^{7/2}}+\frac{1}{7}(2b\log(F))\int \frac{F^{a+bx}}{x^{7/2}}\,dx\\ &= -\frac{2F^{a+bx}}{7x^{7/2}}-\frac{4bF^{a+bx}\log(F)}{35x^{5/2}}+\frac{1}{35}\left(4b^2\log^2(F)\right)\int \frac{F^{a+bx}}{x^{5/2}}\,dx\\ &= -\frac{2F^{a+bx}}{7x^{7/2}}-\frac{4bF^{a+bx}\log(F)}{35x^{5/2}}-\frac{8b^2F^{a+bx}\log^2(F)}{105x^{3/2}}+\frac{1}{105}\left(8b^3\log^3(F)\right)\int \frac{F^{a+bx}}{x^{3/2}}\,dx\\ &= -\frac{2F^{a+bx}}{7x^{7/2}}-\frac{4bF^{a+bx}\log(F)}{35x^{5/2}}-\frac{8b^2F^{a+bx}\log^2(F)}{105x^{3/2}}-\frac{16b^3F^{a+bx}\log^3(F)}{105\sqrt{x}}+\frac{1}{105}\left(16b^4\log^4(F)\right)\int \frac{F^{a+l}}{\sqrt{x}}\\ &= -\frac{2F^{a+bx}}{7x^{7/2}}-\frac{4bF^{a+bx}\log(F)}{35x^{5/2}}-\frac{8b^2F^{a+bx}\log^2(F)}{105x^{3/2}}-\frac{16b^3F^{a+bx}\log^3(F)}{105\sqrt{x}}+\frac{1}{105}\left(32b^4\log^4(F)\right)\text{Subst}\Big(\\ &= -\frac{2F^{a+bx}}{7x^{7/2}}-\frac{4bF^{a+bx}\log(F)}{35x^{5/2}}-\frac{8b^2F^{a+bx}\log^2(F)}{105x^{3/2}}-\frac{16b^3F^{a+bx}\log^3(F)}{105\sqrt{x}}+\frac{16}{105}b^{7/2}F^a\sqrt{\pi}\,\text{erfi}\Big(\sqrt{b}\,\sqrt{x}\end{aligned}$$

Mathematica [A] time = 0.06, size = 73, normalized size = 0.59

$$-\frac{2F^a\left(F^{bx}\left(8b^3x^3\log^3(F)+4b^2x^2\log^2(F)+6bx\log(F)+15\right)+8(-bx\log(F))^{7/2}\Gamma\left(\frac{1}{2},-bx\log(F)\right)\right)}{105x^{7/2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*x)/x^(9/2),x]
```

```
[Out] (-2*F^a*(8*Gamma[1/2, -(b*x*Log[F])]*(-(b*x*Log[F]))^(7/2) + F^(b*x)*(15 +
6*b*x*Log[F] + 4*b^2*x^2*Log[F]^2 + 8*b^3*x^3*Log[F]^3)))/(105*x^(7/2))
```

fricas [A] time = 0.43, size = 86, normalized size = 0.70

$$-\frac{2\left(8\sqrt{\pi}\sqrt{-b\log(F)}\,F^ab^3x^4\,\text{erf}\left(\sqrt{-b\log(F)}\,\sqrt{x}\right)\log(F)^3+\left(8\,b^3x^3\log(F)^3+4\,b^2x^2\log(F)^2+6\,bx\log(F)+15\right.}{105\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(b*x+a)/x^(9/2),x, algorithm="fricas")
```

```
[Out] -2/105*(8*sqrt(pi)*sqrt(-b*log(F))*F^a*b^3*x^4*erf(sqrt(-b*log(F))*sqrt(x))
*log(F)^3 + (8*b^3*x^3*log(F)^3 + 4*b^2*x^2*log(F)^2 + 6*b*x*log(F) + 15)*F
^(b*x + a)*sqrt(x))/x^4
```

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

$$\int \frac{F^{bx+a}}{x^{\frac{9}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(b*x+a)/x^(9/2),x, algorithm="giac")
```

```
[Out] integrate(F^(b*x + a)/x^(9/2), x)
```

maple [A] time = 0.02, size = 96, normalized size = 0.78

$$-\frac{(-b)^{\frac{9}{2}}\left(\frac{16\sqrt{\pi}\,b^{\frac{7}{2}}\operatorname{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\ln(F)}\right)}{105(-b)^{\frac{7}{2}}}-\frac{2\left(\frac{8b^3x^3\ln(F)^3}{15}+\frac{4b^2x^2\ln(F)^2}{15}+\frac{2bx\ln(F)}{5}+1\right)\mathrm{e}^{bx\ln(F)}}{7(-b)^{\frac{7}{2}}x^{\frac{7}{2}}\ln(F)^{\frac{7}{2}}}\right)F^a\ln(F)^{\frac{7}{2}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(b*x+a)/x^(9/2),x)
```

```
[Out] -F^a*(-b)^(9/2)*ln(F)^(7/2)/b*(-2/7/x^(7/2)/(-b)^(7/2)/ln(F)^(7/2)*(8/15*b^
3*x^3*ln(F)^3+4/15*b^2*x^2*ln(F)^2+2/5*b*x*ln(F)+1)*exp(b*x*ln(F))+16/105/(
-b)^(7/2)*b^(7/2)*Pi^(1/2)*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2)))
```

maxima [A] time = 0.64, size = 24, normalized size = 0.20

$$-\frac{\left(-bx\log(F)\right)^{\frac{7}{2}}F^a\Gamma\left(-\frac{7}{2},-bx\log(F)\right)}{x^{\frac{7}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(b*x+a)/x^(9/2),x, algorithm="maxima")
```

```
[Out] -(-b*x*log(F))^(7/2)*F^a*gamma(-7/2, -b*x*log(F))/x^(7/2)
```

mupad [B] time = 3.53, size = 99, normalized size = 0.80

$$-\frac{\frac{2\,F^{a+b\,x}}{7}+\frac{4\,F^{a+b\,x}\,b\,x\,\ln(F)}{35}+\frac{8\,F^{a+b\,x}\,b^2\,x^2\,\ln(F)^2}{105}+\frac{16\,F^{a+b\,x}\,b^3\,x^3\,\ln(F)^3}{105}-\frac{16\,F^a\,b^3\,x^3\,\operatorname{erfc}\left(\sqrt{-b\,x\,\ln(F)}\right)\ln(F)^3\,\sqrt{-\pi\,b\,x\,\ln(F)}}{105}}{x^{7/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a + b*x)/x^(9/2),x)
```

```
[Out] -((2*F^(a + b*x))/7 + (4*F^(a + b*x)*b*x*log(F))/35 + (8*F^(a + b*x)*b^2*x^
2*log(F)^2)/105 + (16*F^(a + b*x)*b^3*x^3*log(F)^3)/105 - (16*F^a*b^3*x^3*e
rfc((-b*x*log(F))^(1/2))*log(F)^3*(-b*x*pi*log(F))^(1/2))/105)/x^(7/2)
```

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(F**(b*x+a)/x**(9/2),x)
```

```
[Out] Timed out
```

3.39 $\int F^{c(a+bx)}(d+ex)^{7/2}\,dx$

Optimal. Leaf size=208

$$\frac{105\sqrt{\pi}\,e^{7/2}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{16b^{9/2}c^{9/2}\log^{\frac{9}{2}}(F)}-\frac{105e^3\sqrt{d+ex}\,F^{c(a+bx)}}{8b^4c^4\log^4(F)}+\frac{35e^2(d+ex)^{3/2}F^{c(a+bx)}}{4b^3c^3\log^3(F)}-\frac{7e(d+ex)^{5/2}F^{c(a+bx)}}{2b^2c^2\log^2(F)}$$

```
[Out] 35/4*e^2*F^(c*(b*x+a))*(e*x+d)^(3/2)/b^3/c^3/ln(F)^3-7/2*e*F^(c*(b*x+a))*(e
*x+d)^(5/2)/b^2/c^2/ln(F)^2+F^(c*(b*x+a))*(e*x+d)^(7/2)/b/c/ln(F)+105/16*e^
(7/2)*F^(c*(a-b*d/e))*erfi(b^(1/2)*c^(1/2)*(e*x+d)^(1/2)*ln(F)^(1/2)/e^(1/2
))*Pi^(1/2)/b^(9/2)/c^(9/2)/ln(F)^(9/2)-105/8*e^3*F^(c*(b*x+a))*(e*x+d)^(1/
2)/b^4/c^4/ln(F)^4
```

Rubi [A] time = 0.27, antiderivative size = 208, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {2176, 2180, 2204}

$$\frac{105\sqrt{\pi}\,e^{7/2}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{16b^{9/2}c^{9/2}\log^{\frac{9}{2}}(F)}+\frac{35e^2(d+ex)^{3/2}F^{c(a+bx)}}{4b^3c^3\log^3(F)}-\frac{105e^3\sqrt{d+ex}\,F^{c(a+bx)}}{8b^4c^4\log^4(F)}-\frac{7e(d+ex)^{5/2}F^{c(a+bx)}}{2b^2c^2\log^2(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x)^(7/2),x]
```

```
[Out] (105*e^(7/2)*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[c]*Sqrt[d + e*
x]*Sqrt[Log[F]])/Sqrt[e]])/(16*b^(9/2)*c^(9/2)*Log[F]^(9/2)) - (105*e^3*F^(
c*(a + b*x))*Sqrt[d + e*x])/(8*b^4*c^4*Log[F]^4) + (35*e^2*F^(c*(a + b*x))*
(d + e*x)^(3/2))/(4*b^3*c^3*Log[F]^3) - (7*e*F^(c*(a + b*x))*(d + e*x)^(5/2
))/(2*b^2*c^2*Log[F]^2) + (F^(c*(a + b*x))*(d + e*x)^(7/2))/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
```

```
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\int F^{c(a+bx)}(d+ex)^{7/2}\,dx = \frac{F^{c(a+bx)}(d+ex)^{7/2}}{bc\log(F)} - \frac{(7e)\int F^{c(a+bx)}(d+ex)^{5/2}\,dx}{2bc\log(F)}$$

$$= -\frac{7eF^{c(a+bx)}(d+ex)^{5/2}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^{7/2}}{bc\log(F)} + \frac{\left(35e^2\right)\int F^{c(a+bx)}(d+ex)^{3/2}\,dx}{4b^2c^2\log^2(F)}$$

$$= \frac{35e^2F^{c(a+bx)}(d+ex)^{3/2}}{4b^3c^3\log^3(F)} - \frac{7eF^{c(a+bx)}(d+ex)^{5/2}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^{7/2}}{bc\log(F)} - \frac{\left(105e^3\right)\int F^{c(a+}}{8b^3c^3\,\mathrm{lo}}$$

$$= -\frac{105e^3F^{c(a+bx)}\sqrt{d+ex}}{8b^4c^4\log^4(F)} + \frac{35e^2F^{c(a+bx)}(d+ex)^{3/2}}{4b^3c^3\log^3(F)} - \frac{7eF^{c(a+bx)}(d+ex)^{5/2}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d}{bc\log}$$

$$= -\frac{105e^3F^{c(a+bx)}\sqrt{d+ex}}{8b^4c^4\log^4(F)} + \frac{35e^2F^{c(a+bx)}(d+ex)^{3/2}}{4b^3c^3\log^3(F)} - \frac{7eF^{c(a+bx)}(d+ex)^{5/2}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d}{bc\log}$$

$$= \frac{105e^{7/2}F^{c\left(a-\frac{bd}{e}\right)}\sqrt{\pi}\,\mathrm{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)}{16b^{9/2}c^{9/2}\log^{\frac{9}{2}}(F)} - \frac{105e^3F^{c(a+bx)}\sqrt{d+ex}}{8b^4c^4\log^4(F)} + \frac{35e^2F^{c(a+bx)}(d}{4b^3c^3\log}$$

Mathematica [A] time = 0.03, size = 72, normalized size = 0.35

$$\frac{e^4F^{c\left(a-\frac{bd}{e}\right)}\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\,\Gamma\left(\frac{9}{2},-\frac{bc(d+ex)\log(F)}{e}\right)}{b^5c^5\log^5(F)\sqrt{d+ex}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x)^(7/2),x]
```

```
[Out] (e^4*F^(c*(a - (b*d)/e))*Gamma[9/2, -((b*c*(d + e*x)*Log[F])/e)]*Sqrt[-((b*
c*(d + e*x)*Log[F])/e)])/(b^5*c^5*Sqrt[d + e*x]*Log[F]^5)
```

fricas [**A**] time = 0.44, size = 230, normalized size = 1.11

$$-\frac{\frac{105\sqrt{\pi}\sqrt{-\frac{bc\log(F)}{e}}e^4\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{F^{\frac{bcd-ace}{e}}}+2\left(105\,bce^3\log(F)-8\left(b^4c^4e^3x^3+3\,b^4c^4de^2x^2+3\,b^4c^4d^2ex+b^4c^4d^3\right)\log\right.}{16\,b^5c^5\log(}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(7/2),x, algorithm="fricas")
```

```
[Out] -1/16*(105*sqrt(pi)*sqrt(-b*c*log(F)/e)*e^4*erf(sqrt(e*x + d)*sqrt(-b*c*log
(F)/e))/F^((b*c*d - a*c*e)/e) + 2*(105*b*c*e^3*log(F) - 8*(b^4*c^4*e^3*x^3
+ 3*b^4*c^4*d*e^2*x^2 + 3*b^4*c^4*d^2*e*x + b^4*c^4*d^3)*log(F)^4 + 28*(b^3
*c^3*e^3*x^2 + 2*b^3*c^3*d*e^2*x + b^3*c^3*d^2*e)*log(F)^3 - 70*(b^2*c^2*e^
3*x + b^2*c^2*d*e^2)*log(F)^2)*sqrt(e*x + d)*F^(b*c*x + a*c))/(b^5*c^5*log(
F)^5)
```

giac [**B**] time = 1.75, size = 1091, normalized size = 5.25

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(7/2),x, algorithm="giac")
```

```
[Out] -1/16*(16*sqrt(pi)*d^4*erf(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-(
b*c*d*log(F) - a*c*e*log(F))*e^(-1) + 1)/sqrt(-b*c*e*log(F)) - 32*d^3*(sqrt
(pi)*(2*b*c*d*log(F) + e)*erf(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^
(-(b*c*d*log(F) - a*c*e*log(F))*e^(-1) + 1)/(sqrt(-b*c*e*log(F))*b*c*log(F)
) + 2*sqrt(x*e + d)*e^(((x*e + d)*b*c*log(F) - b*c*d*log(F) + a*c*e*log(F))
*e^(-1) + 1)/(b*c*log(F))) + 24*d^2*(sqrt(pi)*(4*b^2*c^2*d^2*log(F)^2 + 4*b
*c*d*e*log(F) + 3*e^2)*erf(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-(
b*c*d*log(F) - a*c*e*log(F) + 2*e)*e^(-1) + 1)/(sqrt(-b*c*e*log(F))*b^2*c^2
*log(F)^2) - 2*(2*(x*e + d)^(3/2)*b*c*e*log(F) - 4*sqrt(x*e + d)*b*c*d*e*lo
g(F) - 3*sqrt(x*e + d)*e^2)*e^(((x*e + d)*b*c*log(F) - b*c*d*log(F) + a*c*e
*log(F) - 2*e)*e^(-1))/(b^2*c^2*log(F)^2))*e^2 - 8*d*(sqrt(pi)*(8*b^3*c^3*d
^3*log(F)^3 + 12*b^2*c^2*d^2*e*log(F)^2 + 18*b*c*d*e^2*log(F) + 15*e^3)*erf
(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*c*d*log(F) - a*c*e*log(F
) + 3*e)*e^(-1) + 1)/(sqrt(-b*c*e*log(F))*b^3*c^3*log(F)^3) + 2*(4*(x*e + d
)^(5/2)*b^2*c^2*e*log(F)^2 - 12*(x*e + d)^(3/2)*b^2*c^2*d*e*log(F)^2 + 12*s
qrt(x*e + d)*b^2*c^2*d^2*e*log(F)^2 - 10*(x*e + d)^(3/2)*b*c*e^2*log(F) + 1
8*sqrt(x*e + d)*b*c*d*e^2*log(F) + 15*sqrt(x*e + d)*e^3)*e^(((x*e + d)*b*c*
log(F) - b*c*d*log(F) + a*c*e*log(F) - 3*e)*e^(-1))/(b^3*c^3*log(F)^3))*e^3
 + (sqrt(pi)*(16*b^4*c^4*d^4*log(F)^4 + 32*b^3*c^3*d^3*e*log(F)^3 + 72*b^2*
c^2*d^2*e^2*log(F)^2 + 120*b*c*d*e^3*log(F) + 105*e^4)*erf(-sqrt(-b*c*e*log
```

```
(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*c*d*log(F) - a*c*e*log(F) + 4*e)*e^(-1) +
 1)/(sqrt(-b*c*e*log(F))*b^4*c^4*log(F)^4) - 2*(8*(x*e + d)^(7/2)*b^3*c^3*e
*log(F)^3 - 32*(x*e + d)^(5/2)*b^3*c^3*d*e*log(F)^3 + 48*(x*e + d)^(3/2)*b^
3*c^3*d^2*e*log(F)^3 - 32*sqrt(x*e + d)*b^3*c^3*d^3*e*log(F)^3 - 28*(x*e +
d)^(5/2)*b^2*c^2*e^2*log(F)^2 + 80*(x*e + d)^(3/2)*b^2*c^2*d*e^2*log(F)^2 -
 72*sqrt(x*e + d)*b^2*c^2*d^2*e^2*log(F)^2 + 70*(x*e + d)^(3/2)*b*c*e^3*log
(F) - 120*sqrt(x*e + d)*b*c*d*e^3*log(F) - 105*sqrt(x*e + d)*e^4)*e^(((x*e
+ d)*b*c*log(F) - b*c*d*log(F) + a*c*e*log(F) - 4*e)*e^(-1))/(b^4*c^4*log(F
)^4))*e^4)*e^(-1)
```

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

$$\int (ex+d)^{\frac{7}{2}} F^{(bx+a)c}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e*x+d)^(7/2),x)
[Out] int(F^((b*x+a)*c)*(e*x+d)^(7/2),x)
```

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

$$\int (ex+d)^{\frac{7}{2}} F^{(bx+a)c}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(7/2),x, algorithm="maxima")
[Out] integrate((e*x + d)^(7/2)*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)}\,{\left(d+e\,x\right)}^{7/2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x)^(7/2),x)
[Out] int(F^(c*(a + b*x))*(d + e*x)^(7/2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**(7/2),x)
[Out] Timed out
```

3.40 $\int F^{c(a+bx)}(d+ex)^{5/2}\,dx$

Optimal. Leaf size=173

$$-\frac{15\sqrt{\pi}\,e^{5/2}F^{c\left(a-\frac{bd}{e}\right)}\text{erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{8b^{7/2}c^{7/2}\log^{\frac{7}{2}}(F)}+\frac{15e^2\sqrt{d+ex}\,F^{c(a+bx)}}{4b^3c^3\log^3(F)}-\frac{5e(d+ex)^{3/2}F^{c(a+bx)}}{2b^2c^2\log^2(F)}+\frac{(d+ex)^{5/2}F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] -5/2*e*F^(c*(b*x+a))*(e*x+d)^(3/2)/b^2/c^2/ln(F)^2+F^(c*(b*x+a))*(e*x+d)^(5
/2)/b/c/ln(F)-15/8*e^(5/2)*F^(c*(a-b*d/e))*erfi(b^(1/2)*c^(1/2)*(e*x+d)^(1/
2)*ln(F)^(1/2)/e^(1/2))*Pi^(1/2)/b^(7/2)/c^(7/2)/ln(F)^(7/2)+15/4*e^2*F^(c*
(b*x+a))*(e*x+d)^(1/2)/b^3/c^3/ln(F)^3
```

Rubi [A] time = 0.17, antiderivative size = 173, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {2176, 2180, 2204}

$$-\frac{15\sqrt{\pi}\,e^{5/2}F^{c\left(a-\frac{bd}{e}\right)}\text{Erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{8b^{7/2}c^{7/2}\log^{\frac{7}{2}}(F)}+\frac{15e^2\sqrt{d+ex}\,F^{c(a+bx)}}{4b^3c^3\log^3(F)}-\frac{5e(d+ex)^{3/2}F^{c(a+bx)}}{2b^2c^2\log^2(F)}+\frac{(d+ex)^{5/2}F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x)^(5/2),x]
```

```
[Out] (-15*e^(5/2)*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[c]*Sqrt[d + e*
x]*Sqrt[Log[F]])/Sqrt[e]])/(8*b^(7/2)*c^(7/2)*Log[F]^(7/2)) + (15*e^2*F^(c*
(a + b*x))*Sqrt[d + e*x])/(4*b^3*c^3*Log[F]^3) - (5*e*F^(c*(a + b*x))*(d +
e*x)^(3/2))/(2*b^2*c^2*Log[F]^2) + (F^(c*(a + b*x))*(d + e*x)^(5/2))/(b*c*L
og[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\int F^{c(a+bx)}(d+ex)^{5/2}\,dx = \frac{F^{c(a+bx)}(d+ex)^{5/2}}{bc\log(F)} - \frac{(5e)\int F^{c(a+bx)}(d+ex)^{3/2}\,dx}{2bc\log(F)}$$

$$= -\frac{5eF^{c(a+bx)}(d+ex)^{3/2}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^{5/2}}{bc\log(F)} + \frac{\left(15e^2\right)\int F^{c(a+bx)}\sqrt{d+ex}\,dx}{4b^2c^2\log^2(F)}$$

$$= \frac{15e^2F^{c(a+bx)}\sqrt{d+ex}}{4b^3c^3\log^3(F)} - \frac{5eF^{c(a+bx)}(d+ex)^{3/2}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^{5/2}}{bc\log(F)} - \frac{\left(15e^3\right)\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}}\,dx}{8b^3c^3\log^3(F)}$$

$$= \frac{15e^2F^{c(a+bx)}\sqrt{d+ex}}{4b^3c^3\log^3(F)} - \frac{5eF^{c(a+bx)}(d+ex)^{3/2}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^{5/2}}{bc\log(F)} - \frac{\left(15e^2\right)\text{Subst}\left(\int F\right.}{4b}$$

$$= -\frac{15e^{5/2}F^{c\left(a-\frac{bd}{e}\right)}\sqrt{\pi}\,\text{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)}{8b^{7/2}c^{7/2}\log^{\frac{7}{2}}(F)} + \frac{15e^2F^{c(a+bx)}\sqrt{d+ex}}{4b^3c^3\log^3(F)} - \frac{5eF^{c(a+bx)}(d+e}{2b^2c^2\log^2(}$$

Mathematica [A] time = 0.03, size = 72, normalized size = 0.42

$$\frac{e^2\sqrt{d+ex}\,F^{c\left(a-\frac{bd}{e}\right)}\Gamma\left(\frac{7}{2},-\frac{bc(d+ex)\log(F)}{e}\right)}{b^3c^3\log^3(F)\sqrt{-\frac{bc\log(F)(d+ex)}{e}}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x)^(5/2),x]
```

```
[Out] (e^2*F^(c*(a - (b*d)/e))*Sqrt[d + e*x]*Gamma[7/2, -((b*c*(d + e*x)*Log[F])/
e)])/(b^3*c^3*Log[F]^3*Sqrt[-((b*c*(d + e*x)*Log[F])/e)])
```

fricas [A] time = 0.45, size = 167, normalized size = 0.97

$$\frac{\frac{15\sqrt{\pi}\sqrt{-\frac{bc\log(F)}{e}}\,e^3\,\text{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{F^{\frac{bcd-ace}{e}}} + 2\left(15\,bce^2\log(F) + 4\left(b^3c^3e^2x^2 + 2\,b^3c^3dex + b^3c^3d^2\right)\log(F)^3 - 10\left(b^2c^2e^2\right.\right.}{8\,b^4c^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(5/2),x, algorithm="fricas")
```

```
[Out] 1/8*(15*sqrt(pi)*sqrt(-b*c*log(F)/e)*e^3*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)
/e))/F^((b*c*d - a*c*e)/e) + 2*(15*b*c*e^2*log(F) + 4*(b^3*c^3*e^2*x^2 + 2*
b^3*c^3*d*e*x + b^3*c^3*d^2)*log(F)^3 - 10*(b^2*c^2*e^2*x + b^2*c^2*d*e)*lo
g(F)^2)*sqrt(e*x + d)*F^(b*c*x + a*c))/(b^4*c^4*log(F)^4)
```

giac [B] time = 1.30, size = 691, normalized size = 3.99

$$-\frac{1}{8}\left(\frac{8\,\sqrt{\pi}\,d^3\,\mathrm{erf}\left(-\sqrt{-bce\log(F)}\,\sqrt{xe+d}\,e^{(-1)}\right)e^{\left(-\left(bcd\log(F)-ace\log(F)\right)e^{(-1)}+1\right)}}{\sqrt{-bce\log(F)}}-12\,d^2\left(\frac{\sqrt{\pi}\left(2\,bcd\log(F)+e\right)\mathrm{erf}\left(-\sqrt{\right.}\right.}{}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(5/2),x, algorithm="giac")
```

```
[Out] -1/8*(8*sqrt(pi)*d^3*erf(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*
c*d*log(F) - a*c*e*log(F))*e^(-1) + 1)/sqrt(-b*c*e*log(F)) - 12*d^2*(sqrt(p
i)*(2*b*c*d*log(F) + e)*erf(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-
(b*c*d*log(F) - a*c*e*log(F))*e^(-1) + 1)/(sqrt(-b*c*e*log(F))*b*c*log(F))
+ 2*sqrt(x*e + d)*e^(((x*e + d)*b*c*log(F) - b*c*d*log(F) + a*c*e*log(F))*e
^(-1) + 1)/(b*c*log(F))) + 6*d*(sqrt(pi)*(4*b^2*c^2*d^2*log(F)^2 + 4*b*c*d*
e*log(F) + 3*e^2)*erf(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*c*d
*log(F) - a*c*e*log(F) + 2*e)*e^(-1) + 1)/(sqrt(-b*c*e*log(F))*b^2*c^2*log(
F)^2) - 2*(2*(x*e + d)^(3/2)*b*c*e*log(F) - 4*sqrt(x*e + d)*b*c*d*e*log(F)
- 3*sqrt(x*e + d)*e^2)*e^(((x*e + d)*b*c*log(F) - b*c*d*log(F) + a*c*e*log(
F) - 2*e)*e^(-1))/(b^2*c^2*log(F)^2))*e^2 - (sqrt(pi)*(8*b^3*c^3*d^3*log(F)
^3 + 12*b^2*c^2*d^2*e*log(F)^2 + 18*b*c*d*e^2*log(F) + 15*e^3)*erf(-sqrt(-b
*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*c*d*log(F) - a*c*e*log(F) + 3*e)*
e^(-1) + 1)/(sqrt(-b*c*e*log(F))*b^3*c^3*log(F)^3) + 2*(4*(x*e + d)^(5/2)*b
^2*c^2*e*log(F)^2 - 12*(x*e + d)^(3/2)*b^2*c^2*d*e*log(F)^2 + 12*sqrt(x*e +
 d)*b^2*c^2*d^2*e*log(F)^2 - 10*(x*e + d)^(3/2)*b*c*e^2*log(F) + 18*sqrt(x*
e + d)*b*c*d*e^2*log(F) + 15*sqrt(x*e + d)*e^3)*e^(((x*e + d)*b*c*log(F) -
b*c*d*log(F) + a*c*e*log(F) - 3*e)*e^(-1))/(b^3*c^3*log(F)^3))*e^3)*e^(-1)
```

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

$$\int (ex+d)^{\frac{5}{2}}\,F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e*x+d)^(5/2),x)
```

```
[Out] int(F^((b*x+a)*c)*(e*x+d)^(5/2),x)
```

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

$$\int (ex+d)^{\frac{5}{2}} F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(5/2),x, algorithm="maxima")
[Out] integrate((e*x + d)^(5/2)*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)}\,{\left(d+e\,x\right)}^{5/2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x)^(5/2),x)
[Out] int(F^(c*(a + b*x))*(d + e*x)^(5/2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**(5/2),x)
[Out] Timed out
```

3.41 $\int F^{c(a+bx)}(d+ex)^{3/2}\,dx$

Optimal. Leaf size=138

$$\frac{3\sqrt{\pi}\,e^{3/2}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{4b^{5/2}c^{5/2}\log^{\frac{5}{2}}(F)}-\frac{3e\sqrt{d+ex}\,F^{c(a+bx)}}{2b^2c^2\log^2(F)}+\frac{(d+ex)^{3/2}F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] F^(c*(b*x+a))*(e*x+d)^(3/2)/b/c/ln(F)+3/4*e^(3/2)*F^(c*(a-b*d/e))*erfi(b^(1
/2)*c^(1/2)*(e*x+d)^(1/2)*ln(F)^(1/2)/e^(1/2))*Pi^(1/2)/b^(5/2)/c^(5/2)/ln(
F)^(5/2)-3/2*e*F^(c*(b*x+a))*(e*x+d)^(1/2)/b^2/c^2/ln(F)^2
```

Rubi [A] time = 0.12, antiderivative size = 138, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {2176, 2180, 2204}

$$\frac{3\sqrt{\pi}\,e^{3/2}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{4b^{5/2}c^{5/2}\log^{\frac{5}{2}}(F)}-\frac{3e\sqrt{d+ex}\,F^{c(a+bx)}}{2b^2c^2\log^2(F)}+\frac{(d+ex)^{3/2}F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x)^(3/2),x]
```

```
[Out] (3*e^(3/2)*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[c]*Sqrt[d + e*x]
*Sqrt[Log[F]])/Sqrt[e]])/(4*b^(5/2)*c^(5/2)*Log[F]^(5/2)) - (3*e*F^(c*(a +
b*x))*Sqrt[d + e*x])/(2*b^2*c^2*Log[F]^2) + (F^(c*(a + b*x))*(d + e*x)^(3/2
))/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\begin{aligned}
\int F^{c(a+bx)}(d+ex)^{3/2}\,dx &= \frac{F^{c(a+bx)}(d+ex)^{3/2}}{bc\log(F)} - \frac{(3e)\int F^{c(a+bx)}\sqrt{d+ex}\,dx}{2bc\log(F)} \\
&= -\frac{3eF^{c(a+bx)}\sqrt{d+ex}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^{3/2}}{bc\log(F)} + \frac{\left(3e^2\right)\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}}\,dx}{4b^2c^2\log^2(F)} \\
&= -\frac{3eF^{c(a+bx)}\sqrt{d+ex}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^{3/2}}{bc\log(F)} + \frac{(3e)\operatorname{Subst}\left(\int F^{c\left(a-\frac{bd}{e}\right)+\frac{bcx^2}{e}}\,dx, x, \sqrt{d+ex}\right)}{2b^2c^2\log^2(F)} \\
&= \frac{3e^{3/2}F^{c\left(a-\frac{bd}{e}\right)}\sqrt{\pi}\,\operatorname{erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{d+ex}\,\sqrt{\log(F)}}{\sqrt{e}}\right)}{4b^{5/2}c^{5/2}\log^{\frac{5}{2}}(F)} - \frac{3eF^{c(a+bx)}\sqrt{d+ex}}{2b^2c^2\log^2(F)} + \frac{F^{c(a+bx)}(d+ex)^{3/2}}{bc\log(F)}
\end{aligned}$$

Mathematica [A] time = 0.07, size = 63, normalized size = 0.46

$$-\frac{(d+ex)^{5/2}F^{c\left(a-\frac{bd}{e}\right)}\Gamma\left(\frac{5}{2},-\frac{bc(d+ex)\log(F)}{e}\right)}{e\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{5/2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x)^(3/2),x]
[Out] -((F^(c*(a - (b*d)/e))*(d + e*x)^(5/2)*Gamma[5/2, -((b*c*(d + e*x)*Log[F])/
e)])/(e*(-((b*c*(d + e*x)*Log[F])/e))^(5/2)))
```

fricas [A] time = 0.44, size = 121, normalized size = 0.88

$$-\frac{\frac{3\,\sqrt{\pi}\,\sqrt{-\frac{bc\log(F)}{e}}\,e^2\operatorname{erf}\left(\sqrt{ex+d}\,\sqrt{-\frac{bc\log(F)}{e}}\right)}{F^{\frac{bcd-ace}{e}}} + 2\left(3\,bce\log(F) - 2\left(b^2c^2ex + b^2c^2d\right)\log(F)^2\right)\sqrt{ex+d}\,F^{bcx+ac}}{4\,b^3c^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/4*(3*sqrt(pi)*sqrt(-b*c*log(F)/e)*e^2*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)
/e))/F^((b*c*d - a*c*e)/e) + 2*(3*b*c*e*log(F) - 2*(b^2*c^2*e*x + b^2*c^2*d
)*log(F)^2)*sqrt(e*x + d)*F^(b*c*x + a*c))/(b^3*c^3*log(F)^3)
```

giac [B] time = 0.91, size = 401, normalized size = 2.91

$$-\frac{1}{4}\left(\frac{4\sqrt{\pi}\,d^2\operatorname{erf}\left(-\sqrt{-bce\log(F)}\sqrt{xe+d}\,e^{(-1)}\right)e^{\left(-\left(bcd\log(F)-ace\log(F)\right)e^{(-1)}+1\right)}}{\sqrt{-bce\log(F)}}-4\,d\left(\frac{\sqrt{\pi}\left(2\,bcd\log(F)+e\right)\operatorname{erf}\left(-\sqrt{-\cdots}\right.}{\sqrt{\cdots}}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int \left(ex+d\right)^{\frac{3}{2}} F^{\left(bx+a\right)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e*x+d)^(3/2),x)
```

```
[Out] int(F^((b*x+a)*c)*(e*x+d)^(3/2),x)
```

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

$$\int \left(ex+d\right)^{\frac{3}{2}} F^{\left(bx+a\right)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(3/2),x, algorithm="maxima")
```

```
[Out] integrate((e*x + d)^(3/2)*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)}\,{\left(d+e\,x\right)}^{3/2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x)^(3/2),x)
[Out] int(F^(c*(a + b*x))*(d + e*x)^(3/2), x)
```

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

$$\int F^{c(a+bx)}(d+ex)^{\frac{3}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**(3/2),x)
[Out] Integral(F**(c*(a + b*x))*(d + e*x)**(3/2), x)
```

3.42 $\int F^{c(a+bx)}\sqrt{d+ex}\,dx$

Optimal. Leaf size=105

$$\frac{\sqrt{d+ex}\,F^{c(a+bx)}}{bc\log(F)}-\frac{\sqrt{\pi}\,\sqrt{e}\,F^{c\left(a-\frac{bd}{e}\right)}\operatorname{erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{2b^{3/2}c^{3/2}\log^{\frac{3}{2}}(F)}$$

```
[Out] -1/2*F^(c*(a-b*d/e))*erfi(b^(1/2)*c^(1/2)*(e*x+d)^(1/2)*ln(F)^(1/2)/e^(1/2)
)*e^(1/2)*Pi^(1/2)/b^(3/2)/c^(3/2)/ln(F)^(3/2)+F^(c*(b*x+a))*(e*x+d)^(1/2)/
b/c/ln(F)
```

Rubi [A] time = 0.08, antiderivative size = 105, 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 = {2176, 2180, 2204}

$$\frac{\sqrt{d+ex}\,F^{c(a+bx)}}{bc\log(F)}-\frac{\sqrt{\pi}\,\sqrt{e}\,F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{2b^{3/2}c^{3/2}\log^{\frac{3}{2}}(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*Sqrt[d + e*x],x]
```

```
[Out] -(Sqrt[e]*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[c]*Sqrt[d + e*x]*
Sqrt[Log[F]])/Sqrt[e]])/(2*b^(3/2)*c^(3/2)*Log[F]^(3/2)) + (F^(c*(a + b*x))
*Sqrt[d + e*x])/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\begin{aligned}
\int F^{c(a+bx)}\sqrt{d+ex}\,dx &= \frac{F^{c(a+bx)}\sqrt{d+ex}}{bc\log(F)} - \frac{e\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}}\,dx}{2bc\log(F)} \\
&= \frac{F^{c(a+bx)}\sqrt{d+ex}}{bc\log(F)} - \frac{\operatorname{Subst}\left(\int F^{c\left(a-\frac{bd}{e}\right)+\frac{bcx^2}{e}}\,dx, x, \sqrt{d+ex}\right)}{bc\log(F)} \\
&= -\frac{\sqrt{e}\,F^{c\left(a-\frac{bd}{e}\right)}\sqrt{\pi}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)}{2b^{3/2}c^{3/2}\log^{\frac{3}{2}}(F)} + \frac{F^{c(a+bx)}\sqrt{d+ex}}{bc\log(F)}
\end{aligned}$$

Mathematica [A] time = 0.04, size = 63, normalized size = 0.60

$$-\frac{(d+ex)^{3/2}F^{c\left(a-\frac{bd}{e}\right)}\Gamma\left(\frac{3}{2},-\frac{bc(d+ex)\log(F)}{e}\right)}{e\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3/2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*Sqrt[d + e*x],x]
```

```
[Out] -((F^(c*(a - (b*d)/e))*(d + e*x)^(3/2)*Gamma[3/2, -((b*c*(d + e*x)*Log[F])/
e)])/(e*(-((b*c*(d + e*x)*Log[F])/e))^(3/2)))
```

fricas [A] time = 0.44, size = 90, normalized size = 0.86

$$\frac{2\sqrt{ex+d}\,F^{bcx+ac}bc\log(F) + \frac{\sqrt{\pi}\sqrt{-\frac{bc\log(F)}{e}}\,e\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{F^{\frac{bcd-ace}{e}}}}{2\,b^2c^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*(2*sqrt(e*x + d)*F^(b*c*x + a*c)*b*c*log(F) + sqrt(pi)*sqrt(-b*c*log(F)
/e)*e*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/e))/F^((b*c*d - a*c*e)/e))/(b^2*c^
2*log(F)^2)
```

giac [B] time = 0.52, size = 198, normalized size = 1.89

$$-\frac{1}{2}\left(\frac{2\sqrt{\pi}\,d\operatorname{erf}\left(-\sqrt{-bce\log(F)}\,\sqrt{xe+d}\,e^{(-1)}\right)e^{\left(-\left(bcd\log(F)-ace\log(F)\right)e^{(-1)}+1\right)}}{\sqrt{-bce\log(F)}}-\frac{\sqrt{\pi}\left(2\,bcd\log(F)+e\right)\operatorname{erf}\left(-\sqrt{-bce\log\right.}{\sqrt{-bce}}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/2*(2*sqrt(pi)*d*erf(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*c*
d*log(F) - a*c*e*log(F))*e^(-1) + 1)/sqrt(-b*c*e*log(F)) - sqrt(pi)*(2*b*c*
d*log(F) + e)*erf(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*c*d*log
(F) - a*c*e*log(F))*e^(-1) + 1)/(sqrt(-b*c*e*log(F))*b*c*log(F)) - 2*sqrt(x
*e + d)*e^(((x*e + d)*b*c*log(F) - b*c*d*log(F) + a*c*e*log(F))*e^(-1) + 1)
/(b*c*log(F)))*e^(-1)
```

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int \sqrt{ex+d}\;F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \sqrt{ex+d}\,F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(sqrt(e*x + d)*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)}\,\sqrt{d+e\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int F^{c(a+bx)}\sqrt{d+ex}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**(1/2),x)
```

```
[Out] Integral(F**(c*(a + b*x))*sqrt(d + e*x), x)
```

3.43 $\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}} dx$

Optimal. Leaf size=72

$$\frac{\sqrt{\pi} F^{c\left(a-\frac{bd}{e}\right)} \operatorname{erfi}\left(\frac{\sqrt{b} \sqrt{c} \sqrt{\log(F)} \sqrt{d+ex}}{\sqrt{e}}\right)}{\sqrt{b} \sqrt{c} \sqrt{e} \sqrt{\log(F)}}$$

```
[Out] F^(c*(a-b*d/e))*erfi(b^(1/2)*c^(1/2)*(e*x+d)^(1/2)*ln(F)^(1/2)/e^(1/2))*Pi^
(1/2)/b^(1/2)/c^(1/2)/e^(1/2)/ln(F)^(1/2)
```

Rubi [A] time = 0.05, antiderivative size = 72, 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 = {2180, 2204}

$$\frac{\sqrt{\pi} F^{c\left(a-\frac{bd}{e}\right)} \operatorname{Erfi}\left(\frac{\sqrt{b} \sqrt{c} \sqrt{\log(F)} \sqrt{d+ex}}{\sqrt{e}}\right)}{\sqrt{b} \sqrt{c} \sqrt{e} \sqrt{\log(F)}}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/Sqrt[d + e*x],x]
```

```
[Out] (F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[c]*Sqrt[d + e*x]*Sqrt[Log[
F]])/Sqrt[e]])/(Sqrt[b]*Sqrt[c]*Sqrt[e]*Sqrt[Log[F]])
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}}\,dx = \frac{2\,\mathrm{Subst}\left(\int F^{c\left(a-\frac{bd}{e}\right)+\frac{bcx^2}{e}}\,dx, x, \sqrt{d+ex}\right)}{e}$$
$$= \frac{F^{c\left(a-\frac{bd}{e}\right)}\sqrt{\pi}\,\mathrm{erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{d+ex}\,\sqrt{\log(F)}}{\sqrt{e}}\right)}{\sqrt{b}\,\sqrt{c}\,\sqrt{e}\,\sqrt{\log(F)}}$$

Mathematica [A] time = 0.03, size = 63, normalized size = 0.88

$$-\frac{\sqrt{d+ex}\,F^{c\left(a-\frac{bd}{e}\right)}\Gamma\left(\frac{1}{2},-\frac{bc(d+ex)\log(F)}{e}\right)}{e\sqrt{-\frac{bc\log(F)(d+ex)}{e}}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/Sqrt[d + e*x],x]
```

```
[Out] -((F^(c*(a - (b*d)/e))*Sqrt[d + e*x]*Gamma[1/2, -((b*c*(d + e*x)*Log[F])/e)
])/(e*Sqrt[-((b*c*(d + e*x)*Log[F])/e)]))
```

fricas [A] time = 0.43, size = 64, normalized size = 0.89

$$-\frac{\sqrt{\pi}\sqrt{-\frac{bc\log(F)}{e}}\,\mathrm{erf}\left(\sqrt{ex+d}\,\sqrt{-\frac{bc\log(F)}{e}}\right)}{F^{\frac{bcd-ace}{e}}bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -sqrt(pi)*sqrt(-b*c*log(F)/e)*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/e))/(F^((b
*c*d - a*c*e)/e)*b*c*log(F))
```

giac [A] time = 0.39, size = 58, normalized size = 0.81

$$-\frac{\sqrt{\pi}\,\mathrm{erf}\left(-\sqrt{-bce\log(F)}\,\sqrt{xe+d}\,e^{(-1)}\right)e^{\left(-\left(bcd\log(F)-ace\log(F)\right)e^{(-1)}\right)}}{\sqrt{-bce\log(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -sqrt(pi)*erf(-sqrt(-b*c*e*log(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*c*d*log(F)
- a*c*e*log(F))*e^(-1))/sqrt(-b*c*e*log(F))
```

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

$$\int \frac{F^{(bx+a)c}}{\sqrt{ex+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{F^{(bx+a)c}}{\sqrt{ex+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate(F^((b*x + a)*c)/sqrt(e*x + d), x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{\sqrt{d+e\,x}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/(e*x+d)**(1/2),x)
```

```
[Out] Integral(F**(c*(a + b*x))/sqrt(d + e*x), x)
```

3.44 $\int \frac{F^{c(a+bx)}}{(d+ex)^{3/2}} dx$

Optimal. Leaf size=97

$$\frac{2\sqrt{\pi}\sqrt{b}\sqrt{c}\sqrt{\log(F)}F^{c\left(a-\frac{bd}{e}\right)}\text{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{e^{3/2}}-\frac{2F^{c(a+bx)}}{e\sqrt{d+ex}}$$

```
[Out] -2*F^(c*(b*x+a))/e/(e*x+d)^(1/2)+2*F^(c*(a-b*d/e))*erfi(b^(1/2)*c^(1/2)*(e*
x+d)^(1/2)*ln(F)^(1/2)/e^(1/2))*b^(1/2)*c^(1/2)*Pi^(1/2)*ln(F)^(1/2)/e^(3/2
)
```

Rubi [A] time = 0.09, antiderivative size = 97, 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 = {2177, 2180, 2204}

$$\frac{2\sqrt{\pi}\sqrt{b}\sqrt{c}\sqrt{\log(F)}F^{c\left(a-\frac{bd}{e}\right)}\text{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{e^{3/2}}-\frac{2F^{c(a+bx)}}{e\sqrt{d+ex}}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d + e*x)^(3/2),x]
```

```
[Out] (-2*F^(c*(a + b*x)))/(e*Sqrt[d + e*x]) + (2*Sqrt[b]*Sqrt[c]*F^(c*(a - (b*d)
/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[c]*Sqrt[d + e*x]*Sqrt[Log[F]])/Sqrt[e]]*Sq
rt[Log[F]])/e^(3/2)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\begin{aligned}
\int \frac{F^{c(a+bx)}}{(d+ex)^{3/2}}\,dx &= -\frac{2F^{c(a+bx)}}{e\sqrt{d+ex}}+\frac{(2bc\log(F))\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}}\,dx}{e}\\
&= -\frac{2F^{c(a+bx)}}{e\sqrt{d+ex}}+\frac{(4bc\log(F))\operatorname{Subst}\left(\int F^{c\left(a-\frac{bd}{e}\right)+\frac{bcx^2}{e}}\,dx,x,\sqrt{d+ex}\right)}{e^2}\\
&= -\frac{2F^{c(a+bx)}}{e\sqrt{d+ex}}+\frac{2\sqrt{b}\,\sqrt{c}\,F^{c\left(a-\frac{bd}{e}\right)}\sqrt{\pi}\operatorname{erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{d+ex}\,\sqrt{\log(F)}}{\sqrt{e}}\right)\sqrt{\log(F)}}{e^{3/2}}
\end{aligned}$$

Mathematica [A] time = 0.08, size = 75, normalized size = 0.77

$$-\frac{2\left(F^{c(a+bx)}-F^{c\left(a-\frac{bd}{e}\right)}\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\,\Gamma\left(\frac{1}{2},-\frac{bc(d+ex)\log(F)}{e}\right)\right)}{e\sqrt{d+ex}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d + e*x)^(3/2),x]
```

```
[Out] (-2*(F^(c*(a + b*x)) - F^(c*(a - (b*d)/e))*Gamma[1/2, -((b*c*(d + e*x)*Log[
F])/e)]*Sqrt[-((b*c*(d + e*x)*Log[F])/e)]))/(e*Sqrt[d + e*x])
```

fricas [A] time = 0.43, size = 90, normalized size = 0.93

$$-\frac{2\left(\frac{\sqrt{\pi}\,(ex+d)\sqrt{-\frac{bc\log(F)}{e}}\operatorname{erf}\left(\sqrt{ex+d}\,\sqrt{-\frac{bc\log(F)}{e}}\right)}{F^{\frac{bcd-ace}{e}}}+\sqrt{ex+d}\,F^{bcx+ac}\right)}{e^2x+de}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -2*(sqrt(pi)*(e*x + d)*sqrt(-b*c*log(F)/e)*erf(sqrt(e*x + d)*sqrt(-b*c*log(
F)/e))/F^((b*c*d - a*c*e)/e) + sqrt(e*x + d)*F^(b*c*x + a*c))/(e^2*x + d*e)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(3/2),x, algorithm="giac")
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(3/2), x)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/(e*x+d)^(3/2),x)
[Out] int(F^((b*x+a)*c)/(e*x+d)^(3/2),x)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(3/2),x, algorithm="maxima")
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(3/2), x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{{(d+e\,x)}^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d + e*x)^(3/2),x)
[Out] int(F^(c*(a + b*x))/(d + e*x)^(3/2), x)
```

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

$$\int \frac{F^{c(a+bx)}}{(d+ex)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/(e*x+d)**(3/2),x)
```

```
[Out] Integral(F**(c*(a + b*x))/(d + e*x)**(3/2), x)
```

3.45 $\int \frac{F^{c(a+bx)}}{(d+ex)^{5/2}}\,dx$

Optimal. Leaf size=130

$$\frac{4\sqrt{\pi}\,b^{3/2}c^{3/2}\log^{\frac{3}{2}}(F)F^{c\left(a-\frac{bd}{e}\right)}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{3e^{5/2}}-\frac{4bc\log(F)F^{c(a+bx)}}{3e^2\sqrt{d+ex}}-\frac{2F^{c(a+bx)}}{3e(d+ex)^{3/2}}$$

```
[Out] -2/3*F^(c*(b*x+a))/e/(e*x+d)^(3/2)+4/3*b^(3/2)*c^(3/2)*F^(c*(a-b*d/e))*erfi
(b^(1/2)*c^(1/2)*(e*x+d)^(1/2)*ln(F)^(1/2)/e^(1/2))*ln(F)^(3/2)*Pi^(1/2)/e^
(5/2)-4/3*b*c*F^(c*(b*x+a))*ln(F)/e^2/(e*x+d)^(1/2)
```

Rubi [A] time = 0.12, antiderivative size = 130, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {2177, 2180, 2204}

$$\frac{4\sqrt{\pi}\,b^{3/2}c^{3/2}\log^{\frac{3}{2}}(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{3e^{5/2}}-\frac{4bc\log(F)F^{c(a+bx)}}{3e^2\sqrt{d+ex}}-\frac{2F^{c(a+bx)}}{3e(d+ex)^{3/2}}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d + e*x)^(5/2),x]
```

```
[Out] (-2*F^(c*(a + b*x)))/(3*e*(d + e*x)^(3/2)) - (4*b*c*F^(c*(a + b*x))*Log[F])
/(3*e^2*Sqrt[d + e*x]) + (4*b^(3/2)*c^(3/2)*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Er
fi[(Sqrt[b]*Sqrt[c]*Sqrt[d + e*x]*Sqrt[Log[F]])/Sqrt[e]]*Log[F]^(3/2))/(3*e
^(5/2))
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$
\begin{aligned}
\int \frac{F^{c(a+bx)}}{(d+ex)^{5/2}}\,dx &= -\frac{2F^{c(a+bx)}}{3e(d+ex)^{3/2}}+\frac{(2bc\log(F))\int \frac{F^{c(a+bx)}}{(d+ex)^{3/2}}\,dx}{3e}\\
&= -\frac{2F^{c(a+bx)}}{3e(d+ex)^{3/2}}-\frac{4bcF^{c(a+bx)}\log(F)}{3e^2\sqrt{d+ex}}+\frac{\left(4b^2c^2\log^2(F)\right)\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}}\,dx}{3e^2}\\
&= -\frac{2F^{c(a+bx)}}{3e(d+ex)^{3/2}}-\frac{4bcF^{c(a+bx)}\log(F)}{3e^2\sqrt{d+ex}}+\frac{\left(8b^2c^2\log^2(F)\right)\operatorname{Subst}\left(\int F^{c\left(a-\frac{bd}{e}\right)+\frac{bcx^2}{e}}\,dx,x,\sqrt{d+ex}\right)}{3e^3}\\
&= -\frac{2F^{c(a+bx)}}{3e(d+ex)^{3/2}}-\frac{4bcF^{c(a+bx)}\log(F)}{3e^2\sqrt{d+ex}}+\frac{4b^{3/2}c^{3/2}F^{c\left(a-\frac{bd}{e}\right)}\sqrt{\pi}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)\log^{\frac{3}{2}}(F)}{3e^{5/2}}
\end{aligned}
$$

Mathematica [A] time = 0.24, size = 92, normalized size = 0.71

$$
-\frac{2\left(F^{c(a+bx)}(2bc\log(F)(d+ex)+e)+2eF^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3/2}\Gamma\left(\frac{1}{2},-\frac{bc(d+ex)\log(F)}{e}\right)\right)}{3e^2(d+ex)^{3/2}}
$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d + e*x)^(5/2),x]
```

```
[Out] (-2*(2*e*F^(c*(a - (b*d)/e))*Gamma[1/2, -((b*c*(d + e*x)*Log[F])/e)]*(-((b*
c*(d + e*x)*Log[F])/e))^(3/2) + F^(c*(a + b*x))*(e + 2*b*c*(d + e*x)*Log[F]
)))/(3*e^2*(d + e*x)^(3/2))
```

fricas [A] time = 0.43, size = 140, normalized size = 1.08

$$
-\frac{2\left(\frac{2\sqrt{\pi}\left(bce^2x^2+2\,bcdex+bcd^2\right)\sqrt{-\frac{bc\log(F)}{e}}\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)\log(F)}{F^{\frac{bcd-ace}{e}}}+\sqrt{ex+d}\left(2\left(bcex+bcd\right)\log(F)+e\right)F^{bcx+ac}\right)}{3\left(e^4x^2+2\,de^3x+d^2e^2\right)}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(5/2),x, algorithm="fricas")
```

```
[Out] -2/3*(2*sqrt(pi)*(b*c*e^2*x^2 + 2*b*c*d*e*x + b*c*d^2)*sqrt(-b*c*log(F)/e)*
erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/e))*log(F)/F^((b*c*d - a*c*e)/e) + sqrt(
e*x + d)*(2*(b*c*e*x + b*c*d)*log(F) + e)*F^(b*c*x + a*c))/(e^4*x^2 + 2*d*e
^3*x + d^2*e^2)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(5/2), x)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/(e*x+d)^(5/2),x)
```

```
[Out] int(F^((b*x+a)*c)/(e*x+d)^(5/2),x)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(5/2),x, algorithm="maxima")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(5/2), x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{{(d+e\,x)}^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d + e*x)^(5/2),x)
```

```
[Out] int(F^(c*(a + b*x))/(d + e*x)^(5/2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/(e*x+d)**(5/2),x)
```

```
[Out] Timed out
```

3.46 $\int \frac{F^{c(a+bx)}}{(d+ex)^{7/2}}\,dx$

Optimal. Leaf size=165

$$\frac{8\sqrt{\pi}\,b^{5/2}c^{5/2}\log^{\frac{5}{2}}(F)F^{c\left(a-\frac{bd}{e}\right)}\text{erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{15e^{7/2}}-\frac{8b^2c^2\log^2(F)F^{c(a+bx)}}{15e^3\sqrt{d+ex}}-\frac{4bc\log(F)F^{c(a+bx)}}{15e^2(d+ex)^{3/2}}-\frac{2F^{c(a+bx)}}{5e(d+ex)^{5/2}}$$

```
[Out] -2/5*F^(c*(b*x+a))/e/(e*x+d)^(5/2)-4/15*b*c*F^(c*(b*x+a))*ln(F)/e^2/(e*x+d)
^(3/2)+8/15*b^(5/2)*c^(5/2)*F^(c*(a-b*d/e))*erfi(b^(1/2)*c^(1/2)*(e*x+d)^(1
/2)*ln(F)^(1/2)/e^(1/2))*ln(F)^(5/2)*Pi^(1/2)/e^(7/2)-8/15*b^2*c^2*F^(c*(b*
x+a))*ln(F)^2/e^3/(e*x+d)^(1/2)
```

Rubi [A] time = 0.16, antiderivative size = 165, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {2177, 2180, 2204}

$$\frac{8\sqrt{\pi}\,b^{5/2}c^{5/2}\log^{\frac{5}{2}}(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{15e^{7/2}}-\frac{8b^2c^2\log^2(F)F^{c(a+bx)}}{15e^3\sqrt{d+ex}}-\frac{4bc\log(F)F^{c(a+bx)}}{15e^2(d+ex)^{3/2}}-\frac{2F^{c(a+bx)}}{5e(d+ex)^{5/2}}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d + e*x)^(7/2),x]
```

```
[Out] (-2*F^(c*(a + b*x)))/(5*e*(d + e*x)^(5/2)) - (4*b*c*F^(c*(a + b*x))*Log[F])
/(15*e^2*(d + e*x)^(3/2)) - (8*b^2*c^2*F^(c*(a + b*x))*Log[F]^2)/(15*e^3*Sq
rt[d + e*x]) + (8*b^(5/2)*c^(5/2)*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b
]*Sqrt[c]*Sqrt[d + e*x]*Sqrt[Log[F]])/Sqrt[e]]*Log[F]^(5/2))/(15*e^(7/2))
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{(d+ex)^{7/2}}\,dx = -\frac{2F^{c(a+bx)}}{5e(d+ex)^{5/2}} + \frac{(2bc\log(F))\int \frac{F^{c(a+bx)}}{(d+ex)^{5/2}}\,dx}{5e}$$

$$= -\frac{2F^{c(a+bx)}}{5e(d+ex)^{5/2}} - \frac{4bcF^{c(a+bx)}\log(F)}{15e^2(d+ex)^{3/2}} + \frac{\left(4b^2c^2\log^2(F)\right)\int \frac{F^{c(a+bx)}}{(d+ex)^{3/2}}\,dx}{15e^2}$$

$$= -\frac{2F^{c(a+bx)}}{5e(d+ex)^{5/2}} - \frac{4bcF^{c(a+bx)}\log(F)}{15e^2(d+ex)^{3/2}} - \frac{8b^2c^2F^{c(a+bx)}\log^2(F)}{15e^3\sqrt{d+ex}} + \frac{\left(8b^3c^3\log^3(F)\right)\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}}\,dx}{15e^3}$$

$$= -\frac{2F^{c(a+bx)}}{5e(d+ex)^{5/2}} - \frac{4bcF^{c(a+bx)}\log(F)}{15e^2(d+ex)^{3/2}} - \frac{8b^2c^2F^{c(a+bx)}\log^2(F)}{15e^3\sqrt{d+ex}} + \frac{\left(16b^3c^3\log^3(F)\right)\text{Subst}\left(\int F^{c\left(a-\right.}\right.}{15e^4}$$

$$= -\frac{2F^{c(a+bx)}}{5e(d+ex)^{5/2}} - \frac{4bcF^{c(a+bx)}\log(F)}{15e^2(d+ex)^{3/2}} - \frac{8b^2c^2F^{c(a+bx)}\log^2(F)}{15e^3\sqrt{d+ex}} + \frac{8b^{5/2}c^{5/2}F^{c\left(a-\frac{bd}{e}\right)}\sqrt{\pi}\,\text{erfi}\left(\frac{\sqrt{b}\sqrt{c}}{}\right.}{15e^{7/2}}$$

Mathematica [A] time = 0.14, size = 118, normalized size = 0.72

$$\frac{2\left(-2bc\log(F)(d+ex)\left(F^{c(a+bx)}(2bc\log(F)(d+ex)+e)+2eF^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3/2}\Gamma\left(\frac{1}{2},-\frac{bc(d+ex)\log(F)}{e}\right)\right)-3e\right.}{15e^3(d+ex)^{5/2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d + e*x)^(7/2),x]
```

```
[Out] (2*(-3*e^2*F^(c*(a + b*x)) - 2*b*c*(d + e*x)*Log[F]*(2*e*F^(c*(a - (b*d)/e)
)*Gamma[1/2, -((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d + e*x)*Log[F])/e))^(3/
2) + F^(c*(a + b*x))*(e + 2*b*c*(d + e*x)*Log[F]))))/(15*e^3*(d + e*x)^(5/2
))
```

fricas [A] time = 0.43, size = 230, normalized size = 1.39

$$-\frac{2\left(\frac{4\sqrt{\pi}\left(b^2c^2e^3x^3+3\,b^2c^2de^2x^2+3\,b^2c^2d^2ex+b^2c^2d^3\right)\sqrt{-\frac{bc\log(F)}{e}}\,\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)\log(F)^2}{F^{\frac{bcd-ace}{e}}}+\left(4\left(b^2c^2e^2x^2+2\,b^2c^2dex+b^2c^2d^2\right.\right.\right.}{15\left(e^6x^3+3\,de^5x^2+3\,d^2e^4x+d^3e^3\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(7/2),x, algorithm="fricas")
```

```
[Out] -2/15*(4*sqrt(pi)*(b^2*c^2*e^3*x^3 + 3*b^2*c^2*d*e^2*x^2 + 3*b^2*c^2*d^2*e*
x + b^2*c^2*d^3)*sqrt(-b*c*log(F)/e)*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/e))
*log(F)^2/F^((b*c*d - a*c*e)/e) + (4*(b^2*c^2*e^2*x^2 + 2*b^2*c^2*d*e*x + b
^2*c^2*d^2)*log(F)^2 + 3*e^2 + 2*(b*c*e^2*x + b*c*d*e)*log(F))*sqrt(e*x + d
)*F^(b*c*x + a*c))/(e^6*x^3 + 3*d*e^5*x^2 + 3*d^2*e^4*x + d^3*e^3)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(7/2),x, algorithm="giac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(7/2), x)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/(e*x+d)^(7/2),x)
```

```
[Out] int(F^((b*x+a)*c)/(e*x+d)^(7/2),x)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(7/2),x, algorithm="maxima")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(7/2), x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{(d+e\,x)^{7/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d + e*x)^(7/2),x)
```

```
[Out] int(F^(c*(a + b*x))/(d + e*x)^(7/2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/(e*x+d)**(7/2),x)
```

```
[Out] Timed out
```

3.47 $\int \frac{F^{c(a+bx)}}{(d+ex)^{9/2}} dx$

Optimal. Leaf size=200

$$\frac{16\sqrt{\pi}\, b^{7/2} c^{7/2} \log^{\frac{7}{2}}(F) F^{c\left(a-\frac{bd}{e}\right)} \operatorname{erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{105e^{9/2}} - \frac{16b^3c^3\log^3(F)F^{c(a+bx)}}{105e^4\sqrt{d+ex}} - \frac{8b^2c^2\log^2(F)F^{c(a+bx)}}{105e^3(d+ex)^{3/2}} - \frac{4bc\log(F}{35e^2(d}$$

```
[Out] -2/7*F^(c*(b*x+a))/e/(e*x+d)^(7/2)-4/35*b*c*F^(c*(b*x+a))*ln(F)/e^2/(e*x+d)
^(5/2)-8/105*b^2*c^2*F^(c*(b*x+a))*ln(F)^2/e^3/(e*x+d)^(3/2)+16/105*b^(7/2)
*c^(7/2)*F^(c*(a-b*d/e))*erfi(b^(1/2)*c^(1/2)*(e*x+d)^(1/2)*ln(F)^(1/2)/e^(
1/2))*ln(F)^(7/2)*Pi^(1/2)/e^(9/2)-16/105*b^3*c^3*F^(c*(b*x+a))*ln(F)^3/e^4
/(e*x+d)^(1/2)
```

Rubi [A] time = 0.20, antiderivative size = 200, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {2177, 2180, 2204}

$$\frac{16\sqrt{\pi}\, b^{7/2} c^{7/2} \log^{\frac{7}{2}}(F) F^{c\left(a-\frac{bd}{e}\right)} \text{Erfi}\left(\frac{\sqrt{b}\,\sqrt{c}\,\sqrt{\log(F)}\,\sqrt{d+ex}}{\sqrt{e}}\right)}{105e^{9/2}} - \frac{16b^3c^3\log^3(F)F^{c(a+bx)}}{105e^4\sqrt{d+ex}} - \frac{8b^2c^2\log^2(F)F^{c(a+bx)}}{105e^3(d+ex)^{3/2}} - \frac{4bc\log(F}{35e^2(d}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))/(d + e*x)^(9/2),x]
```

```
[Out] (-2*F^(c*(a + b*x)))/(7*e*(d + e*x)^(7/2)) - (4*b*c*F^(c*(a + b*x))*Log[F])
/(35*e^2*(d + e*x)^(5/2)) - (8*b^2*c^2*F^(c*(a + b*x))*Log[F]^2)/(105*e^3*(
d + e*x)^(3/2)) - (16*b^3*c^3*F^(c*(a + b*x))*Log[F]^3)/(105*e^4*Sqrt[d + e
*x]) + (16*b^(7/2)*c^(7/2)*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[
c]*Sqrt[d + e*x]*Sqrt[Log[F]])/Sqrt[e]]*Log[F]^(7/2))/(105*e^(9/2))
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
```

```
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\int \frac{F^{c(a+bx)}}{(d+ex)^{9/2}}\,dx = -\frac{2F^{c(a+bx)}}{7e(d+ex)^{7/2}} + \frac{(2bc\log(F))\int \frac{F^{c(a+bx)}}{(d+ex)^{7/2}}\,dx}{7e}$$

$$= -\frac{2F^{c(a+bx)}}{7e(d+ex)^{7/2}} - \frac{4bcF^{c(a+bx)}\log(F)}{35e^2(d+ex)^{5/2}} + \frac{\left(4b^2c^2\log^2(F)\right)\int \frac{F^{c(a+bx)}}{(d+ex)^{5/2}}\,dx}{35e^2}$$

$$= -\frac{2F^{c(a+bx)}}{7e(d+ex)^{7/2}} - \frac{4bcF^{c(a+bx)}\log(F)}{35e^2(d+ex)^{5/2}} - \frac{8b^2c^2F^{c(a+bx)}\log^2(F)}{105e^3(d+ex)^{3/2}} + \frac{\left(8b^3c^3\log^3(F)\right)\int \frac{F^{c(a+bx)}}{(d+ex)^{3/2}}\,dx}{105e^3}$$

$$= -\frac{2F^{c(a+bx)}}{7e(d+ex)^{7/2}} - \frac{4bcF^{c(a+bx)}\log(F)}{35e^2(d+ex)^{5/2}} - \frac{8b^2c^2F^{c(a+bx)}\log^2(F)}{105e^3(d+ex)^{3/2}} - \frac{16b^3c^3F^{c(a+bx)}\log^3(F)}{105e^4\sqrt{d+ex}} + \frac{\left(16b^4c\right.}{}$$

$$= -\frac{2F^{c(a+bx)}}{7e(d+ex)^{7/2}} - \frac{4bcF^{c(a+bx)}\log(F)}{35e^2(d+ex)^{5/2}} - \frac{8b^2c^2F^{c(a+bx)}\log^2(F)}{105e^3(d+ex)^{3/2}} - \frac{16b^3c^3F^{c(a+bx)}\log^3(F)}{105e^4\sqrt{d+ex}} + \frac{\left(32b^4\right.}{}$$

$$= -\frac{2F^{c(a+bx)}}{7e(d+ex)^{7/2}} - \frac{4bcF^{c(a+bx)}\log(F)}{35e^2(d+ex)^{5/2}} - \frac{8b^2c^2F^{c(a+bx)}\log^2(F)}{105e^3(d+ex)^{3/2}} - \frac{16b^3c^3F^{c(a+bx)}\log^3(F)}{105e^4\sqrt{d+ex}} + \frac{16b^{7/2}}{}$$

Mathematica [A] time = 0.17, size = 144, normalized size = 0.72

$$\frac{2\left(2bc\log(F)(d+ex)\left(-2bc\log(F)(d+ex)\left(F^{c(a+bx)}(2bc\log(F)(d+ex)+e)+2eF^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3/2}\Gamma\left(\frac{1}{2},-\right.\right.\right.\right.}{105e^4(d+ex)^{7/2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))/(d + e*x)^(9/2),x]
```

```
[Out] (2*(-15*e^3*F^(c*(a + b*x)) + 2*b*c*(d + e*x)*Log[F]*(-3*e^2*F^(c*(a + b*x)
) - 2*b*c*(d + e*x)*Log[F]*(2*e*F^(c*(a - (b*d)/e))*Gamma[1/2, -((b*c*(d +
```

```
e*x)*Log[F])/e)]*(-((b*c*(d + e*x)*Log[F])/e))^(3/2) + F^(c*(a + b*x))*(e +
 2*b*c*(d + e*x)*Log[F])))))/(105*e^4*(d + e*x)^(7/2))
```

fricas [A] time = 0.44, size = 321, normalized size = 1.60

$$-\frac{2\left(\frac{8\sqrt{\pi}\left(b^3c^3e^4x^4+4\,b^3c^3de^3x^3+6\,b^3c^3d^2e^2x^2+4\,b^3c^3d^3ex+b^3c^3d^4\right)\sqrt{-\frac{bc\log(F)}{e}}\,\operatorname{erf}\left(\sqrt{ex+d}\,\sqrt{-\frac{bc\log(F)}{e}}\right)\log(F)^3}{F^{\frac{bcd-ace}{e}}}+\left(8\left(b^3c^3e^3x^3+3\,b^3c^3d\right.\right.\right.}{105\left(e^8x^4+\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(9/2),x, algorithm="fricas")
```

```
[Out] -2/105*(8*sqrt(pi)*(b^3*c^3*e^4*x^4 + 4*b^3*c^3*d*e^3*x^3 + 6*b^3*c^3*d^2*e
^2*x^2 + 4*b^3*c^3*d^3*e*x + b^3*c^3*d^4)*sqrt(-b*c*log(F)/e)*erf(sqrt(e*x
+ d)*sqrt(-b*c*log(F)/e))*log(F)^3/F^((b*c*d - a*c*e)/e) + (8*(b^3*c^3*e^3*
x^3 + 3*b^3*c^3*d*e^2*x^2 + 3*b^3*c^3*d^2*e*x + b^3*c^3*d^3)*log(F)^3 + 15*
e^3 + 4*(b^2*c^2*e^3*x^2 + 2*b^2*c^2*d*e^2*x + b^2*c^2*d^2*e)*log(F)^2 + 6*
(b*c*e^3*x + b*c*d*e^2)*log(F))*sqrt(e*x + d)*F^(b*c*x + a*c))/(e^8*x^4 + 4
*d*e^7*x^3 + 6*d^2*e^6*x^2 + 4*d^3*e^5*x + d^4*e^4)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{9}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(9/2),x, algorithm="giac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(9/2), x)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{9}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)/(e*x+d)^(9/2),x)
```

```
[Out] int(F^((b*x+a)*c)/(e*x+d)^(9/2),x)
```

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

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{9}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))/(e*x+d)^(9/2),x, algorithm="maxima")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(9/2), x)
```

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

$$\int \frac{F^{c\,(a+b\,x)}}{{(d+e\,x)}^{9/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))/(d + e*x)^(9/2),x)
```

```
[Out] int(F^(c*(a + b*x))/(d + e*x)^(9/2), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))/(e*x+d)**(9/2),x)
```

```
[Out] Timed out
```

3.48 $\int e^{-bx}x^{13/2}\,dx$

Optimal. Leaf size=151

$$\frac{135135\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{b}\,\sqrt{x}\right)}{128b^{15/2}}-\frac{135135\sqrt{x}\,e^{-bx}}{64b^7}-\frac{45045x^{3/2}e^{-bx}}{32b^6}-\frac{9009x^{5/2}e^{-bx}}{16b^5}-\frac{1287x^{7/2}e^{-bx}}{8b^4}-\frac{143x^{9/2}e^{-bx}}{4b^3}-\frac{13x^{11/2}e^{-bx}}{2b^2}$$

```
[Out] -45045/32*x^(3/2)/b^6/exp(b*x)-9009/16*x^(5/2)/b^5/exp(b*x)-1287/8*x^(7/2)/
b^4/exp(b*x)-143/4*x^(9/2)/b^3/exp(b*x)-13/2*x^(11/2)/b^2/exp(b*x)-x^(13/2)
/b/exp(b*x)+135135/128*erf(b^(1/2)*x^(1/2))*Pi^(1/2)/b^(15/2)-135135/64*x^(
1/2)/b^7/exp(b*x)
```

Rubi [A] time = 0.15, antiderivative size = 151, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 3, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {2176, 2180, 2205}

$$\frac{135135\sqrt{\pi}\,\mathrm{Erf}\left(\sqrt{b}\,\sqrt{x}\right)}{128b^{15/2}}-\frac{13x^{11/2}e^{-bx}}{2b^2}-\frac{143x^{9/2}e^{-bx}}{4b^3}-\frac{1287x^{7/2}e^{-bx}}{8b^4}-\frac{9009x^{5/2}e^{-bx}}{16b^5}-\frac{45045x^{3/2}e^{-bx}}{32b^6}-\frac{135135\sqrt{x}\,e^{-bx}}{64b^7}$$

Antiderivative was successfully verified.

```
[In] Int[x^(13/2)/E^(b*x),x]
```

```
[Out] (-135135*Sqrt[x])/(64*b^7*E^(b*x)) - (45045*x^(3/2))/(32*b^6*E^(b*x)) - (90
09*x^(5/2))/(16*b^5*E^(b*x)) - (1287*x^(7/2))/(8*b^4*E^(b*x)) - (143*x^(9/2
))/(4*b^3*E^(b*x)) - (13*x^(11/2))/(2*b^2*E^(b*x)) - x^(13/2)/(b*E^(b*x)) +
 (135135*Sqrt[Pi]*Erf[Sqrt[b]*Sqrt[x]])/(128*b^(15/2))
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2180

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/Sqrt[(c_.) + (d_.)*(x_)], x_Symbol] :
> Dist[2/d, Subst[Int[F^(g*(e - (c*f)/d) + (f*g*x^2)/d), x], x, Sqrt[c + d*
x]], x] /; FreeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

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]
```

Rubi steps

$$\int e^{-bx}x^{13/2}\,dx = -\frac{e^{-bx}x^{13/2}}{b}+\frac{13\int e^{-bx}x^{11/2}\,dx}{2b}$$
$$= -\frac{13e^{-bx}x^{11/2}}{2b^2}-\frac{e^{-bx}x^{13/2}}{b}+\frac{143\int e^{-bx}x^{9/2}\,dx}{4b^2}$$
$$= -\frac{143e^{-bx}x^{9/2}}{4b^3}-\frac{13e^{-bx}x^{11/2}}{2b^2}-\frac{e^{-bx}x^{13/2}}{b}+\frac{1287\int e^{-bx}x^{7/2}\,dx}{8b^3}$$
$$= -\frac{1287e^{-bx}x^{7/2}}{8b^4}-\frac{143e^{-bx}x^{9/2}}{4b^3}-\frac{13e^{-bx}x^{11/2}}{2b^2}-\frac{e^{-bx}x^{13/2}}{b}+\frac{9009\int e^{-bx}x^{5/2}\,dx}{16b^4}$$
$$= -\frac{9009e^{-bx}x^{5/2}}{16b^5}-\frac{1287e^{-bx}x^{7/2}}{8b^4}-\frac{143e^{-bx}x^{9/2}}{4b^3}-\frac{13e^{-bx}x^{11/2}}{2b^2}-\frac{e^{-bx}x^{13/2}}{b}+\frac{45045\int e^{-bx}x^{3/2}\,dx}{32b^5}$$
$$= -\frac{45045e^{-bx}x^{3/2}}{32b^6}-\frac{9009e^{-bx}x^{5/2}}{16b^5}-\frac{1287e^{-bx}x^{7/2}}{8b^4}-\frac{143e^{-bx}x^{9/2}}{4b^3}-\frac{13e^{-bx}x^{11/2}}{2b^2}-\frac{e^{-bx}x^{13/2}}{b}+ 13513$$
$$= -\frac{135135e^{-bx}\sqrt{x}}{64b^7}-\frac{45045e^{-bx}x^{3/2}}{32b^6}-\frac{9009e^{-bx}x^{5/2}}{16b^5}-\frac{1287e^{-bx}x^{7/2}}{8b^4}-\frac{143e^{-bx}x^{9/2}}{4b^3}-\frac{13e^{-bx}x^{11/2}}{2b^2}-$$
$$= -\frac{135135e^{-bx}\sqrt{x}}{64b^7}-\frac{45045e^{-bx}x^{3/2}}{32b^6}-\frac{9009e^{-bx}x^{5/2}}{16b^5}-\frac{1287e^{-bx}x^{7/2}}{8b^4}-\frac{143e^{-bx}x^{9/2}}{4b^3}-\frac{13e^{-bx}x^{11/2}}{2b^2}-$$
$$= -\frac{135135e^{-bx}\sqrt{x}}{64b^7}-\frac{45045e^{-bx}x^{3/2}}{32b^6}-\frac{9009e^{-bx}x^{5/2}}{16b^5}-\frac{1287e^{-bx}x^{7/2}}{8b^4}-\frac{143e^{-bx}x^{9/2}}{4b^3}-\frac{13e^{-bx}x^{11/2}}{2b^2}-$$

Mathematica [A] time = 0.00, size = 24, normalized size = 0.16

$$-\frac{\sqrt{bx}\,\Gamma\left(\frac{15}{2},bx\right)}{b^8\sqrt{x}}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^(13/2)/E^(b*x),x]
[Out] -((Sqrt[b*x]*Gamma[15/2, b*x])/(b^8*Sqrt[x]))
```

fricas [A] time = 0.45, size = 82, normalized size = 0.54

$$-\frac{2\left(64\,b^7x^6+416\,b^6x^5+2288\,b^5x^4+10296\,b^4x^3+36036\,b^3x^2+90090\,b^2x+135135\,b\right)\sqrt{x}\,e^{(-bx)}-135135\,\sqrt{\pi}\,\sqrt{}}{128\,b^8}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^(13/2)/exp(b*x),x, algorithm="fricas")
```

```
[Out] -1/128*(2*(64*b^7*x^6 + 416*b^6*x^5 + 2288*b^5*x^4 + 10296*b^4*x^3 + 36036*
b^3*x^2 + 90090*b^2*x + 135135*b)*sqrt(x)*e^(-b*x) - 135135*sqrt(pi)*sqrt(b
)*erf(sqrt(b)*sqrt(x)))/b^8
```

giac [A] time = 0.36, size = 80, normalized size = 0.53

$$-\frac{\left(64\,b^{6}x^{\frac{13}{2}} + 416\,b^{5}x^{\frac{11}{2}} + 2288\,b^{4}x^{\frac{9}{2}} + 10296\,b^{3}x^{\frac{7}{2}} + 36036\,b^{2}x^{\frac{5}{2}} + 90090\,bx^{\frac{3}{2}} + 135135\,\sqrt{x}\right)e^{(-bx)}}{64\,b^{7}} - \frac{135135\,\sqrt{\pi}}{12}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^(13/2)/exp(b*x),x, algorithm="giac")
```

```
[Out] -1/64*(64*b^6*x^(13/2) + 416*b^5*x^(11/2) + 2288*b^4*x^(9/2) + 10296*b^3*x^
(7/2) + 36036*b^2*x^(5/2) + 90090*b*x^(3/2) + 135135*sqrt(x))*e^(-b*x)/b^7
- 135135/128*sqrt(pi)*erf(-sqrt(b)*sqrt(x))/b^(15/2)
```

maple [A] time = 0.14, size = 145, normalized size = 0.96

$$-\frac{x^{\frac{13}{2}} e^{-bx}}{b}+\frac{-\frac{13x^{\frac{11}{2}} e^{-bx}}{2b}+\frac{13\left(-\frac{11x^{\frac{9}{2}} e^{-bx}}{4b}+\frac{11\left(-\frac{9x^{\frac{7}{2}} e^{-bx}}{4b}+\frac{9\left(-\frac{7x^{\frac{5}{2}} e^{-bx}}{4b}+\frac{7\left(-\frac{5x^{\frac{3}{2}} e^{-bx}}{4b}+\frac{5\left(-\frac{3\sqrt{x}\, e^{-bx}}{4b}+\frac{3\sqrt{\pi}\, \operatorname{erf}\left(\sqrt{b}\, \sqrt{x}\right)}{8b^{\frac{3}{2}}}\right)}{2b}\right)}{2b}\right)}{2b}\right)}{2b}\right)}{b}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^(13/2)/exp(b*x),x)
```

```
[Out] -1/b*x^(13/2)*exp(-b*x)+13/b*(-1/2/b*x^(11/2)*exp(-b*x)+11/2/b*(-1/2/b*x^(9
/2)*exp(-b*x)+9/2/b*(-1/2/b*x^(7/2)*exp(-b*x)+7/2/b*(-1/2/b*x^(5/2)*exp(-b*
x)+5/2/b*(-1/2/b*x^(3/2)*exp(-b*x)+3/2/b*(-1/2/b*x^(1/2)*exp(-b*x)+1/4/b^(3
/2)*Pi^(1/2)*erf(b^(1/2)*x^(1/2)))))))
```

maxima [A] time = 0.84, size = 79, normalized size = 0.52

$$-\frac{\left(64\,b^{6}x^{\frac{13}{2}}+416\,b^{5}x^{\frac{11}{2}}+2288\,b^{4}x^{\frac{9}{2}}+10296\,b^{3}x^{\frac{7}{2}}+36036\,b^{2}x^{\frac{5}{2}}+90090\,bx^{\frac{3}{2}}+135135\,\sqrt{x}\right)e^{(-bx)}}{64\,b^{7}}+\frac{135135\,\sqrt{\pi}}{12}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^(13/2)/exp(b*x),x, algorithm="maxima")
```

```
[Out] -1/64*(64*b^6*x^(13/2) + 416*b^5*x^(11/2) + 2288*b^4*x^(9/2) + 10296*b^3*x^
(7/2) + 36036*b^2*x^(5/2) + 90090*b*x^(3/2) + 135135*sqrt(x))*e^(-b*x)/b^7
+ 135135/128*sqrt(pi)*erf(sqrt(b)*sqrt(x))/b^(15/2)
```

mupad [B] time = 3.43, size = 89, normalized size = 0.59

$$-\frac{135135\,x^{13/2}\,\sqrt{\pi}\,\mathrm{erfc}\left(\sqrt{b\,x}\right)}{128\,b\,(b\,x)^{13/2}}-\frac{x^{13/2}\,\mathrm{e}^{-b\,x}\,\left(\frac{135135\,\sqrt{b\,x}}{64}+\frac{45045\,(b\,x)^{3/2}}{32}+\frac{9009\,(b\,x)^{5/2}}{16}+\frac{1287\,(b\,x)^{7/2}}{8}+\frac{143\,(b\,x)^{9/2}}{4}+\frac{13\,(b\,x}{2}\right.}{b\,(b\,x)^{13/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^(13/2)*exp(-b*x),x)
```

```
[Out] - (135135*x^(13/2)*pi^(1/2)*erfc((b*x)^(1/2)))/(128*b*(b*x)^(13/2)) - (x^(1
3/2)*exp(-b*x)*((135135*(b*x)^(1/2))/64 + (45045*(b*x)^(3/2))/32 + (9009*(b
*x)^(5/2))/16 + (1287*(b*x)^(7/2))/8 + (143*(b*x)^(9/2))/4 + (13*(b*x)^(11/
2))/2 + (b*x)^(13/2)))/(b*(b*x)^(13/2))
```

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**(13/2)/exp(b*x),x)
```

```
[Out] Timed out
```

3.49 $\int F^{c(a+bx)}(d+ex)^{4/3}\,dx$

Optimal. Leaf size=71

$$-\frac{e\sqrt[3]{d+ex}\,F^{c\left(a-\frac{bd}{e}\right)}\Gamma\left(\frac{7}{3},-\frac{bc(d+ex)\log(F)}{e}\right)}{b^2c^2\log^2(F)\sqrt[3]{-\frac{bc\log(F)(d+ex)}{e}}}$$

```
[Out] -e*F^(c*(a-b*d/e))*(e*x+d)^(1/3)*GAMMA(7/3,-b*c*(e*x+d)*ln(F)/e)/b^2/c^2/ln
(F)^2/(-b*c*(e*x+d)*ln(F)/e)^(1/3)
```

Rubi [A] time = 0.03, antiderivative size = 71, 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 = {2181}

$$-\frac{e\sqrt[3]{d+ex}\,F^{c\left(a-\frac{bd}{e}\right)}\text{Gamma}\left(\frac{7}{3},-\frac{bc\log(F)(d+ex)}{e}\right)}{b^2c^2\log^2(F)\sqrt[3]{-\frac{bc\log(F)(d+ex)}{e}}}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x)^(4/3),x]
```

```
[Out] -((e*F^(c*(a - (b*d)/e))*(d + e*x)^(1/3)*Gamma[7/3, -((b*c*(d + e*x)*Log[F]
)/e)])/(b^2*c^2*Log[F]^2*(-((b*c*(d + e*x)*Log[F])/e))^(1/3)))
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] && !I
ntegerQ[m]
```

Rubi steps

$$\int F^{c(a+bx)}(d+ex)^{4/3}\,dx=-\frac{eF^{c\left(a-\frac{bd}{e}\right)}\sqrt[3]{d+ex}\,\Gamma\left(\frac{7}{3},-\frac{bc(d+ex)\log(F)}{e}\right)}{b^2c^2\log^2(F)\sqrt[3]{-\frac{bc(d+ex)\log(F)}{e}}}$$

Mathematica [A] time = 0.08, size = 63, normalized size = 0.89

$$-\frac{(d+ex)^{7/3}F^{c\left(a-\frac{bd}{e}\right)}\Gamma\left(\frac{7}{3},-\frac{bc(d+ex)\log(F)}{e}\right)}{e\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{7/3}}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x)^(4/3),x]
```

```
[Out] -((F^(c*(a - (b*d)/e))*(d + e*x)^(7/3)*Gamma[7/3, -((b*c*(d + e*x)*Log[F])/
e)])/(e*(-((b*c*(d + e*x)*Log[F])/e))^(7/3)))
```

fricas [A] time = 0.45, size = 117, normalized size = 1.65

$$\frac{\frac{4\left(-\frac{bc\log(F)}{e}\right)^{\frac{2}{3}}e^{2}\Gamma\left(\frac{1}{3},-\frac{(bcex+bcd)\log(F)}{e}\right)}{F^{\frac{bcd-ace}{e}}}-3\left(4\,bce\log(F)-3\left(b^{2}c^{2}ex+b^{2}c^{2}d\right)\log(F)^{2}\right)(ex+d)^{\frac{1}{3}}F^{bcx+ac}}{9\,b^{3}c^{3}\log(F)^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(4/3),x, algorithm="fricas")
```

```
[Out] 1/9*(4*(-b*c*log(F)/e)^(2/3)*e^2*gamma(1/3, -(b*c*e*x + b*c*d)*log(F)/e)/F^
((b*c*d - a*c*e)/e) - 3*(4*b*c*e*log(F) - 3*(b^2*c^2*e*x + b^2*c^2*d)*log(F
)^2)*(e*x + d)^(1/3)*F^(b*c*x + a*c))/(b^3*c^3*log(F)^3)
```

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

$$\int (ex+d)^{\frac{4}{3}}F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(4/3),x, algorithm="giac")
```

```
[Out] integrate((e*x + d)^(4/3)*F^((b*x + a)*c), x)
```

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

$$\int (ex+d)^{\frac{4}{3}}F^{(bx+a)c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e*x+d)^(4/3),x)
```

```
[Out] int(F^((b*x+a)*c)*(e*x+d)^(4/3),x)
```

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

$$\int (ex+d)^{\frac{4}{3}} F^{(bx+a)c}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d)^(4/3),x, algorithm="maxima")
```

```
[Out] integrate((e*x + d)^(4/3)*F^((b*x + a)*c), x)
```

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

$$\int F^{c\,(a+b\,x)}\,{(d+e\,x)}^{4/3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x)^(4/3),x)
```

```
[Out] int(F^(c*(a + b*x))*(d + e*x)^(4/3), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d)**(4/3),x)
```

```
[Out] Timed out
```

3.50 $\int \left(F^{c(a+bx)}\right)^n (d+ex)^{4/3}\,dx$

Optimal. Leaf size=98

$$-\frac{e\sqrt[3]{d+ex}\left(F^{c(a+bx)}\right)^n F^{cn\left(a-\frac{bd}{e}\right)-cn(a+bx)}\Gamma\left(\frac{7}{3},-\frac{bcn(d+ex)\log(F)}{e}\right)}{b^2c^2n^2\log^2(F)\sqrt[3]{-\frac{bcn\log(F)(d+ex)}{e}}}$$

```
[Out] -e*F^(c*(a-b*d/e)*n-c*n*(b*x+a))*(F^(c*(b*x+a)))^n*(e*x+d)^(1/3)*GAMMA(7/3,
-b*c*n*(e*x+d)*ln(F)/e)/b^2/c^2/n^2/ln(F)^2/(-b*c*n*(e*x+d)*ln(F)/e)^(1/3)
```

Rubi [A] time = 0.10, antiderivative size = 98, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.095, Rules used = {2182, 2181}

$$-\frac{e\sqrt[3]{d+ex}\left(F^{c(a+bx)}\right)^n F^{cn\left(a-\frac{bd}{e}\right)-cn(a+bx)}\text{Gamma}\left(\frac{7}{3},-\frac{bcn\log(F)(d+ex)}{e}\right)}{b^2c^2n^2\log^2(F)\sqrt[3]{-\frac{bcn\log(F)(d+ex)}{e}}}$$

Antiderivative was successfully verified.

```
[In] Int[(F^(c*(a + b*x)))^n*(d + e*x)^(4/3),x]
```

```
[Out] -((e*F^(c*(a - (b*d)/e)*n - c*n*(a + b*x))*(F^(c*(a + b*x)))^n*(d + e*x)^(1
/3)*Gamma[7/3, -((b*c*n*(d + e*x)*Log[F])/e)])/(b^2*c^2*n^2*Log[F]^2*(-((b*
c*n*(d + e*x)*Log[F])/e))^(1/3)))
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&  !I
ntegerQ[m]
```

Rule 2182

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_)*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Dist[(b*F^(g*(e + f*x)))^n/F^(g*n*(e + f*x)), Int[(c + d*x
)^m*F^(g*n*(e + f*x)), x], x] /; FreeQ[{F, b, c, d, e, f, g, m, n}, x]
```

Rubi steps

$$\int \left(F^{c(a+bx)}\right)^n (d+ex)^{4/3}\,dx = \left(F^{-cn(a+bx)}\left(F^{c(a+bx)}\right)^n\right)\int F^{cn(a+bx)}(d+ex)^{4/3}\,dx$$
$$= -\frac{eF^{c\left(a-\frac{bd}{e}\right)n-cn(a+bx)}\left(F^{c(a+bx)}\right)^n\sqrt[3]{d+ex}\,\Gamma\left(\frac{7}{3},-\frac{bcn(d+ex)\log(F)}{e}\right)}{b^2c^2n^2\log^2(F)\sqrt[3]{-\frac{bcn(d+ex)\log(F)}{e}}}$$

Mathematica [A] time = 0.14, size = 78, normalized size = 0.80

$$-\frac{(d+ex)^{7/3}\left(F^{c(a+bx)}\right)^n F^{-\frac{bcn(d+ex)}{e}}\Gamma\left(\frac{7}{3},-\frac{bcn(d+ex)\log(F)}{e}\right)}{e\left(-\frac{bcn\log(F)(d+ex)}{e}\right)^{7/3}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(F^(c*(a + b*x)))^n*(d + e*x)^(4/3),x]
```

```
[Out] -(((F^(c*(a + b*x)))^n*(d + e*x)^(7/3)*Gamma[7/3, -((b*c*n*(d + e*x)*Log[F]
)/e)])/(e*F^((b*c*n*(d + e*x))/e)*(-((b*c*n*(d + e*x)*Log[F])/e))^(7/3)))
```

fricas [A] time = 0.49, size = 133, normalized size = 1.36

$$\frac{\frac{4\left(-\frac{bcn\log(F)}{e}\right)^{\frac{2}{3}}e^2\Gamma\left(\frac{1}{3},-\frac{(bcenx+bcdn)\log(F)}{e}\right)}{F^{\frac{(bcd-ace)n}{e}}} - 3\left(4\,bcen\log(F) - 3\left(b^2c^2en^2x + b^2c^2dn^2\right)\log(F)^2\right)(ex+d)^{\frac{1}{3}}F^{bcnx+acn}}{9\,b^3c^3n^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((F^(c*(b*x+a)))^n*(e*x+d)^(4/3),x, algorithm="fricas")
```

```
[Out] 1/9*(4*(-b*c*n*log(F)/e)^(2/3)*e^2*gamma(1/3, -(b*c*e*n*x + b*c*d*n)*log(F)
/e)/F^((b*c*d - a*c*e)*n/e) - 3*(4*b*c*e*n*log(F) - 3*(b^2*c^2*e*n^2*x + b^
2*c^2*d*n^2)*log(F)^2)*(e*x + d)^(1/3)*F^(b*c*n*x + a*c*n))/(b^3*c^3*n^3*lo
g(F)^3)
```

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

$$\int (ex+d)^{\frac{4}{3}}\left(F^{(bx+a)c}\right)^n\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((F^(c*(b*x+a)))^n*(e*x+d)^(4/3),x, algorithm="giac")
[Out] integrate((e*x + d)^(4/3)*(F^((b*x + a)*c))^n, x)
```

maple [F] time = 0.08, size = 0, normalized size = 0.00

$$\int (ex+d)^{\frac{4}{3}} \left(F^{(bx+a)c}\right)^n \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^((b*x+a)*c))^n*(e*x+d)^(4/3),x)
[Out] int((F^((b*x+a)*c))^n*(e*x+d)^(4/3),x)
```

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

$$\int (ex+d)^{\frac{4}{3}} \left(F^{(bx+a)c}\right)^n \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((F^(c*(b*x+a)))^n*(e*x+d)^(4/3),x, algorithm="maxima")
[Out] integrate((e*x + d)^(4/3)*(F^((b*x + a)*c))^n, x)
```

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

$$\int \left(F^{c\,(a+b\,x)}\right)^n \,(d+e\,x)^{4/3} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^(c*(a + b*x)))^n*(d + e*x)^(4/3),x)
[Out] int((F^(c*(a + b*x)))^n*(d + e*x)^(4/3), x)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((F**(c*(b*x+a)))**n*(e*x+d)**(4/3),x)
[Out] Timed out
```

3.51 $\int F^{c(a+bx)}(d+ex)\,dx$

Optimal. Leaf size=48

$$\frac{(d+ex)F^{c(a+bx)}}{bc\log(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}$$

```
[Out] -e*F^(c*(b*x+a))/b^2/c^2/ln(F)^2+F^(c*(b*x+a))*(e*x+d)/b/c/ln(F)
```

Rubi [A] time = 0.02, antiderivative size = 48, 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 = {2176, 2194}

$$\frac{(d+ex)F^{c(a+bx)}}{bc\log(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x),x]
```

```
[Out] -((e*F^(c*(a + b*x)))/(b^2*c^2*Log[F]^2)) + (F^(c*(a + b*x))*(d + e*x))/(b*
c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] && !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\begin{aligned}\int F^{c(a+bx)}(d+ex)\,dx &= \frac{F^{c(a+bx)}(d+ex)}{bc\log(F)}-\frac{e\int F^{c(a+bx)}\,dx}{bc\log(F)}\\ &= -\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{F^{c(a+bx)}(d+ex)}{bc\log(F)}\end{aligned}$$

Mathematica [A] time = 0.03, size = 34, normalized size = 0.71

$$\frac{F^{c(a+bx)}(bc\log(F)(d+ex)-e)}{b^2c^2\log^2(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x),x]
[Out] (F^(c*(a + b*x))*(-e + b*c*(d + e*x)*Log[F]))/(b^2*c^2*Log[F]^2)
```

fricas [A] time = 0.41, size = 38, normalized size = 0.79

$$\frac{\left((bcex+bcd)\log(F)-e\right)F^{bcx+ac}}{b^2c^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d),x, algorithm="fricas")
[Out] ((b*c*e*x + b*c*d)*log(F) - e)*F^(b*c*x + a*c)/(b^2*c^2*log(F)^2)
```

giac [C] time = 0.65, size = 1083, normalized size = 22.56

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d),x, algorithm="giac")
[Out] (2*((pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(pi*b*c*x*sgn(
F) - pi*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))
^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) + (pi
^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(b*c*x*log(abs(
F)) - 1)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*cos(-1/2*p
i*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi^2*b^
2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(pi*b*c*x*sgn(F) - p
i*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) - 4*(pi*b^2
*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(b*c*x*log(abs(F)) - 1)/(
(pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^
2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*sin(-1/2*pi*b*c*x*sg
n(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F))
 + a*c*log(abs(F)) + 1) - 1/2*I*((2*pi*b*c*x*sgn(F) - 2*pi*b*c*x - 4*I*b*c*
x*log(abs(F)) + 4*I)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a
```

```
*c*sgn(F) - 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) + 4*I*pi*b^2*c^2*log(abs(F
))*sgn(F) - 2*pi^2*b^2*c^2 - 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs
(F))^2) + (2*pi*b*c*x*sgn(F) - 2*pi*b*c*x + 4*I*b*c*x*log(abs(F)) - 4*I)*e^
(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a
*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2*pi^2*b^2
*c^2 + 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2))*e^(b*c*x*log(
abs(F)) + a*c*log(abs(F)) + 1) + 2*(2*b*c*d*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*
pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)*log(abs(F))/(4*b^2*c^2*log(abs(F
))^2 + (pi*b*c*sgn(F) - pi*b*c)^2) - (pi*b*c*sgn(F) - pi*b*c)*d*sin(-1/2*pi
*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c)/(4*b^2*c^2*l
og(abs(F))^2 + (pi*b*c*sgn(F) - pi*b*c)^2))*e^(b*c*x*log(abs(F)) + a*c*log(
abs(F))) - 1/2*I*(-2*I*d*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*
pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(I*pi*b*c*sgn(F) - I*pi*b*c + 2*b*c*log(abs(F
))) + 2*I*d*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F
) + 1/2*I*pi*a*c)/(-I*pi*b*c*sgn(F) + I*pi*b*c + 2*b*c*log(abs(F))))*e^(b*c
*x*log(abs(F)) + a*c*log(abs(F)))
```

maple [A] time = 0.01, size = 38, normalized size = 0.79

$$\frac{\left(bcex\ln(F)+bcd\ln(F)-e\right)F^{(bx+a)c}}{b^2c^2\ln(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(e*x+d),x)
```

```
[Out] (b*c*e*x*ln(F)+b*c*d*ln(F)-e)/b^2/c^2*F^((b*x+a)*c)/ln(F)^2
```

maxima [A] time = 0.54, size = 60, normalized size = 1.25

$$\frac{F^{bcx+ac}d}{bc\log(F)}+\frac{\left(F^{ac}bcx\log(F)-F^{ac}\right)F^{bcx}e}{b^2c^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(e*x+d),x, algorithm="maxima")
```

```
[Out] F^(b*c*x + a*c)*d/(b*c*log(F)) + (F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*c*x)
*e/(b^2*c^2*log(F)^2)
```

mupad [B] time = 0.00, size = 38, normalized size = 0.79

$$\frac{F^{a\,c+b\,c\,x}\,\left(b\,c\,d\,\ln(F)-e+b\,c\,e\,x\,\ln(F)\right)}{b^2\,c^2\,{\ln(F)}^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x),x)
```

```
[Out] (F^(a*c + b*c*x)*(b*c*d*log(F) - e + b*c*e*x*log(F)))/(b^2*c^2*log(F)^2)
```

sympy [A] time = 0.14, size = 60, normalized size = 1.25

$$\begin{cases} \frac{F^{c(a+bx)}\left(bcd\log\left(F\right)+bcex\log\left(F\right)-e\right)}{b^2c^2\log\left(F\right)^2} & \text{for } b^2c^2\log\left(F\right)^2\neq 0 \\ dx+\frac{ex^2}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(e*x+d),x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b*c*d*log(F) + b*c*e*x*log(F) - e)/(b**2*c**2*
log(F)**2), Ne(b**2*c**2*log(F)**2, 0)), (d*x + e*x**2/2, True))
```

3.52 $\int F^{c(a+bx)}\left(d+ex+fx^2\right)dx$

Optimal. Leaf size=135

$$\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{exF^{c(a+bx)}}{bc\log(F)}+\frac{fx^2F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] 2*f*F^(c*(b*x+a))/b^3/c^3/ln(F)^3-e*F^(c*(b*x+a))/b^2/c^2/ln(F)^2-2*f*F^(c*
(b*x+a))*x/b^2/c^2/ln(F)^2+d*F^(c*(b*x+a))/b/c/ln(F)+e*F^(c*(b*x+a))*x/b/c/
ln(F)+f*F^(c*(b*x+a))*x^2/b/c/ln(F)
```

Rubi [A] time = 0.10, antiderivative size = 135, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 3, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.150, Rules used = {2196, 2194, 2176}

$$-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{exF^{c(a+bx)}}{bc\log(F)}+\frac{fx^2F^{c(a+bx)}}{bc\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x + f*x^2),x]
```

```
[Out] (2*f*F^(c*(a + b*x)))/(b^3*c^3*Log[F]^3) - (e*F^(c*(a + b*x)))/(b^2*c^2*Log
[F]^2) - (2*f*F^(c*(a + b*x))*x)/(b^2*c^2*Log[F]^2) + (d*F^(c*(a + b*x)))/(
b*c*Log[F]) + (e*F^(c*(a + b*x))*x)/(b*c*Log[F]) + (f*F^(c*(a + b*x))*x^2)/
(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\int F^{c(a+bx)}\left(d+ex+fx^2\right)dx=\int\left(dF^{c(a+bx)}+eF^{c(a+bx)}x+fF^{c(a+bx)}x^2\right)dx$$
$$=d\int F^{c(a+bx)}\,dx+e\int F^{c(a+bx)}x\,dx+f\int F^{c(a+bx)}x^2\,dx$$
$$=\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{eF^{c(a+bx)}x}{bc\log(F)}+\frac{fF^{c(a+bx)}x^2}{bc\log(F)}-\frac{e\int F^{c(a+bx)}\,dx}{bc\log(F)}-\frac{(2f)\int F^{c(a+bx)}x\,dx}{bc\log(F)}$$
$$=-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fF^{c(a+bx)}x}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{eF^{c(a+bx)}x}{bc\log(F)}+\frac{fF^{c(a+bx)}x^2}{bc\log(F)}+\frac{(2f)\int F}{b^2c^2\,l}$$
$$=\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fF^{c(a+bx)}x}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{eF^{c(a+bx)}x}{bc\log(F)}+\frac{fF^{c(a+bx}}{bc\log(}$$

Mathematica [A] time = 0.08, size = 56, normalized size = 0.41

$$\frac{F^{c(a+bx)}\left(b^2c^2\log^2(F)(d+x(e+fx))-bc\log(F)(e+2fx)+2f\right)}{b^3c^3\log^3(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x + f*x^2),x]
```

```
[Out] (F^(c*(a + b*x))*(2*f - b*c*(e + 2*f*x)*Log[F] + b^2*c^2*(d + x*(e + f*x))*
Log[F]^2))/(b^3*c^3*Log[F]^3)
```

fricas [A] time = 0.42, size = 74, normalized size = 0.55

$$\frac{\left(\left(b^2c^2fx^2+b^2c^2ex+b^2c^2d\right)\log(F)^2-\left(2\,bcfx+bce\right)\log(F)+2\,f\right)F^{bcx+ac}}{b^3c^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^2*c^2*f*x^2 + b^2*c^2*e*x + b^2*c^2*d)*log(F)^2 - (2*b*c*f*x + b*c*e)*l
og(F) + 2*f)*F^(b*c*x + a*c)/(b^3*c^3*log(F)^3)
```

giac [C] time = 0.75, size = 2490, normalized size = 18.44

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (2*((pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(pi*b*c*x*sgn(
F) - pi*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))
^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) + (pi
^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(b*c*x*log(abs(
F)) - 1)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*cos(-1/2*p
i*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi^2*b^
2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(pi*b*c*x*sgn(F) - p
i*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) - 4*(pi*b^2
*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(b*c*x*log(abs(F)) - 1)/(
(pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^
2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*sin(-1/2*pi*b*c*x*sg
n(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F))
 + a*c*log(abs(F)) + 1) - 1/2*I*((2*pi*b*c*x*sgn(F) - 2*pi*b*c*x - 4*I*b*c*
x*log(abs(F)) + 4*I)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a
*c*sgn(F) - 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) + 4*I*pi*b^2*c^2*log(abs(F
))*sgn(F) - 2*pi^2*b^2*c^2 - 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs
(F))^2) + (2*pi*b*c*x*sgn(F) - 2*pi*b*c*x + 4*I*b*c*x*log(abs(F)) - 4*I)*e^
(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a
*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2*pi^2*b^2
*c^2 + 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2))*e^(b*c*x*log(
abs(F)) + a*c*log(abs(F)) + 1) + (((pi^2*b^2*c^2*f*x^2*sgn(F) - pi^2*b^2*c^
2*f*x^2 + 2*b^2*c^2*f*x^2*log(abs(F))^2 + pi^2*b^2*c^2*d*sgn(F) - pi^2*b^2*
c^2*d + 2*b^2*c^2*d*log(abs(F))^2 - 4*b*c*f*x*log(abs(F)) + 4*f)*(3*pi^2*b^
3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F
))^3)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*
c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) -
3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2) - 2*(pi^3*b^3*c^3*
sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*lo
g(abs(F))^2)*(pi*b^2*c^2*f*x^2*log(abs(F))*sgn(F) - pi*b^2*c^2*f*x^2*log(ab
s(F)) + pi*b^2*c^2*d*log(abs(F))*sgn(F) - pi*b^2*c^2*d*log(abs(F)) - pi*b*c
*f*x*sgn(F) + pi*b*c*f*x)/((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^
2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*l
og(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2
))*cos(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c
) + ((pi^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^
3 + 3*pi*b^3*c^3*log(abs(F))^2)*(pi^2*b^2*c^2*f*x^2*sgn(F) - pi^2*b^2*c^2*f
*x^2 + 2*b^2*c^2*f*x^2*log(abs(F))^2 + pi^2*b^2*c^2*d*sgn(F) - pi^2*b^2*c^2
*d + 2*b^2*c^2*d*log(abs(F))^2 - 4*b*c*f*x*log(abs(F)) + 4*f)/((pi^3*b^3*c^
3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi*b^3*c^3*
log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*log(
abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2) + 2*(3*pi^2*b^3*c^3*log(abs(F))*sgn(F
```

```
) - 3*pi^2*b^3*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)*(pi*b^2*c^2*f*x^2
*log(abs(F))*sgn(F) - pi*b^2*c^2*f*x^2*log(abs(F)) + pi*b^2*c^2*d*log(abs(F
))*sgn(F) - pi*b^2*c^2*d*log(abs(F)) - pi*b*c*f*x*sgn(F) + pi*b*c*f*x)/((pi
^3*b^3*c^3*sgn(F) - 3*pi*b^3*c^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3 + 3*pi
*b^3*c^3*log(abs(F))^2)^2 + (3*pi^2*b^3*c^3*log(abs(F))*sgn(F) - 3*pi^2*b^3
*c^3*log(abs(F)) + 2*b^3*c^3*log(abs(F))^3)^2))*sin(-1/2*pi*b*c*x*sgn(F) +
1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F)) + a*c*
log(abs(F))) + 1/2*I*((4*I*pi^2*b^2*c^2*f*x^2*sgn(F) - 8*pi*b^2*c^2*f*x^2*l
og(abs(F))*sgn(F) - 4*I*pi^2*b^2*c^2*f*x^2 + 8*pi*b^2*c^2*f*x^2*log(abs(F))
 + 8*I*b^2*c^2*f*x^2*log(abs(F))^2 + 4*I*pi^2*b^2*c^2*d*sgn(F) - 8*pi*b^2*c
^2*d*log(abs(F))*sgn(F) - 4*I*pi^2*b^2*c^2*d + 8*pi*b^2*c^2*d*log(abs(F)) +
 8*I*b^2*c^2*d*log(abs(F))^2 + 8*pi*b*c*f*x*sgn(F) - 8*pi*b*c*f*x - 16*I*b*
c*f*x*log(abs(F)) + 16*I*f)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2
*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(-4*I*pi^3*b^3*c^3*sgn(F) + 12*pi^2*b^3*c^
3*log(abs(F))*sgn(F) + 12*I*pi*b^3*c^3*log(abs(F))^2*sgn(F) + 4*I*pi^3*b^3*
c^3 - 12*pi^2*b^3*c^3*log(abs(F)) - 12*I*pi*b^3*c^3*log(abs(F))^2 + 8*b^3*c
^3*log(abs(F))^3) - (4*I*pi^2*b^2*c^2*f*x^2*sgn(F) + 8*pi*b^2*c^2*f*x^2*log
(abs(F))*sgn(F) - 4*I*pi^2*b^2*c^2*f*x^2 - 8*pi*b^2*c^2*f*x^2*log(abs(F)) +
 8*I*b^2*c^2*f*x^2*log(abs(F))^2 + 4*I*pi^2*b^2*c^2*d*sgn(F) + 8*pi*b^2*c^2
*d*log(abs(F))*sgn(F) - 4*I*pi^2*b^2*c^2*d - 8*pi*b^2*c^2*d*log(abs(F)) + 8
*I*b^2*c^2*d*log(abs(F))^2 - 8*pi*b*c*f*x*sgn(F) + 8*pi*b*c*f*x - 16*I*b*c*
f*x*log(abs(F)) + 16*I*f)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*
I*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(4*I*pi^3*b^3*c^3*sgn(F) + 12*pi^2*b^3*c^3*
log(abs(F))*sgn(F) - 12*I*pi*b^3*c^3*log(abs(F))^2*sgn(F) - 4*I*pi^3*b^3*c^
3 - 12*pi^2*b^3*c^3*log(abs(F)) + 12*I*pi*b^3*c^3*log(abs(F))^2 + 8*b^3*c^3
*log(abs(F))^3))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)))
```

maple [A] time = 0.01, size = 80, normalized size = 0.59

$$\frac{\left(b^2c^2f\,x^2\ln(F)^2 + b^2c^2ex\ln(F)^2 + b^2c^2d\ln(F)^2 - 2bcfx\ln(F) - bce\ln(F) + 2f\right)F^{(bx+a)c}}{b^3c^3\ln(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(f*x^2+e*x+d),x)
```

```
[Out] (f*x^2*b^2*c^2*ln(F)^2+ln(F)^2*b^2*c^2*e*x+b^2*c^2*ln(F)^2*d-2*ln(F)*b*c*f*
x-ln(F)*b*c*e+2*f)*F^((b*x+a)*c)/b^3/c^3/ln(F)^3
```

maxima [A] time = 0.70, size = 117, normalized size = 0.87

$$\frac{F^{bcx+ac}d}{bc\log(F)} + \frac{\left(F^{ac}bcx\log(F) - F^{ac}\right)F^{bcx}e}{b^2c^2\log(F)^2} + \frac{\left(F^{ac}b^2c^2x^2\log(F)^2 - 2\,F^{ac}bcx\log(F) + 2\,F^{ac}\right)F^{bcx}f}{b^3c^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*c*x + a*c)*d/(b*c*log(F)) + (F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*c*x)
*e/(b^2*c^2*log(F)^2) + (F^(a*c)*b^2*c^2*x^2*log(F)^2 - 2*F^(a*c)*b*c*x*log
(F) + 2*F^(a*c))*F^(b*c*x)*f/(b^3*c^3*log(F)^3)
```

mupad [B] time = 3.40, size = 80, normalized size = 0.59

$$\frac{F^{a\,c+b\,c\,x}\,\left(f\,b^2\,c^2\,x^2\,\ln(F)^2+e\,b^2\,c^2\,x\,\ln(F)^2+d\,b^2\,c^2\,\ln(F)^2-2\,f\,b\,c\,x\,\ln(F)-e\,b\,c\,\ln(F)+2\,f\right)}{b^3\,c^3\,\ln(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x + f*x^2),x)
```

```
[Out] (F^(a*c + b*c*x)*(2*f - b*c*e*log(F) + b^2*c^2*d*log(F)^2 + b^2*c^2*f*x^2*l
og(F)^2 - 2*b*c*f*x*log(F) + b^2*c^2*e*x*log(F)^2))/(b^3*c^3*log(F)^3)
```

sympy [A] time = 0.17, size = 116, normalized size = 0.86

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^2c^2d\log{(F)}^2+b^2c^2ex\log{(F)}^2+b^2c^2fx^2\log{(F)}^2-bce\log{(F)}-2bcfx\log{(F)}+2f\right)}{b^3c^3\log{(F)}^3} & \text{for } b^3c^3\log{(F)}^3\neq 0 \\ dx+\frac{ex^2}{2}+\frac{fx^3}{3} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(f*x**2+e*x+d),x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b**2*c**2*d*log(F)**2 + b**2*c**2*e*x*log(F)**
2 + b**2*c**2*f*x**2*log(F)**2 - b*c*e*log(F) - 2*b*c*f*x*log(F) + 2*f)/(b*
*3*c**3*log(F)**3), Ne(b**3*c**3*log(F)**3, 0)), (d*x + e*x**2/2 + f*x**3/3
, True))
```

3.53 $\int F^{c(a+bx)}\left(d+ex+fx^2+gx^3\right)dx$

Optimal. Leaf size=229

$$-\frac{6gF^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{6gxF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{3gx^2F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{exF^{c(a+bx)}}{bc\log(F)}+f$$

```
[Out] -6*F^(c*(b*x+a))*g/b^4/c^4/ln(F)^4+2*f*F^(c*(b*x+a))/b^3/c^3/ln(F)^3+6*F^(c
*(b*x+a))*g*x/b^3/c^3/ln(F)^3-e*F^(c*(b*x+a))/b^2/c^2/ln(F)^2-2*f*F^(c*(b*x
+a))*x/b^2/c^2/ln(F)^2-3*F^(c*(b*x+a))*g*x^2/b^2/c^2/ln(F)^2+d*F^(c*(b*x+a)
)/b/c/ln(F)+e*F^(c*(b*x+a))*x/b/c/ln(F)+f*F^(c*(b*x+a))*x^2/b/c/ln(F)+F^(c*
(b*x+a))*g*x^3/b/c/ln(F)
```

Rubi [A] time = 0.19, antiderivative size = 229, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 3, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.120, Rules used = {2196, 2194, 2176}

$$-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{3gx^2F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{6gxF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{6gF^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{exF^{c(a+bx)}}{bc\log(F)}+f$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x + f*x^2 + g*x^3),x]
```

```
[Out] (-6*F^(c*(a + b*x))*g)/(b^4*c^4*Log[F]^4) + (2*f*F^(c*(a + b*x)))/(b^3*c^3*
Log[F]^3) + (6*F^(c*(a + b*x))*g*x)/(b^3*c^3*Log[F]^3) - (e*F^(c*(a + b*x))
)/(b^2*c^2*Log[F]^2) - (2*f*F^(c*(a + b*x))*x)/(b^2*c^2*Log[F]^2) - (3*F^(c
*(a + b*x))*g*x^2)/(b^2*c^2*Log[F]^2) + (d*F^(c*(a + b*x)))/(b*c*Log[F]) +
(e*F^(c*(a + b*x))*x)/(b*c*Log[F]) + (f*F^(c*(a + b*x))*x^2)/(b*c*Log[F]) +
 (F^(c*(a + b*x))*g*x^3)/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}\int F^{c(a+bx)}\left(d+ex+fx^2+gx^3\right)dx &= \int \left(dF^{c(a+bx)}+eF^{c(a+bx)}x+fF^{c(a+bx)}x^2+F^{c(a+bx)}gx^3\right)dx\\ &= d\int F^{c(a+bx)}\,dx+e\int F^{c(a+bx)}x\,dx+f\int F^{c(a+bx)}x^2\,dx+g\int F^{c(a+bx)}x^3\,dx\\ &= \frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{eF^{c(a+bx)}x}{bc\log(F)}+\frac{fF^{c(a+bx)}x^2}{bc\log(F)}+\frac{F^{c(a+bx)}gx^3}{bc\log(F)}-\frac{e\int F^{c(a+bx)}\,dx}{bc\log(F)}-\frac{(2f)}{}\\ &= -\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fF^{c(a+bx)}x}{b^2c^2\log^2(F)}-\frac{3F^{c(a+bx)}gx^2}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{eF^{c(a+bx)}x}{bc\log(F)}+\frac{f}{b}\\ &= \frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{6F^{c(a+bx)}gx}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fF^{c(a+bx)}x}{b^2c^2\log^2(F)}-\frac{3F^{c(a+bx)}gx^2}{b^2c^2\log^2(F)}\\ &= -\frac{6F^{c(a+bx)}g}{b^4c^4\log^4(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{6F^{c(a+bx)}gx}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fF^{c(a+bx)}x}{b^2c^2\log^2(F)}\end{aligned}$$

Mathematica [A] time = 0.12, size = 84, normalized size = 0.37

$$\frac{F^{c(a+bx)}\left(b^3c^3\log^3(F)(d+x(e+x(f+gx)))-b^2c^2\log^2(F)(e+x(2f+3gx))+2bc\log(F)(f+3gx)-6g\right)}{b^4c^4\log^4(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x + f*x^2 + g*x^3),x]
```

```
[Out] (F^(c*(a + b*x))*(-6*g + 2*b*c*(f + 3*g*x)*Log[F] - b^2*c^2*(e + x*(2*f + 3
*g*x))*Log[F]^2 + b^3*c^3*(d + x*(e + x*(f + g*x)))*Log[F]^3))/(b^4*c^4*Log
[F]^4)
```

fricas [A] time = 0.43, size = 122, normalized size = 0.53

$$\frac{\left(\left(b^3c^3gx^3+b^3c^3fx^2+b^3c^3ex+b^3c^3d\right)\log(F)^3-\left(3\,b^2c^2gx^2+2\,b^2c^2fx+b^2c^2e\right)\log(F)^2+2\left(3\,bcgx+bcf\right)\log(F\right.}{b^4c^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(g*x^3+f*x^2+e*x+d),x, algorithm="fricas")
```

```
[Out] ((b^3*c^3*g*x^3 + b^3*c^3*f*x^2 + b^3*c^3*e*x + b^3*c^3*d)*log(F)^3 - (3*b^
2*c^2*g*x^2 + 2*b^2*c^2*f*x + b^2*c^2*e)*log(F)^2 + 2*(3*b*c*g*x + b*c*f)*l
og(F) - 6*g)*F^(b*c*x + a*c)/(b^4*c^4*log(F)^4)
```

giac [C] time = 0.94, size = 4287, normalized size = 18.72

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(g*x^3+f*x^2+e*x+d),x, algorithm="giac")
```

```
[Out] (2*((pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(pi*b*c*x*sgn(
F) - pi*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))
^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) + (pi
^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(b*c*x*log(abs(
F)) - 1)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*cos(-1/2*p
i*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi^2*b^
2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(pi*b*c*x*sgn(F) - p
i*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) - 4*(pi*b^2
*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(b*c*x*log(abs(F)) - 1)/(
(pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^
2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*sin(-1/2*pi*b*c*x*sg
n(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F))
 + a*c*log(abs(F)) + 1) - 1/2*I*((2*pi*b*c*x*sgn(F) - 2*pi*b*c*x - 4*I*b*c*
x*log(abs(F)) + 4*I)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a
*c*sgn(F) - 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) + 4*I*pi*b^2*c^2*log(abs(F
))*sgn(F) - 2*pi^2*b^2*c^2 - 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs
(F))^2) + (2*pi*b*c*x*sgn(F) - 2*pi*b*c*x + 4*I*b*c*x*log(abs(F)) - 4*I)*e^
(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a
*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2*pi^2*b^2
*c^2 + 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2))*e^(b*c*x*log(
abs(F)) + a*c*log(abs(F)) + 1) - (((3*pi^2*b^3*c^3*g*x^3*log(abs(F))*sgn(F)
 - 3*pi^2*b^3*c^3*g*x^3*log(abs(F)) + 2*b^3*c^3*g*x^3*log(abs(F))^3 + 3*pi^
2*b^3*c^3*f*x^2*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*f*x^2*log(abs(F)) + 2*b
^3*c^3*f*x^2*log(abs(F))^3 + 3*pi^2*b^3*c^3*d*log(abs(F))*sgn(F) - 3*pi^2*b
^3*c^3*d*log(abs(F)) + 2*b^3*c^3*d*log(abs(F))^3 - 3*pi^2*b^2*c^2*g*x^2*sgn
(F) + 3*pi^2*b^2*c^2*g*x^2 - 6*b^2*c^2*g*x^2*log(abs(F))^2 - 2*pi^2*b^2*c^2
*f*x*sgn(F) + 2*pi^2*b^2*c^2*f*x - 4*b^2*c^2*f*x*log(abs(F))^2 + 12*b*c*g*x
*log(abs(F)) + 4*b*c*f*log(abs(F)) - 12*g)*(pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^
4*c^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 -
2*b^4*c^4*log(abs(F))^4)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))
^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs
(F))^4)^2 + 16*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*
```

```
sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2) - 4*(pi^3*
b^3*c^3*g*x^3*sgn(F) - 3*pi*b^3*c^3*g*x^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c
^3*g*x^3 + 3*pi*b^3*c^3*g*x^3*log(abs(F))^2 + pi^3*b^3*c^3*f*x^2*sgn(F) - 3
*pi*b^3*c^3*f*x^2*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3*f*x^2 + 3*pi*b^3*c^3*
f*x^2*log(abs(F))^2 + pi^3*b^3*c^3*d*sgn(F) - 3*pi*b^3*c^3*d*log(abs(F))^2*
sgn(F) - pi^3*b^3*c^3*d + 3*pi*b^3*c^3*d*log(abs(F))^2 + 6*pi*b^2*c^2*g*x^2
*log(abs(F))*sgn(F) - 6*pi*b^2*c^2*g*x^2*log(abs(F)) + 4*pi*b^2*c^2*f*x*log
(abs(F))*sgn(F) - 4*pi*b^2*c^2*f*x*log(abs(F)) - 6*pi*b*c*g*x*sgn(F) + 6*pi
*b*c*g*x - 2*pi*b*c*f*sgn(F) + 2*pi*b*c*f)*(pi^3*b^4*c^4*log(abs(F))*sgn(F)
 - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*
log(abs(F))^3)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F)
- pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2
+ 16*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - p
i^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2))*cos(-1/2*pi*b*c*x*s
gn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) - ((pi^3*b^3*c^3*g*x
^3*sgn(F) - 3*pi*b^3*c^3*g*x^3*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3*g*x^3 +
3*pi*b^3*c^3*g*x^3*log(abs(F))^2 + pi^3*b^3*c^3*f*x^2*sgn(F) - 3*pi*b^3*c^3
*f*x^2*log(abs(F))^2*sgn(F) - pi^3*b^3*c^3*f*x^2 + 3*pi*b^3*c^3*f*x^2*log(a
bs(F))^2 + pi^3*b^3*c^3*d*sgn(F) - 3*pi*b^3*c^3*d*log(abs(F))^2*sgn(F) - pi
^3*b^3*c^3*d + 3*pi*b^3*c^3*d*log(abs(F))^2 + 6*pi*b^2*c^2*g*x^2*log(abs(F)
)*sgn(F) - 6*pi*b^2*c^2*g*x^2*log(abs(F)) + 4*pi*b^2*c^2*f*x*log(abs(F))*sg
n(F) - 4*pi*b^2*c^2*f*x*log(abs(F)) - 6*pi*b*c*g*x*sgn(F) + 6*pi*b*c*g*x -
2*pi*b*c*f*sgn(F) + 2*pi*b*c*f)*(pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(a
bs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*l
og(abs(F))^4)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) -
 pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^4*c^4*log(abs(F))^4)^2 +
 16*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi
^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^2) + 4*(3*pi^2*b^3*c^3*g
*x^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*g*x^3*log(abs(F)) + 2*b^3*c^3*g*x^
3*log(abs(F))^3 + 3*pi^2*b^3*c^3*f*x^2*log(abs(F))*sgn(F) - 3*pi^2*b^3*c^3*
f*x^2*log(abs(F)) + 2*b^3*c^3*f*x^2*log(abs(F))^3 + 3*pi^2*b^3*c^3*d*log(ab
s(F))*sgn(F) - 3*pi^2*b^3*c^3*d*log(abs(F)) + 2*b^3*c^3*d*log(abs(F))^3 - 3
*pi^2*b^2*c^2*g*x^2*sgn(F) + 3*pi^2*b^2*c^2*g*x^2 - 6*b^2*c^2*g*x^2*log(abs
(F))^2 - 2*pi^2*b^2*c^2*f*x*sgn(F) + 2*pi^2*b^2*c^2*f*x - 4*b^2*c^2*f*x*log
(abs(F))^2 + 12*b*c*g*x*log(abs(F)) + 4*b*c*f*log(abs(F)) - 12*g)*(pi^3*b^4
*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*log(abs(F))^3*sgn(F) - pi^3*b^4*c^4*lo
g(abs(F)) + pi*b^4*c^4*log(abs(F))^3)/((pi^4*b^4*c^4*sgn(F) - 6*pi^2*b^4*c^
4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4 + 6*pi^2*b^4*c^4*log(abs(F))^2 - 2*b^
4*c^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*c^4*log(abs(F))*sgn(F) - pi*b^4*c^4*l
og(abs(F))^3*sgn(F) - pi^3*b^4*c^4*log(abs(F)) + pi*b^4*c^4*log(abs(F))^3)^
2))*sin(-1/2*pi*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*
c))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F))) - 1/2*I*((8*pi^3*b^3*c^3*g*x^3*
sgn(F) + 24*I*pi^2*b^3*c^3*g*x^3*log(abs(F))*sgn(F) - 24*pi*b^3*c^3*g*x^3*l
og(abs(F))^2*sgn(F) - 8*pi^3*b^3*c^3*g*x^3 - 24*I*pi^2*b^3*c^3*g*x^3*log(ab
s(F)) + 24*pi*b^3*c^3*g*x^3*log(abs(F))^2 + 16*I*b^3*c^3*g*x^3*log(abs(F))^
```

```
3 + 8*pi^3*b^3*c^3*f*x^2*sgn(F) + 24*I*pi^2*b^3*c^3*f*x^2*log(abs(F))*sgn(F
) - 24*pi*b^3*c^3*f*x^2*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*c^3*f*x^2 - 24*I*
pi^2*b^3*c^3*f*x^2*log(abs(F)) + 24*pi*b^3*c^3*f*x^2*log(abs(F))^2 + 16*I*b
^3*c^3*f*x^2*log(abs(F))^3 + 8*pi^3*b^3*c^3*d*sgn(F) + 24*I*pi^2*b^3*c^3*d*
log(abs(F))*sgn(F) - 24*pi*b^3*c^3*d*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*c^3*
d - 24*I*pi^2*b^3*c^3*d*log(abs(F)) + 24*pi*b^3*c^3*d*log(abs(F))^2 + 16*I*
b^3*c^3*d*log(abs(F))^3 - 24*I*pi^2*b^2*c^2*g*x^2*sgn(F) + 48*pi*b^2*c^2*g*
x^2*log(abs(F))*sgn(F) + 24*I*pi^2*b^2*c^2*g*x^2 - 48*pi*b^2*c^2*g*x^2*log(
abs(F)) - 48*I*b^2*c^2*g*x^2*log(abs(F))^2 - 16*I*pi^2*b^2*c^2*f*x*sgn(F) +
 32*pi*b^2*c^2*f*x*log(abs(F))*sgn(F) + 16*I*pi^2*b^2*c^2*f*x - 32*pi*b^2*c
^2*f*x*log(abs(F)) - 32*I*b^2*c^2*f*x*log(abs(F))^2 - 48*pi*b*c*g*x*sgn(F)
+ 48*pi*b*c*g*x + 96*I*b*c*g*x*log(abs(F)) - 16*pi*b*c*f*sgn(F) + 16*pi*b*c
*f + 32*I*b*c*f*log(abs(F)) - 96*I*g)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b
*c*x + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn(F) + 32*I*pi
^3*b^4*c^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) - 32*I
*pi*b^4*c^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*c^4 - 32*I*pi^3*b^4*c^4*log(a
bs(F)) + 48*pi^2*b^4*c^4*log(abs(F))^2 + 32*I*pi*b^4*c^4*log(abs(F))^3 - 16
*b^4*c^4*log(abs(F))^4) + (8*pi^3*b^3*c^3*g*x^3*sgn(F) - 24*I*pi^2*b^3*c^3*
g*x^3*log(abs(F))*sgn(F) - 24*pi*b^3*c^3*g*x^3*log(abs(F))^2*sgn(F) - 8*pi^
3*b^3*c^3*g*x^3 + 24*I*pi^2*b^3*c^3*g*x^3*log(abs(F)) + 24*pi*b^3*c^3*g*x^3
*log(abs(F))^2 - 16*I*b^3*c^3*g*x^3*log(abs(F))^3 + 8*pi^3*b^3*c^3*f*x^2*sg
n(F) - 24*I*pi^2*b^3*c^3*f*x^2*log(abs(F))*sgn(F) - 24*pi*b^3*c^3*f*x^2*log
(abs(F))^2*sgn(F) - 8*pi^3*b^3*c^3*f*x^2 + 24*I*pi^2*b^3*c^3*f*x^2*log(abs(
F)) + 24*pi*b^3*c^3*f*x^2*log(abs(F))^2 - 16*I*b^3*c^3*f*x^2*log(abs(F))^3
+ 8*pi^3*b^3*c^3*d*sgn(F) - 24*I*pi^2*b^3*c^3*d*log(abs(F))*sgn(F) - 24*pi*
b^3*c^3*d*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*c^3*d + 24*I*pi^2*b^3*c^3*d*log
(abs(F)) + 24*pi*b^3*c^3*d*log(abs(F))^2 - 16*I*b^3*c^3*d*log(abs(F))^3 + 2
4*I*pi^2*b^2*c^2*g*x^2*sgn(F) + 48*pi*b^2*c^2*g*x^2*log(abs(F))*sgn(F) - 24
*I*pi^2*b^2*c^2*g*x^2 - 48*pi*b^2*c^2*g*x^2*log(abs(F)) + 48*I*b^2*c^2*g*x^
2*log(abs(F))^2 + 16*I*pi^2*b^2*c^2*f*x*sgn(F) + 32*pi*b^2*c^2*f*x*log(abs(
F))*sgn(F) - 16*I*pi^2*b^2*c^2*f*x - 32*pi*b^2*c^2*f*x*log(abs(F)) + 32*I*b
^2*c^2*f*x*log(abs(F))^2 - 48*pi*b*c*g*x*sgn(F) + 48*pi*b*c*g*x - 96*I*b*c*
g*x*log(abs(F)) - 16*pi*b*c*f*sgn(F) + 16*pi*b*c*f - 32*I*b*c*f*log(abs(F))
 + 96*I*g)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F)
 + 1/2*I*pi*a*c)/(8*pi^4*b^4*c^4*sgn(F) - 32*I*pi^3*b^4*c^4*log(abs(F))*sgn
(F) - 48*pi^2*b^4*c^4*log(abs(F))^2*sgn(F) + 32*I*pi*b^4*c^4*log(abs(F))^3*
sgn(F) - 8*pi^4*b^4*c^4 + 32*I*pi^3*b^4*c^4*log(abs(F)) + 48*pi^2*b^4*c^4*l
og(abs(F))^2 - 32*I*pi*b^4*c^4*log(abs(F))^3 - 16*b^4*c^4*log(abs(F))^4))*e
^(b*c*x*log(abs(F)) + a*c*log(abs(F)))
```

maple [A] time = 0.01, size = 138, normalized size = 0.60

$$\frac{\left(b^3c^3g\,x^3\ln(F)^3 + b^3c^3f\,x^2\ln(F)^3 + b^3c^3ex\ln(F)^3 + b^3c^3d\ln(F)^3 - 3b^2c^2g\,x^2\ln(F)^2 - 2b^2c^2fx\ln(F)^2 - b^2c^2e\ln(\right.}{b^4c^4\ln(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(g*x^3+f*x^2+e*x+d),x)
```

```
[Out] (g*x^3*b^3*c^3*ln(F)^3+ln(F)^3*b^3*c^3*f*x^2+ln(F)^3*b^3*c^3*e*x+b^3*c^3*ln
(F)^3*d-3*ln(F)^2*b^2*c^2*g*x^2-2*ln(F)^2*b^2*c^2*f*x-b^2*c^2*ln(F)^2*e+6*l
n(F)*b*c*g*x+2*f*b*c*ln(F)-6*g)*F^((b*x+a)*c)/b^4/c^4/ln(F)^4
```

maxima [A] time = 0.85, size = 194, normalized size = 0.85

$$\frac{F^{bcx+ac}d}{bc\log(F)}+\frac{\left(F^{ac}bcx\log(F)-F^{ac}\right)F^{bcx}e}{b^2c^2\log(F)^2}+\frac{\left(F^{ac}b^2c^2x^2\log(F)^2-2\,F^{ac}bcx\log(F)+2\,F^{ac}\right)F^{bcx}f}{b^3c^3\log(F)^3}+\frac{\left(F^{ac}b^3c^3x^3\log(F)^3-\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(g*x^3+f*x^2+e*x+d),x, algorithm="maxima")
```

```
[Out] F^(b*c*x + a*c)*d/(b*c*log(F)) + (F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*c*x)
*e/(b^2*c^2*log(F)^2) + (F^(a*c)*b^2*c^2*x^2*log(F)^2 - 2*F^(a*c)*b*c*x*log
(F) + 2*F^(a*c))*F^(b*c*x)*f/(b^3*c^3*log(F)^3) + (F^(a*c)*b^3*c^3*x^3*log(
F)^3 - 3*F^(a*c)*b^2*c^2*x^2*log(F)^2 + 6*F^(a*c)*b*c*x*log(F) - 6*F^(a*c))
*F^(b*c*x)*g/(b^4*c^4*log(F)^4)
```

mupad [B] time = 3.54, size = 138, normalized size = 0.60

$$\frac{F^{a\,c+b\,c\,x}\,\left(g\,b^3\,c^3\,x^3\,\ln(F)^3+f\,b^3\,c^3\,x^2\,\ln(F)^3+e\,b^3\,c^3\,x\,\ln(F)^3+d\,b^3\,c^3\,\ln(F)^3-3\,g\,b^2\,c^2\,x^2\,\ln(F)^2-2\,f\,b^2\,c^2\,x\,\ln(\right.}{b^4\,c^4\,\ln(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x + f*x^2 + g*x^3),x)
```

```
[Out] (F^(a*c + b*c*x)*(2*b*c*f*log(F) - 6*g + b^3*c^3*d*log(F)^3 - b^2*c^2*e*log
(F)^2 + b^3*c^3*f*x^2*log(F)^3 - 3*b^2*c^2*g*x^2*log(F)^2 + b^3*c^3*g*x^3*l
og(F)^3 + 6*b*c*g*x*log(F) + b^3*c^3*e*x*log(F)^3 - 2*b^2*c^2*f*x*log(F)^2)
)/(b^4*c^4*log(F)^4)
```

sympy [A] time = 0.22, size = 190, normalized size = 0.83

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^3c^3d\log{(F)}^3+b^3c^3ex\log{(F)}^3+b^3c^3fx^2\log{(F)}^3+b^3c^3gx^3\log{(F)}^3-b^2c^2e\log{(F)}^2-2b^2c^2fx\log{(F)}^2-3b^2c^2gx^2\log{(F)}^2+2bcf\log{(F)}+6bcgx\,\mathrm{l}\right.}{b^4c^4\log{(F)}^4} \\ dx+\frac{ex^2}{2}+\frac{fx^3}{3}+\frac{gx^4}{4} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(g*x**3+f*x**2+e*x+d),x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b**3*c**3*d*log(F)**3 + b**3*c**3*e*x*log(F)**
3 + b**3*c**3*f*x**2*log(F)**3 + b**3*c**3*g*x**3*log(F)**3 - b**2*c**2*e*l
og(F)**2 - 2*b**2*c**2*f*x*log(F)**2 - 3*b**2*c**2*g*x**2*log(F)**2 + 2*b*c
*f*log(F) + 6*b*c*g*x*log(F) - 6*g)/(b**4*c**4*log(F)**4), Ne(b**4*c**4*log
(F)**4, 0)), (d*x + e*x**2/2 + f*x**3/3 + g*x**4/4, True))
```

3.54 $\int F^{c(a+bx)}\left(d+ex+fx^2+gx^3+hx^4\right)dx$

Optimal. Leaf size=348

$$\frac{24hF^{c(a+bx)}}{b^5c^5\log^5(F)}-\frac{6gF^{c(a+bx)}}{b^4c^4\log^4(F)}-\frac{24hxF^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{6gxF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{12hx^2F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}$$

```
[Out] 24*F^(c*(b*x+a))*h/b^5/c^5/ln(F)^5-6*F^(c*(b*x+a))*g/b^4/c^4/ln(F)^4-24*F^(
c*(b*x+a))*h*x/b^4/c^4/ln(F)^4+2*f*F^(c*(b*x+a))/b^3/c^3/ln(F)^3+6*F^(c*(b*
x+a))*g*x/b^3/c^3/ln(F)^3+12*F^(c*(b*x+a))*h*x^2/b^3/c^3/ln(F)^3-e*F^(c*(b*
x+a))/b^2/c^2/ln(F)^2-2*f*F^(c*(b*x+a))*x/b^2/c^2/ln(F)^2-3*F^(c*(b*x+a))*g
*x^2/b^2/c^2/ln(F)^2-4*F^(c*(b*x+a))*h*x^3/b^2/c^2/ln(F)^2+d*F^(c*(b*x+a))/
b/c/ln(F)+e*F^(c*(b*x+a))*x/b/c/ln(F)+f*F^(c*(b*x+a))*x^2/b/c/ln(F)+F^(c*(b
*x+a))*g*x^3/b/c/ln(F)+F^(c*(b*x+a))*h*x^4/b/c/ln(F)
```

Rubi [A] time = 0.31, antiderivative size = 348, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 3, integrand size = 30, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.100, Rules used = {2196, 2194, 2176}

$$-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{3gx^2F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{6gxF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{6gF^{c(a+bx)}}{b^4c^4\log^4(F)}-\frac{4hx^3F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{12hx^2F^{c(a+bx)}}{b^3c^3\log^3(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*(d + e*x + f*x^2 + g*x^3 + h*x^4),x]
```

```
[Out] (24*F^(c*(a + b*x))*h)/(b^5*c^5*Log[F]^5) - (6*F^(c*(a + b*x))*g)/(b^4*c^4*
Log[F]^4) - (24*F^(c*(a + b*x))*h*x)/(b^4*c^4*Log[F]^4) + (2*f*F^(c*(a + b*
x)))/(b^3*c^3*Log[F]^3) + (6*F^(c*(a + b*x))*g*x)/(b^3*c^3*Log[F]^3) + (12*
F^(c*(a + b*x))*h*x^2)/(b^3*c^3*Log[F]^3) - (e*F^(c*(a + b*x)))/(b^2*c^2*Lo
g[F]^2) - (2*f*F^(c*(a + b*x))*x)/(b^2*c^2*Log[F]^2) - (3*F^(c*(a + b*x))*g
*x^2)/(b^2*c^2*Log[F]^2) - (4*F^(c*(a + b*x))*h*x^3)/(b^2*c^2*Log[F]^2) + (
d*F^(c*(a + b*x)))/(b*c*Log[F]) + (e*F^(c*(a + b*x))*x)/(b*c*Log[F]) + (f*F
^(c*(a + b*x))*x^2)/(b*c*Log[F]) + (F^(c*(a + b*x))*g*x^3)/(b*c*Log[F]) + (
F^(c*(a + b*x))*h*x^4)/(b*c*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\int F^{c(a+bx)}\left(d+ex+fx^2+gx^3+hx^4\right)dx = \int \left(dF^{c(a+bx)}+eF^{c(a+bx)}x+fF^{c(a+bx)}x^2+F^{c(a+bx)}gx^3+F^{c(a+bx)}hx^4\right)$$

$$= d\int F^{c(a+bx)}\,dx + e\int F^{c(a+bx)}x\,dx + f\int F^{c(a+bx)}x^2\,dx + g\int F^{c(a+bx}$$

$$= \frac{dF^{c(a+bx)}}{bc\log(F)} + \frac{eF^{c(a+bx)}x}{bc\log(F)} + \frac{fF^{c(a+bx)}x^2}{bc\log(F)} + \frac{F^{c(a+bx)}gx^3}{bc\log(F)} + \frac{F^{c(a+bx)}hx^4}{bc\log(F)} -$$

$$= -\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)} - \frac{2fF^{c(a+bx)}x}{b^2c^2\log^2(F)} - \frac{3F^{c(a+bx)}gx^2}{b^2c^2\log^2(F)} - \frac{4F^{c(a+bx)}hx^3}{b^2c^2\log^2(F)} + \frac{dF^{c}}{bc\,\mathrm{lo}}$$

$$= \frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)} + \frac{6F^{c(a+bx)}gx}{b^3c^3\log^3(F)} + \frac{12F^{c(a+bx)}hx^2}{b^3c^3\log^3(F)} - \frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)} - \frac{2fF}{b^2c^2}$$

$$= -\frac{6F^{c(a+bx)}g}{b^4c^4\log^4(F)} - \frac{24F^{c(a+bx)}hx}{b^4c^4\log^4(F)} + \frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)} + \frac{6F^{c(a+bx)}gx}{b^3c^3\log^3(F)} + \frac{12F}{b^3c}$$

$$= \frac{24F^{c(a+bx)}h}{b^5c^5\log^5(F)} - \frac{6F^{c(a+bx)}g}{b^4c^4\log^4(F)} - \frac{24F^{c(a+bx)}hx}{b^4c^4\log^4(F)} + \frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)} + \frac{6F^{c(a}}{b^3c^3\,\mathrm{l}}$$

Mathematica [A] time = 0.18, size = 117, normalized size = 0.34

$$\frac{F^{c(a+bx)}\left(b^4c^4\log^4(F)(d+x(e+x(f+x(g+hx))))-b^3c^3\log^3(F)\left(e+x\left(2f+3gx+4hx^2\right)\right)+2b^2c^2\log^2(F)(f+}{b^5c^5\log^5(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*(d + e*x + f*x^2 + g*x^3 + h*x^4),x]
```

```
[Out] (F^(c*(a + b*x))*(24*h - 6*b*c*(g + 4*h*x)*Log[F] + 2*b^2*c^2*(f + 3*x*(g +
 2*h*x))*Log[F]^2 - b^3*c^3*(e + x*(2*f + 3*g*x + 4*h*x^2))*Log[F]^3 + b^4*
c^4*(d + x*(e + x*(f + x*(g + h*x))))*Log[F]^4))/(b^5*c^5*Log[F]^5)
```

fricas [A] time = 0.41, size = 182, normalized size = 0.52

$$\frac{\left(\left(b^4c^4hx^4 + b^4c^4gx^3 + b^4c^4fx^2 + b^4c^4ex + b^4c^4d\right)\log(F)^4 - \left(4\,b^3c^3hx^3 + 3\,b^3c^3gx^2 + 2\,b^3c^3fx + b^3c^3e\right)\log(F)^3 + \right.}{b^5c^5\log(F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(h*x^4+g*x^3+f*x^2+e*x+d),x, algorithm="fricas")
```

```
[Out] ((b^4*c^4*h*x^4 + b^4*c^4*g*x^3 + b^4*c^4*f*x^2 + b^4*c^4*e*x + b^4*c^4*d)*
log(F)^4 - (4*b^3*c^3*h*x^3 + 3*b^3*c^3*g*x^2 + 2*b^3*c^3*f*x + b^3*c^3*e)*
log(F)^3 + 2*(6*b^2*c^2*h*x^2 + 3*b^2*c^2*g*x + b^2*c^2*f)*log(F)^2 - 6*(4*
b*c*h*x + b*c*g)*log(F) + 24*h)*F^(b*c*x + a*c)/(b^5*c^5*log(F)^5)
```

giac [C] time = 1.31, size = 7425, normalized size = 21.34

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(h*x^4+g*x^3+f*x^2+e*x+d),x, algorithm="giac")
```

```
[Out] (2*((pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(pi*b*c*x*sgn(
F) - pi*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))
^2)^2 + 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) + (pi
^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(b*c*x*log(abs(
F)) - 1)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*cos(-1/2*p
i*b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) + ((pi^2*b^
2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)*(pi*b*c*x*sgn(F) - p
i*b*c*x)/((pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2
+ 4*(pi*b^2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2) - 4*(pi*b^2
*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))*(b*c*x*log(abs(F)) - 1)/(
(pi^2*b^2*c^2*sgn(F) - pi^2*b^2*c^2 + 2*b^2*c^2*log(abs(F))^2)^2 + 4*(pi*b^
2*c^2*log(abs(F))*sgn(F) - pi*b^2*c^2*log(abs(F)))^2))*sin(-1/2*pi*b*c*x*sg
n(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log(abs(F))
 + a*c*log(abs(F)) + 1) - 1/2*I*((2*pi*b*c*x*sgn(F) - 2*pi*b*c*x - 4*I*b*c*
x*log(abs(F)) + 4*I)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x + 1/2*I*pi*a
*c*sgn(F) - 1/2*I*pi*a*c)/(2*pi^2*b^2*c^2*sgn(F) + 4*I*pi*b^2*c^2*log(abs(F
))*sgn(F) - 2*pi^2*b^2*c^2 - 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs
(F))^2) + (2*pi*b*c*x*sgn(F) - 2*pi*b*c*x + 4*I*b*c*x*log(abs(F)) - 4*I)*e^
(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I*pi*a*c*sgn(F) + 1/2*I*pi*a
*c)/(2*pi^2*b^2*c^2*sgn(F) - 4*I*pi*b^2*c^2*log(abs(F))*sgn(F) - 2*pi^2*b^2
*c^2 + 4*I*pi*b^2*c^2*log(abs(F)) + 4*b^2*c^2*log(abs(F))^2))*e^(b*c*x*log(
abs(F)) + a*c*log(abs(F)) + 1) - (((4*pi^3*b^4*c^4*h*x^4*log(abs(F))*sgn(F)
 - 4*pi*b^4*c^4*h*x^4*log(abs(F))^3*sgn(F) - 4*pi^3*b^4*c^4*h*x^4*log(abs(F
```

)) + 4*pi*b^4*c^4*h*x^4*log(abs(F))^3 + 4*pi^3*b^4*c^4*g*x^3*log(abs(F))*sg
n(F) - 4*pi*b^4*c^4*g*x^3*log(abs(F))^3*sgn(F) - 4*pi^3*b^4*c^4*g*x^3*log(a
bs(F)) + 4*pi*b^4*c^4*g*x^3*log(abs(F))^3 + 4*pi^3*b^4*c^4*f*x^2*log(abs(F)
)*sgn(F) - 4*pi*b^4*c^4*f*x^2*log(abs(F))^3*sgn(F) - 4*pi^3*b^4*c^4*f*x^2*l
og(abs(F)) + 4*pi*b^4*c^4*f*x^2*log(abs(F))^3 - 4*pi^3*b^3*c^3*h*x^3*sgn(F)
 + 4*pi^3*b^4*c^4*d*log(abs(F))*sgn(F) + 12*pi*b^3*c^3*h*x^3*log(abs(F))^2*
sgn(F) - 4*pi*b^4*c^4*d*log(abs(F))^3*sgn(F) + 4*pi^3*b^3*c^3*h*x^3 - 4*pi^
3*b^4*c^4*d*log(abs(F)) - 12*pi*b^3*c^3*h*x^3*log(abs(F))^2 + 4*pi*b^4*c^4*
d*log(abs(F))^3 - 3*pi^3*b^3*c^3*g*x^2*sgn(F) + 9*pi*b^3*c^3*g*x^2*log(abs(
F))^2*sgn(F) + 3*pi^3*b^3*c^3*g*x^2 - 9*pi*b^3*c^3*g*x^2*log(abs(F))^2 - 2*
pi^3*b^3*c^3*f*x*sgn(F) + 6*pi*b^3*c^3*f*x*log(abs(F))^2*sgn(F) + 2*pi^3*b^
3*c^3*f*x - 6*pi*b^3*c^3*f*x*log(abs(F))^2 - 24*pi*b^2*c^2*h*x^2*log(abs(F)
)*sgn(F) + 24*pi*b^2*c^2*h*x^2*log(abs(F)) - 12*pi*b^2*c^2*g*x*log(abs(F))*
sgn(F) + 12*pi*b^2*c^2*g*x*log(abs(F)) - 4*pi*b^2*c^2*f*log(abs(F))*sgn(F)
 + 4*pi*b^2*c^2*f*log(abs(F)) + 24*pi*b*c*h*x*sgn(F) - 24*pi*b*c*h*x + 6*pi*
b*c*g*sgn(F) - 6*pi*b*c*g)*(pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F
))^2*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^
5*c^5*log(abs(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)/((pi^5*b^5*c^5*sgn(F) - 1
0*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - p
i^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)^2
 + (5*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F
) - 5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*
log(abs(F))^5)^2) - (pi^4*b^4*c^4*h*x^4*sgn(F) - 6*pi^2*b^4*c^4*h*x^4*log(a
bs(F))^2*sgn(F) - pi^4*b^4*c^4*h*x^4 + 6*pi^2*b^4*c^4*h*x^4*log(abs(F))^2 -
 2*b^4*c^4*h*x^4*log(abs(F))^4 + pi^4*b^4*c^4*g*x^3*sgn(F) - 6*pi^2*b^4*c^4
*g*x^3*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4*g*x^3 + 6*pi^2*b^4*c^4*g*x^3*log
(abs(F))^2 - 2*b^4*c^4*g*x^3*log(abs(F))^4 + pi^4*b^4*c^4*f*x^2*sgn(F) - 6*
pi^2*b^4*c^4*f*x^2*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4*f*x^2 + 6*pi^2*b^4*c
^4*f*x^2*log(abs(F))^2 - 2*b^4*c^4*f*x^2*log(abs(F))^4 + pi^4*b^4*c^4*d*sgn
(F) + 12*pi^2*b^3*c^3*h*x^3*log(abs(F))*sgn(F) - 6*pi^2*b^4*c^4*d*log(abs(F
))^2*sgn(F) - pi^4*b^4*c^4*d - 12*pi^2*b^3*c^3*h*x^3*log(abs(F)) + 6*pi^2*b
^4*c^4*d*log(abs(F))^2 + 8*b^3*c^3*h*x^3*log(abs(F))^3 - 2*b^4*c^4*d*log(ab
s(F))^4 + 9*pi^2*b^3*c^3*g*x^2*log(abs(F))*sgn(F) - 9*pi^2*b^3*c^3*g*x^2*lo
g(abs(F)) + 6*b^3*c^3*g*x^2*log(abs(F))^3 + 6*pi^2*b^3*c^3*f*x*log(abs(F))*
sgn(F) - 6*pi^2*b^3*c^3*f*x*log(abs(F)) + 4*b^3*c^3*f*x*log(abs(F))^3 - 12*
pi^2*b^2*c^2*h*x^2*sgn(F) + 12*pi^2*b^2*c^2*h*x^2 - 24*b^2*c^2*h*x^2*log(ab
s(F))^2 - 6*pi^2*b^2*c^2*g*x*sgn(F) + 6*pi^2*b^2*c^2*g*x - 12*b^2*c^2*g*x*l
og(abs(F))^2 - 2*pi^2*b^2*c^2*f*sgn(F) + 2*pi^2*b^2*c^2*f - 4*b^2*c^2*f*log
(abs(F))^2 + 48*b*c*h*x*log(abs(F)) + 12*b*c*g*log(abs(F)) - 48*h)*(5*pi^4*
b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 5*pi^4*
b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(abs(F))
^5)/((pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 5*pi*b^5
*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F))^2 -
5*pi*b^5*c^5*log(abs(F))^4)^2 + (5*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^
2*b^5*c^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c

```
^5*log(abs(F))^3 - 2*b^5*c^5*log(abs(F))^5)^2))*cos(-1/2*pi*b*c*x*sgn(F) +
1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c) - ((pi^4*b^4*c^4*h*x^4*sgn(F
) - 6*pi^2*b^4*c^4*h*x^4*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4*h*x^4 + 6*pi^2
*b^4*c^4*h*x^4*log(abs(F))^2 - 2*b^4*c^4*h*x^4*log(abs(F))^4 + pi^4*b^4*c^4
*g*x^3*sgn(F) - 6*pi^2*b^4*c^4*g*x^3*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4*g*
x^3 + 6*pi^2*b^4*c^4*g*x^3*log(abs(F))^2 - 2*b^4*c^4*g*x^3*log(abs(F))^4 +
pi^4*b^4*c^4*f*x^2*sgn(F) - 6*pi^2*b^4*c^4*f*x^2*log(abs(F))^2*sgn(F) - pi^
4*b^4*c^4*f*x^2 + 6*pi^2*b^4*c^4*f*x^2*log(abs(F))^2 - 2*b^4*c^4*f*x^2*log(
abs(F))^4 + pi^4*b^4*c^4*d*sgn(F) + 12*pi^2*b^3*c^3*h*x^3*log(abs(F))*sgn(F
) - 6*pi^2*b^4*c^4*d*log(abs(F))^2*sgn(F) - pi^4*b^4*c^4*d - 12*pi^2*b^3*c^
3*h*x^3*log(abs(F)) + 6*pi^2*b^4*c^4*d*log(abs(F))^2 + 8*b^3*c^3*h*x^3*log(
abs(F))^3 - 2*b^4*c^4*d*log(abs(F))^4 + 9*pi^2*b^3*c^3*g*x^2*log(abs(F))*sg
n(F) - 9*pi^2*b^3*c^3*g*x^2*log(abs(F)) + 6*b^3*c^3*g*x^2*log(abs(F))^3 + 6
*pi^2*b^3*c^3*f*x*log(abs(F))*sgn(F) - 6*pi^2*b^3*c^3*f*x*log(abs(F)) + 4*b
^3*c^3*f*x*log(abs(F))^3 - 12*pi^2*b^2*c^2*h*x^2*sgn(F) + 12*pi^2*b^2*c^2*h
*x^2 - 24*b^2*c^2*h*x^2*log(abs(F))^2 - 6*pi^2*b^2*c^2*g*x*sgn(F) + 6*pi^2*
b^2*c^2*g*x - 12*b^2*c^2*g*x*log(abs(F))^2 - 2*pi^2*b^2*c^2*f*sgn(F) + 2*pi
^2*b^2*c^2*f - 4*b^2*c^2*f*log(abs(F))^2 + 48*b*c*h*x*log(abs(F)) + 12*b*c*
g*log(abs(F)) - 48*h)*(pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*
sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5
*log(abs(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)/((pi^5*b^5*c^5*sgn(F) - 10*pi^
3*b^5*c^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b
^5*c^5 + 10*pi^3*b^5*c^5*log(abs(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)^2 + (5
*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 5
*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(a
bs(F))^5)^2) + (4*pi^3*b^4*c^4*h*x^4*log(abs(F))*sgn(F) - 4*pi*b^4*c^4*h*x^
4*log(abs(F))^3*sgn(F) - 4*pi^3*b^4*c^4*h*x^4*log(abs(F)) + 4*pi*b^4*c^4*h*
x^4*log(abs(F))^3 + 4*pi^3*b^4*c^4*g*x^3*log(abs(F))*sgn(F) - 4*pi*b^4*c^4*
g*x^3*log(abs(F))^3*sgn(F) - 4*pi^3*b^4*c^4*g*x^3*log(abs(F)) + 4*pi*b^4*c^
4*g*x^3*log(abs(F))^3 + 4*pi^3*b^4*c^4*f*x^2*log(abs(F))*sgn(F) - 4*pi*b^4*
c^4*f*x^2*log(abs(F))^3*sgn(F) - 4*pi^3*b^4*c^4*f*x^2*log(abs(F)) + 4*pi*b^
4*c^4*f*x^2*log(abs(F))^3 - 4*pi^3*b^3*c^3*h*x^3*sgn(F) + 4*pi^3*b^4*c^4*d*
log(abs(F))*sgn(F) + 12*pi*b^3*c^3*h*x^3*log(abs(F))^2*sgn(F) - 4*pi*b^4*c^
4*d*log(abs(F))^3*sgn(F) + 4*pi^3*b^3*c^3*h*x^3 - 4*pi^3*b^4*c^4*d*log(abs(
F)) - 12*pi*b^3*c^3*h*x^3*log(abs(F))^2 + 4*pi*b^4*c^4*d*log(abs(F))^3 - 3*
pi^3*b^3*c^3*g*x^2*sgn(F) + 9*pi*b^3*c^3*g*x^2*log(abs(F))^2*sgn(F) + 3*pi^
3*b^3*c^3*g*x^2 - 9*pi*b^3*c^3*g*x^2*log(abs(F))^2 - 2*pi^3*b^3*c^3*f*x*sgn
(F) + 6*pi*b^3*c^3*f*x*log(abs(F))^2*sgn(F) + 2*pi^3*b^3*c^3*f*x - 6*pi*b^3
*c^3*f*x*log(abs(F))^2 - 24*pi*b^2*c^2*h*x^2*log(abs(F))*sgn(F) + 24*pi*b^2
*c^2*h*x^2*log(abs(F)) - 12*pi*b^2*c^2*g*x*log(abs(F))*sgn(F) + 12*pi*b^2*c
^2*g*x*log(abs(F)) - 4*pi*b^2*c^2*f*log(abs(F))*sgn(F) + 4*pi*b^2*c^2*f*log
(abs(F)) + 24*pi*b*c*h*x*sgn(F) - 24*pi*b*c*h*x + 6*pi*b*c*g*sgn(F) - 6*pi*
b*c*g)*(5*pi^4*b^5*c^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*s
gn(F) - 5*pi^4*b^5*c^5*log(abs(F)) + 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*
c^5*log(abs(F))^5)/((pi^5*b^5*c^5*sgn(F) - 10*pi^3*b^5*c^5*log(abs(F))^2*sg
```

```
n(F) + 5*pi*b^5*c^5*log(abs(F))^4*sgn(F) - pi^5*b^5*c^5 + 10*pi^3*b^5*c^5*l
og(abs(F))^2 - 5*pi*b^5*c^5*log(abs(F))^4)^2 + (5*pi^4*b^5*c^5*log(abs(F))*
sgn(F) - 10*pi^2*b^5*c^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*c^5*log(abs(F))
+ 10*pi^2*b^5*c^5*log(abs(F))^3 - 2*b^5*c^5*log(abs(F))^5)^2))*sin(-1/2*pi*
b*c*x*sgn(F) + 1/2*pi*b*c*x - 1/2*pi*a*c*sgn(F) + 1/2*pi*a*c))*e^(b*c*x*log
(abs(F)) + a*c*log(abs(F))) + 1/2*I*((-16*I*pi^4*b^4*c^4*h*x^4*sgn(F) + 64*
pi^3*b^4*c^4*h*x^4*log(abs(F))*sgn(F) + 96*I*pi^2*b^4*c^4*h*x^4*log(abs(F))
^2*sgn(F) - 64*pi*b^4*c^4*h*x^4*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4*c^4*h*
x^4 - 64*pi^3*b^4*c^4*h*x^4*log(abs(F)) - 96*I*pi^2*b^4*c^4*h*x^4*log(abs(F
))^2 + 64*pi*b^4*c^4*h*x^4*log(abs(F))^3 + 32*I*b^4*c^4*h*x^4*log(abs(F))^4
 - 16*I*pi^4*b^4*c^4*g*x^3*sgn(F) + 64*pi^3*b^4*c^4*g*x^3*log(abs(F))*sgn(F
) + 96*I*pi^2*b^4*c^4*g*x^3*log(abs(F))^2*sgn(F) - 64*pi*b^4*c^4*g*x^3*log(
abs(F))^3*sgn(F) + 16*I*pi^4*b^4*c^4*g*x^3 - 64*pi^3*b^4*c^4*g*x^3*log(abs(
F)) - 96*I*pi^2*b^4*c^4*g*x^3*log(abs(F))^2 + 64*pi*b^4*c^4*g*x^3*log(abs(F
))^3 + 32*I*b^4*c^4*g*x^3*log(abs(F))^4 - 16*I*pi^4*b^4*c^4*f*x^2*sgn(F) +
64*pi^3*b^4*c^4*f*x^2*log(abs(F))*sgn(F) + 96*I*pi^2*b^4*c^4*f*x^2*log(abs(
F))^2*sgn(F) - 64*pi*b^4*c^4*f*x^2*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4*c^4
*f*x^2 - 64*pi^3*b^4*c^4*f*x^2*log(abs(F)) - 96*I*pi^2*b^4*c^4*f*x^2*log(ab
s(F))^2 + 64*pi*b^4*c^4*f*x^2*log(abs(F))^3 + 32*I*b^4*c^4*f*x^2*log(abs(F)
)^4 - 16*I*pi^4*b^4*c^4*d*sgn(F) - 64*pi^3*b^3*c^3*h*x^3*sgn(F) + 64*pi^3*b
^4*c^4*d*log(abs(F))*sgn(F) - 192*I*pi^2*b^3*c^3*h*x^3*log(abs(F))*sgn(F) +
 96*I*pi^2*b^4*c^4*d*log(abs(F))^2*sgn(F) + 192*pi*b^3*c^3*h*x^3*log(abs(F)
)^2*sgn(F) - 64*pi*b^4*c^4*d*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4*c^4*d + 6
4*pi^3*b^3*c^3*h*x^3 - 64*pi^3*b^4*c^4*d*log(abs(F)) + 192*I*pi^2*b^3*c^3*h
*x^3*log(abs(F)) - 96*I*pi^2*b^4*c^4*d*log(abs(F))^2 - 192*pi*b^3*c^3*h*x^3
*log(abs(F))^2 + 64*pi*b^4*c^4*d*log(abs(F))^3 - 128*I*b^3*c^3*h*x^3*log(ab
s(F))^3 + 32*I*b^4*c^4*d*log(abs(F))^4 - 48*pi^3*b^3*c^3*g*x^2*sgn(F) - 144
*I*pi^2*b^3*c^3*g*x^2*log(abs(F))*sgn(F) + 144*pi*b^3*c^3*g*x^2*log(abs(F))
^2*sgn(F) + 48*pi^3*b^3*c^3*g*x^2 + 144*I*pi^2*b^3*c^3*g*x^2*log(abs(F)) -
144*pi*b^3*c^3*g*x^2*log(abs(F))^2 - 96*I*b^3*c^3*g*x^2*log(abs(F))^3 - 32*
pi^3*b^3*c^3*f*x*sgn(F) - 96*I*pi^2*b^3*c^3*f*x*log(abs(F))*sgn(F) + 96*pi*
b^3*c^3*f*x*log(abs(F))^2*sgn(F) + 32*pi^3*b^3*c^3*f*x + 96*I*pi^2*b^3*c^3*
f*x*log(abs(F)) - 96*pi*b^3*c^3*f*x*log(abs(F))^2 - 64*I*b^3*c^3*f*x*log(ab
s(F))^3 + 192*I*pi^2*b^2*c^2*h*x^2*sgn(F) - 384*pi*b^2*c^2*h*x^2*log(abs(F)
)*sgn(F) - 192*I*pi^2*b^2*c^2*h*x^2 + 384*pi*b^2*c^2*h*x^2*log(abs(F)) + 38
4*I*b^2*c^2*h*x^2*log(abs(F))^2 + 96*I*pi^2*b^2*c^2*g*x*sgn(F) - 192*pi*b^2
*c^2*g*x*log(abs(F))*sgn(F) - 96*I*pi^2*b^2*c^2*g*x + 192*pi*b^2*c^2*g*x*lo
g(abs(F)) + 192*I*b^2*c^2*g*x*log(abs(F))^2 + 32*I*pi^2*b^2*c^2*f*sgn(F) -
64*pi*b^2*c^2*f*log(abs(F))*sgn(F) - 32*I*pi^2*b^2*c^2*f + 64*pi*b^2*c^2*f*
log(abs(F)) + 64*I*b^2*c^2*f*log(abs(F))^2 + 384*pi*b*c*h*x*sgn(F) - 384*pi
*b*c*h*x - 768*I*b*c*h*x*log(abs(F)) + 96*pi*b*c*g*sgn(F) - 96*pi*b*c*g - 1
92*I*b*c*g*log(abs(F)) + 768*I*h)*e^(1/2*I*pi*b*c*x*sgn(F) - 1/2*I*pi*b*c*x
 + 1/2*I*pi*a*c*sgn(F) - 1/2*I*pi*a*c)/(16*I*pi^5*b^5*c^5*sgn(F) - 80*pi^4*
b^5*c^5*log(abs(F))*sgn(F) - 160*I*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 160*
pi^2*b^5*c^5*log(abs(F))^3*sgn(F) + 80*I*pi*b^5*c^5*log(abs(F))^4*sgn(F) -
```

```
16*I*pi^5*b^5*c^5 + 80*pi^4*b^5*c^5*log(abs(F)) + 160*I*pi^3*b^5*c^5*log(ab
s(F))^2 - 160*pi^2*b^5*c^5*log(abs(F))^3 - 80*I*pi*b^5*c^5*log(abs(F))^4 +
32*b^5*c^5*log(abs(F))^5) - (-16*I*pi^4*b^4*c^4*h*x^4*sgn(F) - 64*pi^3*b^4*
c^4*h*x^4*log(abs(F))*sgn(F) + 96*I*pi^2*b^4*c^4*h*x^4*log(abs(F))^2*sgn(F)
 + 64*pi*b^4*c^4*h*x^4*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4*c^4*h*x^4 + 64*
pi^3*b^4*c^4*h*x^4*log(abs(F)) - 96*I*pi^2*b^4*c^4*h*x^4*log(abs(F))^2 - 64
*pi*b^4*c^4*h*x^4*log(abs(F))^3 + 32*I*b^4*c^4*h*x^4*log(abs(F))^4 - 16*I*p
i^4*b^4*c^4*g*x^3*sgn(F) - 64*pi^3*b^4*c^4*g*x^3*log(abs(F))*sgn(F) + 96*I*
pi^2*b^4*c^4*g*x^3*log(abs(F))^2*sgn(F) + 64*pi*b^4*c^4*g*x^3*log(abs(F))^3
*sgn(F) + 16*I*pi^4*b^4*c^4*g*x^3 + 64*pi^3*b^4*c^4*g*x^3*log(abs(F)) - 96*
I*pi^2*b^4*c^4*g*x^3*log(abs(F))^2 - 64*pi*b^4*c^4*g*x^3*log(abs(F))^3 + 32
*I*b^4*c^4*g*x^3*log(abs(F))^4 - 16*I*pi^4*b^4*c^4*f*x^2*sgn(F) - 64*pi^3*b
^4*c^4*f*x^2*log(abs(F))*sgn(F) + 96*I*pi^2*b^4*c^4*f*x^2*log(abs(F))^2*sgn
(F) + 64*pi*b^4*c^4*f*x^2*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4*c^4*f*x^2 +
64*pi^3*b^4*c^4*f*x^2*log(abs(F)) - 96*I*pi^2*b^4*c^4*f*x^2*log(abs(F))^2 -
 64*pi*b^4*c^4*f*x^2*log(abs(F))^3 + 32*I*b^4*c^4*f*x^2*log(abs(F))^4 - 16*
I*pi^4*b^4*c^4*d*sgn(F) + 64*pi^3*b^3*c^3*h*x^3*sgn(F) - 64*pi^3*b^4*c^4*d*
log(abs(F))*sgn(F) - 192*I*pi^2*b^3*c^3*h*x^3*log(abs(F))*sgn(F) + 96*I*pi^
2*b^4*c^4*d*log(abs(F))^2*sgn(F) - 192*pi*b^3*c^3*h*x^3*log(abs(F))^2*sgn(F
) + 64*pi*b^4*c^4*d*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4*c^4*d - 64*pi^3*b^
3*c^3*h*x^3 + 64*pi^3*b^4*c^4*d*log(abs(F)) + 192*I*pi^2*b^3*c^3*h*x^3*log(
abs(F)) - 96*I*pi^2*b^4*c^4*d*log(abs(F))^2 + 192*pi*b^3*c^3*h*x^3*log(abs(
F))^2 - 64*pi*b^4*c^4*d*log(abs(F))^3 - 128*I*b^3*c^3*h*x^3*log(abs(F))^3 +
 32*I*b^4*c^4*d*log(abs(F))^4 + 48*pi^3*b^3*c^3*g*x^2*sgn(F) - 144*I*pi^2*b
^3*c^3*g*x^2*log(abs(F))*sgn(F) - 144*pi*b^3*c^3*g*x^2*log(abs(F))^2*sgn(F)
 - 48*pi^3*b^3*c^3*g*x^2 + 144*I*pi^2*b^3*c^3*g*x^2*log(abs(F)) + 144*pi*b^
3*c^3*g*x^2*log(abs(F))^2 - 96*I*b^3*c^3*g*x^2*log(abs(F))^3 + 32*pi^3*b^3*
c^3*f*x*sgn(F) - 96*I*pi^2*b^3*c^3*f*x*log(abs(F))*sgn(F) - 96*pi*b^3*c^3*f
*x*log(abs(F))^2*sgn(F) - 32*pi^3*b^3*c^3*f*x + 96*I*pi^2*b^3*c^3*f*x*log(a
bs(F)) + 96*pi*b^3*c^3*f*x*log(abs(F))^2 - 64*I*b^3*c^3*f*x*log(abs(F))^3 +
 192*I*pi^2*b^2*c^2*h*x^2*sgn(F) + 384*pi*b^2*c^2*h*x^2*log(abs(F))*sgn(F)
- 192*I*pi^2*b^2*c^2*h*x^2 - 384*pi*b^2*c^2*h*x^2*log(abs(F)) + 384*I*b^2*c
^2*h*x^2*log(abs(F))^2 + 96*I*pi^2*b^2*c^2*g*x*sgn(F) + 192*pi*b^2*c^2*g*x*
log(abs(F))*sgn(F) - 96*I*pi^2*b^2*c^2*g*x - 192*pi*b^2*c^2*g*x*log(abs(F))
 + 192*I*b^2*c^2*g*x*log(abs(F))^2 + 32*I*pi^2*b^2*c^2*f*sgn(F) + 64*pi*b^2
*c^2*f*log(abs(F))*sgn(F) - 32*I*pi^2*b^2*c^2*f - 64*pi*b^2*c^2*f*log(abs(F
)) + 64*I*b^2*c^2*f*log(abs(F))^2 - 384*pi*b*c*h*x*sgn(F) + 384*pi*b*c*h*x
- 768*I*b*c*h*x*log(abs(F)) - 96*pi*b*c*g*sgn(F) + 96*pi*b*c*g - 192*I*b*c*
g*log(abs(F)) + 768*I*h)*e^(-1/2*I*pi*b*c*x*sgn(F) + 1/2*I*pi*b*c*x - 1/2*I
*pi*a*c*sgn(F) + 1/2*I*pi*a*c)/(-16*I*pi^5*b^5*c^5*sgn(F) - 80*pi^4*b^5*c^5
*log(abs(F))*sgn(F) + 160*I*pi^3*b^5*c^5*log(abs(F))^2*sgn(F) + 160*pi^2*b^
5*c^5*log(abs(F))^3*sgn(F) - 80*I*pi*b^5*c^5*log(abs(F))^4*sgn(F) + 16*I*pi
^5*b^5*c^5 + 80*pi^4*b^5*c^5*log(abs(F)) - 160*I*pi^3*b^5*c^5*log(abs(F))^2
 - 160*pi^2*b^5*c^5*log(abs(F))^3 + 80*I*pi*b^5*c^5*log(abs(F))^4 + 32*b^5*
c^5*log(abs(F))^5))*e^(b*c*x*log(abs(F)) + a*c*log(abs(F)))
```

maple [A] time = 0.01, size = 212, normalized size = 0.61

$$\frac{\left(b^4c^4h\,x^4\ln(F)^4+b^4c^4g\,x^3\ln(F)^4+b^4c^4f\,x^2\ln(F)^4+b^4c^4ex\ln(F)^4+b^4c^4d\ln(F)^4-4b^3c^3h\,x^3\ln(F)^3-3b^3c^3g\,x\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*(h*x^4+g*x^3+f*x^2+e*x+d),x)
```

```
[Out] (h*x^4*b^4*c^4*ln(F)^4+ln(F)^4*b^4*c^4*g*x^3+ln(F)^4*b^4*c^4*f*x^2+ln(F)^4*
b^4*c^4*e*x+ln(F)^4*b^4*c^4*d-4*ln(F)^3*b^3*c^3*h*x^3-3*ln(F)^3*b^3*c^3*g*x
^2-2*ln(F)^3*b^3*c^3*f*x-ln(F)^3*b^3*c^3*e+12*ln(F)^2*b^2*c^2*h*x^2+6*ln(F)
^2*b^2*c^2*g*x+2*b^2*c^2*ln(F)^2*f-24*ln(F)*b*c*h*x-6*g*b*c*ln(F)+24*h)*F^(
(b*x+a)*c)/b^5/c^5/ln(F)^5
```

maxima [A] time = 0.84, size = 291, normalized size = 0.84

$$\frac{F^{bcx+ac}d}{bc\log(F)}+\frac{\left(F^{ac}bcx\log(F)-F^{ac}\right)F^{bcx}e}{b^2c^2\log(F)^2}+\frac{\left(F^{ac}b^2c^2x^2\log(F)^2-2\,F^{ac}bcx\log(F)+2\,F^{ac}\right)F^{bcx}f}{b^3c^3\log(F)^3}+\frac{\left(F^{ac}b^3c^3x^3\log(F)^3\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*(h*x^4+g*x^3+f*x^2+e*x+d),x, algorithm="maxima")
```

```
[Out] F^(b*c*x + a*c)*d/(b*c*log(F)) + (F^(a*c)*b*c*x*log(F) - F^(a*c))*F^(b*c*x)
*e/(b^2*c^2*log(F)^2) + (F^(a*c)*b^2*c^2*x^2*log(F)^2 - 2*F^(a*c)*b*c*x*log
(F) + 2*F^(a*c))*F^(b*c*x)*f/(b^3*c^3*log(F)^3) + (F^(a*c)*b^3*c^3*x^3*log(
F)^3 - 3*F^(a*c)*b^2*c^2*x^2*log(F)^2 + 6*F^(a*c)*b*c*x*log(F) - 6*F^(a*c))
*F^(b*c*x)*g/(b^4*c^4*log(F)^4) + (F^(a*c)*b^4*c^4*x^4*log(F)^4 - 4*F^(a*c)
*b^3*c^3*x^3*log(F)^3 + 12*F^(a*c)*b^2*c^2*x^2*log(F)^2 - 24*F^(a*c)*b*c*x*
log(F) + 24*F^(a*c))*F^(b*c*x)*h/(b^5*c^5*log(F)^5)
```

mupad [B] time = 3.53, size = 212, normalized size = 0.61

$$\frac{F^{a\,c+b\,c\,x}\,\left(h\,b^4\,c^4\,x^4\,{\ln(F)}^4+g\,b^4\,c^4\,x^3\,{\ln(F)}^4+f\,b^4\,c^4\,x^2\,{\ln(F)}^4+e\,b^4\,c^4\,x\,{\ln(F)}^4+d\,b^4\,c^4\,{\ln(F)}^4-4\,h\,b^3\,c^3\,x^3\,\ln\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*(d + e*x + f*x^2 + g*x^3 + h*x^4),x)
```

```
[Out] (F^(a*c + b*c*x)*(24*h - 6*b*c*g*log(F) + b^4*c^4*d*log(F)^4 - b^3*c^3*e*lo
g(F)^3 + 2*b^2*c^2*f*log(F)^2 + b^4*c^4*f*x^2*log(F)^4 - 3*b^3*c^3*g*x^2*lo
g(F)^3 + b^4*c^4*g*x^3*log(F)^4 + 12*b^2*c^2*h*x^2*log(F)^2 - 4*b^3*c^3*h*x
^3*log(F)^3 + b^4*c^4*h*x^4*log(F)^4 - 24*b*c*h*x*log(F) + b^4*c^4*e*x*log(
F)^4 - 2*b^3*c^3*f*x*log(F)^3 + 6*b^2*c^2*g*x*log(F)^2))/(b^5*c^5*log(F)^5)
```

sympy [A] time = 0.26, size = 284, normalized size = 0.82

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^4c^4d\log(F)^4+b^4c^4ex\log(F)^4+b^4c^4fx^2\log(F)^4+b^4c^4gx^3\log(F)^4+b^4c^4hx^4\log(F)^4-b^3c^3e\log(F)^3-2b^3c^3fx\log(F)^3-3b^3c^3gx^2\log(F)^3-4b^3\right.}{b^5c^5\log(F)^5} \\ dx+\frac{ex^2}{2}+\frac{fx^3}{3}+\frac{gx^4}{4}+\frac{hx^5}{5} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*(h*x**4+g*x**3+f*x**2+e*x+d),x)
```

```
[Out] Piecewise((F**(c*(a + b*x))*(b**4*c**4*d*log(F)**4 + b**4*c**4*e*x*log(F)**
4 + b**4*c**4*f*x**2*log(F)**4 + b**4*c**4*g*x**3*log(F)**4 + b**4*c**4*h*x
**4*log(F)**4 - b**3*c**3*e*log(F)**3 - 2*b**3*c**3*f*x*log(F)**3 - 3*b**3*
c**3*g*x**2*log(F)**3 - 4*b**3*c**3*h*x**3*log(F)**3 + 2*b**2*c**2*f*log(F)
**2 + 6*b**2*c**2*g*x*log(F)**2 + 12*b**2*c**2*h*x**2*log(F)**2 - 6*b*c*g*l
og(F) - 24*b*c*h*x*log(F) + 24*h)/(b**5*c**5*log(F)**5), Ne(b**5*c**5*log(F
)**5, 0)), (d*x + e*x**2/2 + f*x**3/3 + g*x**4/4 + h*x**5/5, True))
```

3.55 $\int e^{-a-bx} x^m (a+bx)^3 \, dx$

Optimal. Leaf size=116

$$-\frac{a^3 e^{-a} x^m (bx)^{-m} \Gamma(m+1,bx)}{b}-\frac{3a^2 e^{-a} x^m (bx)^{-m} \Gamma(m+2,bx)}{b}-\frac{3a e^{-a} x^m (bx)^{-m} \Gamma(m+3,bx)}{b}-\frac{e^{-a} x^m (bx)^{-m} \Gamma(m+4$$

```
[Out] -a^3*x^m*GAMMA(1+m,b*x)/b/exp(a)/((b*x)^m)-3*a^2*x^m*GAMMA(2+m,b*x)/b/exp(a
)/((b*x)^m)-3*a*x^m*GAMMA(3+m,b*x)/b/exp(a)/((b*x)^m)-x^m*GAMMA(4+m,b*x)/b/
exp(a)/((b*x)^m)
```

Rubi [A] time = 0.17, antiderivative size = 116, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 2, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.095, Rules used = {2199, 2181}

$$-\frac{a^3 e^{-a} x^m (bx)^{-m} \text{Gamma}(m+1,bx)}{b}-\frac{3a^2 e^{-a} x^m (bx)^{-m} \text{Gamma}(m+2,bx)}{b}-\frac{3a e^{-a} x^m (bx)^{-m} \text{Gamma}(m+3,bx)}{b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(-a - b*x)*x^m*(a + b*x)^3,x]
```

```
[Out] -((a^3*x^m*Gamma[1 + m, b*x])/(b*E^a*(b*x)^m)) - (3*a^2*x^m*Gamma[2 + m, b*
x])/(b*E^a*(b*x)^m) - (3*a*x^m*Gamma[3 + m, b*x])/(b*E^a*(b*x)^m) - (x^m*Ga
mma[4 + m, b*x])/(b*E^a*(b*x)^m)
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&  !I
ntegerQ[m]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\int e^{-a-bx}x^m(a+bx)^3\,dx = \int \left(a^3e^{-a-bx}x^m + 3a^2be^{-a-bx}x^{1+m} + 3ab^2e^{-a-bx}x^{2+m} + b^3e^{-a-bx}x^{3+m}\right)dx$$
$$= a^3\int e^{-a-bx}x^m\,dx + \left(3a^2b\right)\int e^{-a-bx}x^{1+m}\,dx + \left(3ab^2\right)\int e^{-a-bx}x^{2+m}\,dx + b^3\int e^{-a-bx}x^3$$
$$= -\frac{a^3e^{-a}x^m(bx)^{-m}\Gamma(1+m,bx)}{b} - \frac{3a^2e^{-a}x^m(bx)^{-m}\Gamma(2+m,bx)}{b} - \frac{3ae^{-a}x^m(bx)^{-m}\Gamma(3+m}{b}$$

Mathematica [A] time = 0.06, size = 61, normalized size = 0.53

$$-\frac{e^{-a}x^m(bx)^{-m}\left(a^3\Gamma(m+1,bx)+3a^2\Gamma(m+2,bx)+3a\Gamma(m+3,bx)+\Gamma(m+4,bx)\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(-a - b*x)*x^m*(a + b*x)^3,x]
```

```
[Out] -((x^m*(a^3*Gamma[1 + m, b*x] + 3*a^2*Gamma[2 + m, b*x] + 3*a*Gamma[3 + m,
b*x] + Gamma[4 + m, b*x]))/(b*E^a*(b*x)^m))
```

fricas [A] time = 0.42, size = 126, normalized size = 1.09

$$-\frac{\left(b^3x^3+\left(3\,(a+1)b^2+b^2m\right)x^2+\left((3\,a+5)bm+bm^2+3\left(a^2+2\,a+2\right)b\right)x\right)x^me^{(-bx-a)}+\left(a^3+3\,(a+2)m^2+m^3\right.}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*x^m*(b*x+a)^3,x, algorithm="fricas")
```

```
[Out] -((b^3*x^3 + (3*(a + 1)*b^2 + b^2*m)*x^2 + ((3*a + 5)*b*m + b*m^2 + 3*(a^2
+ 2*a + 2)*b)*x)*x^m*e^(-b*x - a) + (a^3 + 3*(a + 2)*m^2 + m^3 + 3*a^2 + (3
*a^2 + 9*a + 11)*m + 6*a + 6)*e^(-m*log(b) - a)*gamma(m + 1, b*x))/b
```

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

$$\int (bx+a)^3x^me^{(-bx-a)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*x^m*(b*x+a)^3,x, algorithm="giac")
```

```
[Out] integrate((b*x + a)^3*x^m*e^(-b*x - a), x)
```

maple [C] time = 0.11, size = 334, normalized size = 2.88

$$\frac{a^{3} x^{m} (bx)^{-\frac{m}{2}} \mathrm{WhittakerM}\left(\frac{m}{2}, \frac{m}{2}+\frac{1}{2}, bx\right) \mathrm{e}^{-\frac{bx}{2}-a}}{(m+1)\, b} + 3\left(b^{m} x^{m} (bx)^{-\frac{m}{2}} \mathrm{WhittakerM}\left(\frac{m}{2}, \frac{m}{2}+\frac{1}{2}, bx\right) \mathrm{e}^{-\frac{bx}{2}} + \frac{(-m-2}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*x^m*(b*x+a)^3,x)
```

```
[Out] b^(-m-1)*exp(-a)*(x^m*b^m*(m^2+5*m+6)*(b*x)^(-1/2*m)*exp(-1/2*b*x)*Whittake
rM(1/2*m,1/2*m+1/2,b*x)-x^m*b^m*(b^2*x^2+b*m*x+3*b*x+m^2+5*m+6)*(b*x)^(-1/2
*m)*exp(-1/2*b*x)*WhittakerM(1/2*m+1,1/2*m+1/2,b*x))+3*b^(-m-1)*exp(-a)*a*(
x^m*b^m*(2+m)*(b*x)^(-1/2*m)*exp(-1/2*b*x)*WhittakerM(1/2*m,1/2*m+1/2,b*x)-
x^m*b^m*(b*x+m+2)*(b*x)^(-1/2*m)*exp(-1/2*b*x)*WhittakerM(1/2*m+1,1/2*m+1/2
,b*x))+3*b^(-m-1)*exp(-a)*a^2*(x^m*b^m*(b*x)^(-1/2*m)*exp(-1/2*b*x)*Whittak
erM(1/2*m,1/2*m+1/2,b*x)+1/(2+m)*x^m*b^m*(-2-m)*(b*x)^(-1/2*m)*exp(-1/2*b*x
)*WhittakerM(1/2*m+1,1/2*m+1/2,b*x))+exp(-a-1/2*b*x)/b*a^3/(m+1)*x^m*(b*x)^
(-1/2*m)*WhittakerM(1/2*m,1/2*m+1/2,b*x)
```

maxima [A] time = 0.96, size = 123, normalized size = 1.06

$$-(bx)^{-m-4} b^{3} x^{m+4} e^{(-a)} \Gamma(m+4, bx) - 3\,(bx)^{-m-3} a b^{2} x^{m+3} e^{(-a)} \Gamma(m+3, bx) - 3\,(bx)^{-m-2} a^{2} b x^{m+2} e^{(-a)} \Gamma(m+2, bx)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*x^m*(b*x+a)^3,x, algorithm="maxima")
```

```
[Out] -(b*x)^(-m - 4)*b^3*x^(m + 4)*e^(-a)*gamma(m + 4, b*x) - 3*(b*x)^(-m - 3)*a
*b^2*x^(m + 3)*e^(-a)*gamma(m + 3, b*x) - 3*(b*x)^(-m - 2)*a^2*b*x^(m + 2)*
e^(-a)*gamma(m + 2, b*x) - (b*x)^(-m - 1)*a^3*x^(m + 1)*e^(-a)*gamma(m + 1,
 b*x)
```

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

$$\int x^{m}\, \mathrm{e}^{-a-b\,x}\, (a+b\,x)^{3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*exp(- a - b*x)*(a + b*x)^3,x)
```

```
[Out] int(x^m*exp(- a - b*x)*(a + b*x)^3, x)
```

sympy [A] time = 34.42, size = 109, normalized size = 0.94

$$-\frac{a^{3} x^{m} (bx)^{-m} e^{-a} \Gamma(m+1, bx)}{b} - 3a^{2} x^{m+1} (bx)^{-m-1} e^{-a} \Gamma(m+2, bx) - 3abx^{m+2} (bx)^{-m-2} e^{-a} \Gamma(m+3, bx) - b^{2} x^{m+3} (b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*x**m*(b*x+a)**3,x)
```

```
[Out] -a**3*x**m*(b*x)**(-m)*exp(-a)*uppergamma(m + 1, b*x)/b - 3*a**2*x**(m + 1)
*(b*x)**(-m - 1)*exp(-a)*uppergamma(m + 2, b*x) - 3*a*b*x**(m + 2)*(b*x)**(
-m - 2)*exp(-a)*uppergamma(m + 3, b*x) - b**2*x**(m + 3)*(b*x)**(-m - 3)*ex
p(-a)*uppergamma(m + 4, b*x)
```

3.56 $\int e^{-a-bx}x^3(a+bx)^3\,dx$

Optimal. Leaf size=397

$$-\frac{6a^3e^{-a-bx}}{b^4}-\frac{6a^3xe^{-a-bx}}{b^3}-\frac{3a^3x^2e^{-a-bx}}{b^2}-\frac{a^3x^3e^{-a-bx}}{b}-\frac{72a^2e^{-a-bx}}{b^4}-\frac{72a^2xe^{-a-bx}}{b^3}-\frac{36a^2x^2e^{-a-bx}}{b^2}-3a^2x^4e^{-a-bx}-\frac{12a^2x}{}$$

```
[Out] -720*exp(-b*x-a)/b^4-360*a*exp(-b*x-a)/b^4-72*a^2*exp(-b*x-a)/b^4-6*a^3*exp
(-b*x-a)/b^4-720*exp(-b*x-a)*x/b^3-360*a*exp(-b*x-a)*x/b^3-72*a^2*exp(-b*x-
a)*x/b^3-6*a^3*exp(-b*x-a)*x/b^3-360*exp(-b*x-a)*x^2/b^2-180*a*exp(-b*x-a)*
x^2/b^2-36*a^2*exp(-b*x-a)*x^2/b^2-3*a^3*exp(-b*x-a)*x^2/b^2-120*exp(-b*x-a
)*x^3/b-60*a*exp(-b*x-a)*x^3/b-12*a^2*exp(-b*x-a)*x^3/b-a^3*exp(-b*x-a)*x^3
/b-30*exp(-b*x-a)*x^4-15*a*exp(-b*x-a)*x^4-3*a^2*exp(-b*x-a)*x^4-6*b*exp(-b
*x-a)*x^5-3*a*b*exp(-b*x-a)*x^5-b^2*exp(-b*x-a)*x^6
```

Rubi [A] time = 0.52, antiderivative size = 397, normalized size of antiderivative = 1.00, number of steps used = 24, number of rules used = 3, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143, Rules used = {2196, 2176, 2194}

$$-\frac{3a^3x^2e^{-a-bx}}{b^2}-\frac{36a^2x^2e^{-a-bx}}{b^2}-\frac{6a^3xe^{-a-bx}}{b^3}-\frac{72a^2xe^{-a-bx}}{b^3}-\frac{6a^3e^{-a-bx}}{b^4}-\frac{72a^2e^{-a-bx}}{b^4}-3a^2x^4e^{-a-bx}-\frac{a^3x^3e^{-a-bx}}{b}-\frac{12a^2x}{}$$

Antiderivative was successfully verified.

```
[In] Int[E^(-a - b*x)*x^3*(a + b*x)^3,x]
```

```
[Out] (-720*E^(-a - b*x))/b^4 - (360*a*E^(-a - b*x))/b^4 - (72*a^2*E^(-a - b*x))/
b^4 - (6*a^3*E^(-a - b*x))/b^4 - (720*E^(-a - b*x)*x)/b^3 - (360*a*E^(-a -
b*x)*x)/b^3 - (72*a^2*E^(-a - b*x)*x)/b^3 - (6*a^3*E^(-a - b*x)*x)/b^3 - (3
60*E^(-a - b*x)*x^2)/b^2 - (180*a*E^(-a - b*x)*x^2)/b^2 - (36*a^2*E^(-a - b
*x)*x^2)/b^2 - (3*a^3*E^(-a - b*x)*x^2)/b^2 - (120*E^(-a - b*x)*x^3)/b - (6
0*a*E^(-a - b*x)*x^3)/b - (12*a^2*E^(-a - b*x)*x^3)/b - (a^3*E^(-a - b*x)*x
^3)/b - 30*E^(-a - b*x)*x^4 - 15*a*E^(-a - b*x)*x^4 - 3*a^2*E^(-a - b*x)*x^
4 - 6*b*E^(-a - b*x)*x^5 - 3*a*b*E^(-a - b*x)*x^5 - b^2*E^(-a - b*x)*x^6
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\int e^{-a-bx}x^3(a+bx)^3\,dx = \int \left(a^3e^{-a-bx}x^3+3a^2be^{-a-bx}x^4+3ab^2e^{-a-bx}x^5+b^3e^{-a-bx}x^6\right)dx$$

$$= a^3\int e^{-a-bx}x^3\,dx+\left(3a^2b\right)\int e^{-a-bx}x^4\,dx+\left(3ab^2\right)\int e^{-a-bx}x^5\,dx+b^3\int e^{-a-bx}x^6\,dx$$

$$= -\frac{a^3e^{-a-bx}x^3}{b}-3a^2e^{-a-bx}x^4-3abe^{-a-bx}x^5-b^2e^{-a-bx}x^6+\left(12a^2\right)\int e^{-a-bx}x^3\,dx+\frac{\left(3a^3\right)}{}$$

$$= -\frac{3a^3e^{-a-bx}x^2}{b^2}-\frac{12a^2e^{-a-bx}x^3}{b}-\frac{a^3e^{-a-bx}x^3}{b}-15ae^{-a-bx}x^4-3a^2e^{-a-bx}x^4-6be^{-a-bx}x^5-$$

$$= -\frac{6a^3e^{-a-bx}x}{b^3}-\frac{36a^2e^{-a-bx}x^2}{b^2}-\frac{3a^3e^{-a-bx}x^2}{b^2}-\frac{60ae^{-a-bx}x^3}{b}-\frac{12a^2e^{-a-bx}x^3}{b}-\frac{a^3e^{-a-bx}x^3}{b}$$

$$= -\frac{6a^3e^{-a-bx}}{b^4}-\frac{72a^2e^{-a-bx}x}{b^3}-\frac{6a^3e^{-a-bx}x}{b^3}-\frac{180ae^{-a-bx}x^2}{b^2}-\frac{36a^2e^{-a-bx}x^2}{b^2}-\frac{3a^3e^{-a-bx}x^2}{b^2}$$

$$= -\frac{72a^2e^{-a-bx}}{b^4}-\frac{6a^3e^{-a-bx}}{b^4}-\frac{360ae^{-a-bx}x}{b^3}-\frac{72a^2e^{-a-bx}x}{b^3}-\frac{6a^3e^{-a-bx}x}{b^3}-\frac{360e^{-a-bx}x^2}{b^2}-$$

$$= -\frac{360ae^{-a-bx}}{b^4}-\frac{72a^2e^{-a-bx}}{b^4}-\frac{6a^3e^{-a-bx}}{b^4}-\frac{720e^{-a-bx}x}{b^3}-\frac{360ae^{-a-bx}x}{b^3}-\frac{72a^2e^{-a-bx}x}{b^3}-$$

$$= -\frac{720e^{-a-bx}}{b^4}-\frac{360ae^{-a-bx}}{b^4}-\frac{72a^2e^{-a-bx}}{b^4}-\frac{6a^3e^{-a-bx}}{b^4}-\frac{720e^{-a-bx}x}{b^3}-\frac{360ae^{-a-bx}x}{b^3}-$$

Mathematica [A] time = 0.36, size = 121, normalized size = 0.30

$$e^{-a-bx}\left(-3\left(a^2+5a+10\right)x^4-\frac{6\left(a^3+12a^2+60a+120\right)}{b^4}-\frac{6\left(a^3+12a^2+60a+120\right)x}{b^3}-\frac{3\left(a^3+12a^2+60a+1\right.}{b^2}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(-a - b*x)*x^3*(a + b*x)^3,x]
```

```
[Out] E^(-a - b*x)*((-6*(120 + 60*a + 12*a^2 + a^3))/b^4 - (6*(120 + 60*a + 12*a^
2 + a^3)*x)/b^3 - (3*(120 + 60*a + 12*a^2 + a^3)*x^2)/b^2 - ((120 + 60*a +
12*a^2 + a^3)*x^3)/b - 3*(10 + 5*a + a^2)*x^4 - 3*(2 + a)*b*x^5 - b^2*x^6)
```

fricas [A] time = 0.43, size = 121, normalized size = 0.30

$$-\frac{\left(b^6x^6 + 3\,(a+2)b^5x^5 + 3\left(a^2 + 5\,a + 10\right)b^4x^4 + \left(a^3 + 12\,a^2 + 60\,a + 120\right)b^3x^3 + 3\left(a^3 + 12\,a^2 + 60\,a + 120\right)b^2 \cdots}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^6*x^6 + 3*(a + 2)*b^5*x^5 + 3*(a^2 + 5*a + 10)*b^4*x^4 + (a^3 + 12*a^2
+ 60*a + 120)*b^3*x^3 + 3*(a^3 + 12*a^2 + 60*a + 120)*b^2*x^2 + 6*a^3 + 6*(
a^3 + 12*a^2 + 60*a + 120)*b*x + 72*a^2 + 360*a + 720)*e^(-b*x - a)/b^4
```

giac [A] time = 0.30, size = 202, normalized size = 0.51

$$-\frac{\left(b^9x^6 + 3\,ab^8x^5 + 3\,a^2b^7x^4 + 6\,b^8x^5 + a^3b^6x^3 + 15\,ab^7x^4 + 12\,a^2b^6x^3 + 30\,b^7x^4 + 3\,a^3b^5x^2 + 60\,ab^6x^3 + 36\,a^2b \cdots}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^9*x^6 + 3*a*b^8*x^5 + 3*a^2*b^7*x^4 + 6*b^8*x^5 + a^3*b^6*x^3 + 15*a*b^
7*x^4 + 12*a^2*b^6*x^3 + 30*b^7*x^4 + 3*a^3*b^5*x^2 + 60*a*b^6*x^3 + 36*a^2
*b^5*x^2 + 120*b^6*x^3 + 6*a^3*b^4*x + 180*a*b^5*x^2 + 72*a^2*b^4*x + 360*b
^5*x^2 + 6*a^3*b^3 + 360*a*b^4*x + 72*a^2*b^3 + 720*b^4*x + 360*a*b^3 + 720
*b^3)*e^(-b*x - a)/b^7
```

maple [A] time = 0.01, size = 182, normalized size = 0.46

$$-\frac{\left(b^6x^6 + 3b^5x^5a + 3a^2b^4x^4 + 6b^5x^5 + a^3b^3x^3 + 15a\,b^4x^4 + 12a^2b^3x^3 + 30x^4b^4 + 3a^3b^2x^2 + 60a\,b^3x^3 + 36a^2b^2x^2 \cdots}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*x^3*(b*x+a)^3,x)
```

```
[Out] -(b^6*x^6+3*a*b^5*x^5+3*a^2*b^4*x^4+6*b^5*x^5+a^3*b^3*x^3+15*a*b^4*x^4+12*a
^2*b^3*x^3+30*b^4*x^4+3*a^3*b^2*x^2+60*a*b^3*x^3+36*a^2*b^2*x^2+120*b^3*x^3
+6*a^3*b*x+180*a*b^2*x^2+72*a^2*b*x+360*b^2*x^2+6*a^3+360*a*b*x+72*a^2+720*
b*x+360*a+720)*exp(-b*x-a)/b^4
```

maxima [A] time = 0.55, size = 196, normalized size = 0.49

$$-\frac{\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)a^3e^{(-bx-a)}}{b^4}-\frac{3\left(b^4x^4+4\,b^3x^3+12\,b^2x^2+24\,bx+24\right)a^2e^{(-bx-a)}}{b^4}-\frac{3\left(b^5x^5+5\,b^4x^4+20\,b\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a^3*e^(-b*x - a)/b^4 - 3*(b^4*x^4 + 4*b^
3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*a^2*e^(-b*x - a)/b^4 - 3*(b^5*x^5 + 5*b^4
*x^4 + 20*b^3*x^3 + 60*b^2*x^2 + 120*b*x + 120)*a*e^(-b*x - a)/b^4 - (b^6*x
^6 + 6*b^5*x^5 + 30*b^4*x^4 + 120*b^3*x^3 + 360*b^2*x^2 + 720*b*x + 720)*e^
(-b*x - a)/b^4
```

mupad [B] time = 3.54, size = 175, normalized size = 0.44

$$-x^4\,\mathrm{e}^{-a-b\,x}\,\left(3\,a^2+15\,a+30\right)-b^2\,x^6\,\mathrm{e}^{-a-b\,x}-\frac{6\,\mathrm{e}^{-a-b\,x}\,\left(a^3+12\,a^2+60\,a+120\right)}{b^4}-3\,b\,x^5\,\mathrm{e}^{-a-b\,x}\,\left(a+2\right)-\frac{6\,x\,\mathrm{e}^{-a-b\,x}\,\left(\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*exp(- a - b*x)*(a + b*x)^3,x)
```

```
[Out] - x^4*exp(- a - b*x)*(15*a + 3*a^2 + 30) - b^2*x^6*exp(- a - b*x) - (6*exp(
- a - b*x)*(60*a + 12*a^2 + a^3 + 120))/b^4 - 3*b*x^5*exp(- a - b*x)*(a + 2
) - (6*x*exp(- a - b*x)*(60*a + 12*a^2 + a^3 + 120))/b^3 - (x^3*exp(- a - b
*x)*(60*a + 12*a^2 + a^3 + 120))/b - (3*x^2*exp(- a - b*x)*(60*a + 12*a^2 +
 a^3 + 120))/b^2
```

sympy [A] time = 0.24, size = 236, normalized size = 0.59

$$\begin{cases}\frac{\left(-a^3b^3x^3-3a^3b^2x^2-6a^3bx-6a^3-3a^2b^4x^4-12a^2b^3x^3-36a^2b^2x^2-72a^2bx-72a^2-3ab^5x^5-15ab^4x^4-60ab^3x^3-180ab^2x^2-360abx-360a-b^6x^6-6b^5x^5-30b\right.}{b^4} \\ \frac{a^3x^4}{4}+\frac{3a^2bx^5}{5}+\frac{ab^2x^6}{2}+\frac{b^3x^7}{7}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*x**3*(b*x+a)**3,x)
```

```
[Out] Piecewise(((-a**3*b**3*x**3 - 3*a**3*b**2*x**2 - 6*a**3*b*x - 6*a**3 - 3*a*
*2*b**4*x**4 - 12*a**2*b**3*x**3 - 36*a**2*b**2*x**2 - 72*a**2*b*x - 72*a**
2 - 3*a*b**5*x**5 - 15*a*b**4*x**4 - 60*a*b**3*x**3 - 180*a*b**2*x**2 - 360
*a*b*x - 360*a - b**6*x**6 - 6*b**5*x**5 - 30*b**4*x**4 - 120*b**3*x**3 - 3
60*b**2*x**2 - 720*b*x - 720)*exp(-a - b*x)/b**4, Ne(b**4, 0)), (a**3*x**4/
4 + 3*a**2*b*x**5/5 + a*b**2*x**6/2 + b**3*x**7/7, True))
```

3.57 $\int e^{-a-bx}x^2(a+bx)^3\,dx$

Optimal. Leaf size=318

$$-\frac{2a^3e^{-a-bx}}{b^3}-\frac{2a^3xe^{-a-bx}}{b^2}-\frac{a^3x^2e^{-a-bx}}{b}-\frac{18a^2e^{-a-bx}}{b^3}-\frac{18a^2xe^{-a-bx}}{b^2}-3a^2x^3e^{-a-bx}-\frac{9a^2x^2e^{-a-bx}}{b}-\frac{72ae^{-a-bx}}{b^3}-\frac{120e^{-a-b}}{b^3}$$

```
[Out] -120*exp(-b*x-a)/b^3-72*a*exp(-b*x-a)/b^3-18*a^2*exp(-b*x-a)/b^3-2*a^3*exp(
-b*x-a)/b^3-120*exp(-b*x-a)*x/b^2-72*a*exp(-b*x-a)*x/b^2-18*a^2*exp(-b*x-a)
*x/b^2-2*a^3*exp(-b*x-a)*x/b^2-60*exp(-b*x-a)*x^2/b-36*a*exp(-b*x-a)*x^2/b-
9*a^2*exp(-b*x-a)*x^2/b-a^3*exp(-b*x-a)*x^2/b-20*exp(-b*x-a)*x^3-12*a*exp(-
b*x-a)*x^3-3*a^2*exp(-b*x-a)*x^3-5*b*exp(-b*x-a)*x^4-3*a*b*exp(-b*x-a)*x^4-
b^2*exp(-b*x-a)*x^5
```

Rubi [A] time = 0.41, antiderivative size = 318, normalized size of antiderivative = 1.00, number of steps used = 20, number of rules used = 3, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143, Rules used = {2196, 2176, 2194}

$$-\frac{2a^3xe^{-a-bx}}{b^2}-\frac{18a^2xe^{-a-bx}}{b^2}-\frac{2a^3e^{-a-bx}}{b^3}-\frac{18a^2e^{-a-bx}}{b^3}-3a^2x^3e^{-a-bx}-\frac{a^3x^2e^{-a-bx}}{b}-\frac{9a^2x^2e^{-a-bx}}{b}-b^2x^5e^{-a-bx}-\frac{72axe^{-a-}}{b^2}$$

Antiderivative was successfully verified.

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

```
[Out] (-120*E^(-a - b*x))/b^3 - (72*a*E^(-a - b*x))/b^3 - (18*a^2*E^(-a - b*x))/b
^3 - (2*a^3*E^(-a - b*x))/b^3 - (120*E^(-a - b*x)*x)/b^2 - (72*a*E^(-a - b*
x)*x)/b^2 - (18*a^2*E^(-a - b*x)*x)/b^2 - (2*a^3*E^(-a - b*x)*x)/b^2 - (60*
E^(-a - b*x)*x^2)/b - (36*a*E^(-a - b*x)*x^2)/b - (9*a^2*E^(-a - b*x)*x^2)/
b - (a^3*E^(-a - b*x)*x^2)/b - 20*E^(-a - b*x)*x^3 - 12*a*E^(-a - b*x)*x^3
- 3*a^2*E^(-a - b*x)*x^3 - 5*b*E^(-a - b*x)*x^4 - 3*a*b*E^(-a - b*x)*x^4 -
b^2*E^(-a - b*x)*x^5
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\int e^{-a-bx}x^2(a+bx)^3\,dx = \int \left(a^3e^{-a-bx}x^2+3a^2be^{-a-bx}x^3+3ab^2e^{-a-bx}x^4+b^3e^{-a-bx}x^5\right)dx$$
$$= a^3\int e^{-a-bx}x^2\,dx+\left(3a^2b\right)\int e^{-a-bx}x^3\,dx+\left(3ab^2\right)\int e^{-a-bx}x^4\,dx+b^3\int e^{-a-bx}x^5\,dx$$
$$= -\frac{a^3e^{-a-bx}x^2}{b}-3a^2e^{-a-bx}x^3-3abe^{-a-bx}x^4-b^2e^{-a-bx}x^5+\left(9a^2\right)\int e^{-a-bx}x^2\,dx+\frac{\left(2a^3\right)\int}{}$$
$$= -\frac{2a^3e^{-a-bx}x}{b^2}-\frac{9a^2e^{-a-bx}x^2}{b}-\frac{a^3e^{-a-bx}x^2}{b}-12ae^{-a-bx}x^3-3a^2e^{-a-bx}x^3-5be^{-a-bx}x^4-3a$$
$$= -\frac{2a^3e^{-a-bx}}{b^3}-\frac{18a^2e^{-a-bx}x}{b^2}-\frac{2a^3e^{-a-bx}x}{b^2}-\frac{36ae^{-a-bx}x^2}{b}-\frac{9a^2e^{-a-bx}x^2}{b}-\frac{a^3e^{-a-bx}x^2}{b}-2$$
$$= -\frac{18a^2e^{-a-bx}}{b^3}-\frac{2a^3e^{-a-bx}}{b^3}-\frac{72ae^{-a-bx}x}{b^2}-\frac{18a^2e^{-a-bx}x}{b^2}-\frac{2a^3e^{-a-bx}x}{b^2}-\frac{60e^{-a-bx}x^2}{b}-36a$$
$$= -\frac{72ae^{-a-bx}}{b^3}-\frac{18a^2e^{-a-bx}}{b^3}-\frac{2a^3e^{-a-bx}}{b^3}-\frac{120e^{-a-bx}x}{b^2}-\frac{72ae^{-a-bx}x}{b^2}-\frac{18a^2e^{-a-bx}x}{b^2}-2a^3$$
$$= -\frac{120e^{-a-bx}}{b^3}-\frac{72ae^{-a-bx}}{b^3}-\frac{18a^2e^{-a-bx}}{b^3}-\frac{2a^3e^{-a-bx}}{b^3}-\frac{120e^{-a-bx}x}{b^2}-\frac{72ae^{-a-bx}x}{b^2}-\frac{18a^2e}{b}$$

Mathematica [A] time = 0.21, size = 130, normalized size = 0.41

$$e^{-bx}\left(-\left(3a^2+12a+20\right)e^{-a}x^3-\frac{2\left(a^3+9a^2+36a+60\right)e^{-a}}{b^3}-\frac{2\left(a^3+9a^2+36a+60\right)e^{-a}x}{b^2}-\frac{\left(a^3+9a^2+36a+\right.}{b}\right.$$

Antiderivative was successfully verified.

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

```
[Out] ((-2*(60 + 36*a + 9*a^2 + a^3))/(b^3*E^a) - (2*(60 + 36*a + 9*a^2 + a^3)*x)
/(b^2*E^a) - ((60 + 36*a + 9*a^2 + a^3)*x^2)/(b*E^a) - ((20 + 12*a + 3*a^2)
*x^3)/E^a - ((5 + 3*a)*b*x^4)/E^a - (b^2*x^5)/E^a)/E^(b*x)
```

fricas [A] time = 0.42, size = 102, normalized size = 0.32

$$-\frac{\left(b^5x^5+(3a+5)b^4x^4+\left(3a^2+12a+20\right)b^3x^3+\left(a^3+9a^2+36a+60\right)b^2x^2+2a^3+2\left(a^3+9a^2+36a+60\right)b\right.}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^5*x^5 + (3*a + 5)*b^4*x^4 + (3*a^2 + 12*a + 20)*b^3*x^3 + (a^3 + 9*a^2
+ 36*a + 60)*b^2*x^2 + 2*a^3 + 2*(a^3 + 9*a^2 + 36*a + 60)*b*x + 18*a^2 + 7
2*a + 120)*e^(-b*x - a)/b^3
```

giac [A] time = 0.32, size = 163, normalized size = 0.51

$$-\frac{\left(b^8x^5 + 3\,ab^7x^4 + 3\,a^2b^6x^3 + 5\,b^7x^4 + a^3b^5x^2 + 12\,ab^6x^3 + 9\,a^2b^5x^2 + 20\,b^6x^3 + 2\,a^3b^4x + 36\,ab^5x^2 + 18\,a^2b^4x}{b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^8*x^5 + 3*a*b^7*x^4 + 3*a^2*b^6*x^3 + 5*b^7*x^4 + a^3*b^5*x^2 + 12*a*b^
6*x^3 + 9*a^2*b^5*x^2 + 20*b^6*x^3 + 2*a^3*b^4*x + 36*a*b^5*x^2 + 18*a^2*b^
4*x + 60*b^5*x^2 + 2*a^3*b^3 + 72*a*b^4*x + 18*a^2*b^3 + 120*b^4*x + 72*a*b
^3 + 120*b^3)*e^(-b*x - a)/b^6
```

maple [A] time = 0.01, size = 143, normalized size = 0.45

$$-\frac{\left(b^5x^5 + 3a\,b^4x^4 + 3a^2b^3x^3 + 5x^4b^4 + a^3b^2x^2 + 12a\,b^3x^3 + 9a^2b^2x^2 + 20b^3x^3 + 2a^3bx + 36a\,b^2x^2 + 18a^2bx + 6}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^5*x^5+3*a*b^4*x^4+3*a^2*b^3*x^3+5*b^4*x^4+a^3*b^2*x^2+12*a*b^3*x^3+9*a^
2*b^2*x^2+20*b^3*x^3+2*a^3*b*x+36*a*b^2*x^2+18*a^2*b*x+60*b^2*x^2+2*a^3+72*
a*b*x+18*a^2+120*b*x+72*a+120)*exp(-b*x-a)/b^3
```

maxima [A] time = 0.52, size = 164, normalized size = 0.52

$$-\frac{\left(b^2x^2 + 2\,bx + 2\right)a^3e^{(-bx-a)}}{b^3} - \frac{3\left(b^3x^3 + 3\,b^2x^2 + 6\,bx + 6\right)a^2e^{(-bx-a)}}{b^3} - \frac{3\left(b^4x^4 + 4\,b^3x^3 + 12\,b^2x^2 + 24\,bx + 24\right)a}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^2*x^2 + 2*b*x + 2)*a^3*e^(-b*x - a)/b^3 - 3*(b^3*x^3 + 3*b^2*x^2 + 6*b*
x + 6)*a^2*e^(-b*x - a)/b^3 - 3*(b^4*x^4 + 4*b^3*x^3 + 12*b^2*x^2 + 24*b*x
+ 24)*a*e^(-b*x - a)/b^3 - (b^5*x^5 + 5*b^4*x^4 + 20*b^3*x^3 + 60*b^2*x^2 +
 120*b*x + 120)*e^(-b*x - a)/b^3
```

mupad [B] time = 3.52, size = 126, normalized size = 0.40

$$-x^3\,e^{-a-b\,x}\,\left(3\,a^2+3\,a\,b\,x+12\,a+b^2\,x^2+5\,b\,x+20\right)-\frac{2\,e^{-a-b\,x}\,\left(a^3+9\,a^2+36\,a+60\right)}{b^3}-\frac{2\,x\,e^{-a-b\,x}\,\left(a^3+9\,a^2+3\right.}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] - x^3*exp(- a - b*x)*(12*a + 5*b*x + 3*a^2 + b^2*x^2 + 3*a*b*x + 20) - (2*e
xp(- a - b*x)*(36*a + 9*a^2 + a^3 + 60))/b^3 - (2*x*exp(- a - b*x)*(36*a +
9*a^2 + a^3 + 60))/b^2 - (x^2*exp(- a - b*x)*(36*a + 9*a^2 + a^3 + 60))/b
```

sympy [A] time = 0.21, size = 196, normalized size = 0.62

$$\begin{cases} \frac{\left(-a^3b^2x^2-2a^3bx-2a^3-3a^2b^3x^3-9a^2b^2x^2-18a^2bx-18a^2-3ab^4x^4-12ab^3x^3-36ab^2x^2-72abx-72a-b^5x^5-5b^4x^4-20b^3x^3-60b^2x^2-120bx-120\right)e^{-a-bx}}{b^3} \\ \frac{a^3x^3}{3}+\frac{3a^2bx^4}{4}+\frac{3ab^2x^5}{5}+\frac{b^3x^6}{6} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*x**2*(b*x+a)**3,x)
```

```
[Out] Piecewise(((-a**3*b**2*x**2 - 2*a**3*b*x - 2*a**3 - 3*a**2*b**3*x**3 - 9*a*
*2*b**2*x**2 - 18*a**2*b*x - 18*a**2 - 3*a*b**4*x**4 - 12*a*b**3*x**3 - 36*
a*b**2*x**2 - 72*a*b*x - 72*a - b**5*x**5 - 5*b**4*x**4 - 20*b**3*x**3 - 60
*b**2*x**2 - 120*b*x - 120)*exp(-a - b*x)/b**3, Ne(b**3, 0)), (a**3*x**3/3
+ 3*a**2*b*x**4/4 + 3*a*b**2*x**5/5 + b**3*x**6/6, True))
```

3.58 $\int e^{-a-bx}x(a+bx)^3\,dx$

Optimal. Leaf size=184

$$-\frac{e^{-a-bx}(a+bx)^4}{b^2}+\frac{ae^{-a-bx}(a+bx)^3}{b^2}-\frac{4e^{-a-bx}(a+bx)^3}{b^2}+\frac{3ae^{-a-bx}(a+bx)^2}{b^2}-\frac{12e^{-a-bx}(a+bx)^2}{b^2}+\frac{6ae^{-a-bx}(a+bx)}{b^2}$$

```
[Out] -24*exp(-b*x-a)/b^2+6*a*exp(-b*x-a)/b^2-24*exp(-b*x-a)*(b*x+a)/b^2+6*a*exp(
-b*x-a)*(b*x+a)/b^2-12*exp(-b*x-a)*(b*x+a)^2/b^2+3*a*exp(-b*x-a)*(b*x+a)^2/
b^2-4*exp(-b*x-a)*(b*x+a)^3/b^2+a*exp(-b*x-a)*(b*x+a)^3/b^2-exp(-b*x-a)*(b*
x+a)^4/b^2
```

Rubi [A] time = 0.24, antiderivative size = 184, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {2196, 2176, 2194}

$$-\frac{e^{-a-bx}(a+bx)^4}{b^2}+\frac{ae^{-a-bx}(a+bx)^3}{b^2}-\frac{4e^{-a-bx}(a+bx)^3}{b^2}+\frac{3ae^{-a-bx}(a+bx)^2}{b^2}-\frac{12e^{-a-bx}(a+bx)^2}{b^2}+\frac{6ae^{-a-bx}(a+bx)}{b^2}$$

Antiderivative was successfully verified.

```
[In] Int[E^(-a - b*x)*x*(a + b*x)^3,x]
```

```
[Out] (-24*E^(-a - b*x))/b^2 + (6*a*E^(-a - b*x))/b^2 - (24*E^(-a - b*x)*(a + b*x
))/b^2 + (6*a*E^(-a - b*x)*(a + b*x))/b^2 - (12*E^(-a - b*x)*(a + b*x)^2)/b
^2 + (3*a*E^(-a - b*x)*(a + b*x)^2)/b^2 - (4*E^(-a - b*x)*(a + b*x)^3)/b^2
+ (a*E^(-a - b*x)*(a + b*x)^3)/b^2 - (E^(-a - b*x)*(a + b*x)^4)/b^2
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
```

```
x] &&  !$UseGamma === True
```

Rubi steps

$$
\begin{aligned}
\int e^{-a-bx}x(a+bx)^3\,dx &= \int\left(-\frac{ae^{-a-bx}(a+bx)^3}{b}+\frac{e^{-a-bx}(a+bx)^4}{b}\right)dx\\
&= \frac{\int e^{-a-bx}(a+bx)^4\,dx}{b}-\frac{a\int e^{-a-bx}(a+bx)^3\,dx}{b}\\
&= \frac{ae^{-a-bx}(a+bx)^3}{b^2}-\frac{e^{-a-bx}(a+bx)^4}{b^2}+\frac{4\int e^{-a-bx}(a+bx)^3\,dx}{b}-\frac{(3a)\int e^{-a-bx}(a+bx)^2\,dx}{b}\\
&= \frac{3ae^{-a-bx}(a+bx)^2}{b^2}-\frac{4e^{-a-bx}(a+bx)^3}{b^2}+\frac{ae^{-a-bx}(a+bx)^3}{b^2}-\frac{e^{-a-bx}(a+bx)^4}{b^2}+\frac{12\int e^{-a-b}}{}\\
&= \frac{6ae^{-a-bx}(a+bx)}{b^2}-\frac{12e^{-a-bx}(a+bx)^2}{b^2}+\frac{3ae^{-a-bx}(a+bx)^2}{b^2}-\frac{4e^{-a-bx}(a+bx)^3}{b^2}+\frac{ae^{-a-bx}}{}\\
&= \frac{6ae^{-a-bx}}{b^2}-\frac{24e^{-a-bx}(a+bx)}{b^2}+\frac{6ae^{-a-bx}(a+bx)}{b^2}-\frac{12e^{-a-bx}(a+bx)^2}{b^2}+\frac{3ae^{-a-bx}(a+bx)}{b^2}\\
&= -\frac{24e^{-a-bx}}{b^2}+\frac{6ae^{-a-bx}}{b^2}-\frac{24e^{-a-bx}(a+bx)}{b^2}+\frac{6ae^{-a-bx}(a+bx)}{b^2}-\frac{12e^{-a-bx}(a+bx)^2}{b^2}+\frac{3ae}{}
\end{aligned}
$$

Mathematica [A] time = 0.13, size = 96, normalized size = 0.52

$$
\frac{e^{-a-bx}\left(-a^3(bx+1)-3a^2\left(b^2x^2+2bx+2\right)-3a\left(b^3x^3+3b^2x^2+6bx+6\right)-b^4x^4-4b^3x^3-12b^2x^2-24bx-24\right)}{b^2}
$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(-a - b*x)*x*(a + b*x)^3,x]
```

```
[Out] (E^(-a - b*x)*(-24 - 24*b*x - 12*b^2*x^2 - 4*b^3*x^3 - b^4*x^4 - a^3*(1 + b
*x) - 3*a^2*(2 + 2*b*x + b^2*x^2) - 3*a*(6 + 6*b*x + 3*b^2*x^2 + b^3*x^3)))
/b^2
```

fricas [A] time = 0.44, size = 78, normalized size = 0.42

$$
-\frac{\left(b^4x^4+(3\,a+4)b^3x^3+3\left(a^2+3\,a+4\right)b^2x^2+a^3+\left(a^3+6\,a^2+18\,a+24\right)bx+6\,a^2+18\,a+24\right)e^{(-bx-a)}}{b^2}
$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^4*x^4 + (3*a + 4)*b^3*x^3 + 3*(a^2 + 3*a + 4)*b^2*x^2 + a^3 + (a^3 + 6*
a^2 + 18*a + 24)*b*x + 6*a^2 + 18*a + 24)*e^(-b*x - a)/b^2
```

giac [A] time = 0.40, size = 123, normalized size = 0.67

$$-\frac{\left(b^7x^4 + 3\,ab^6x^3 + 3\,a^2b^5x^2 + 4\,b^6x^3 + a^3b^4x + 9\,ab^5x^2 + 6\,a^2b^4x + 12\,b^5x^2 + a^3b^3 + 18\,ab^4x + 6\,a^2b^3 + 24\,b^4x}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^7*x^4 + 3*a*b^6*x^3 + 3*a^2*b^5*x^2 + 4*b^6*x^3 + a^3*b^4*x + 9*a*b^5*x
^2 + 6*a^2*b^4*x + 12*b^5*x^2 + a^3*b^3 + 18*a*b^4*x + 6*a^2*b^3 + 24*b^4*x
 + 18*a*b^3 + 24*b^3)*e^(-b*x - a)/b^5
```

maple [A] time = 0.00, size = 102, normalized size = 0.55

$$-\frac{\left(x^4b^4 + 3a\,b^3x^3 + 3a^2b^2x^2 + 4b^3x^3 + a^3bx + 9a\,b^2x^2 + 6a^2bx + 12b^2x^2 + a^3 + 18abx + 6a^2 + 24bx + 18a + 24\right.}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*x*(b*x+a)^3,x)
```

```
[Out] -(b^4*x^4+3*a*b^3*x^3+3*a^2*b^2*x^2+4*b^3*x^3+a^3*b*x+9*a*b^2*x^2+6*a^2*b*x
+12*b^2*x^2+a^3+18*a*b*x+6*a^2+24*b*x+18*a+24)*exp(-b*x-a)/b^2
```

maxima [A] time = 0.49, size = 132, normalized size = 0.72

$$-\frac{(bx+1)a^3e^{(-bx-a)}}{b^2}-\frac{3\left(b^2x^2+2\,bx+2\right)a^2e^{(-bx-a)}}{b^2}-\frac{3\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)ae^{(-bx-a)}}{b^2}-\frac{\left(b^4x^4+4\,b^3x^3+12\,b^2\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b*x + 1)*a^3*e^(-b*x - a)/b^2 - 3*(b^2*x^2 + 2*b*x + 2)*a^2*e^(-b*x - a)/
b^2 - 3*(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a*e^(-b*x - a)/b^2 - (b^4*x^4 + 4
*b^3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*e^(-b*x - a)/b^2
```

mupad [B] time = 3.43, size = 117, normalized size = 0.64

$$-x^2\,\mathrm{e}^{-a-b\,x}\,\left(3\,a^2+9\,a+12\right)-b^2\,x^4\,\mathrm{e}^{-a-b\,x}-\frac{\mathrm{e}^{-a-b\,x}\,\left(a^3+6\,a^2+18\,a+24\right)}{b^2}-\frac{x\,\mathrm{e}^{-a-b\,x}\,\left(a^3+6\,a^2+18\,a+24\right)}{b}-b\,x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*exp(- a - b*x)*(a + b*x)^3,x)
```

```
[Out] - x^2*exp(- a - b*x)*(9*a + 3*a^2 + 12) - b^2*x^4*exp(- a - b*x) - (exp(- a
 - b*x)*(18*a + 6*a^2 + a^3 + 24))/b^2 - (x*exp(- a - b*x)*(18*a + 6*a^2 +
a^3 + 24))/b - b*x^3*exp(- a - b*x)*(3*a + 4)
```

sympy [A] time = 0.19, size = 148, normalized size = 0.80

$$\begin{cases} \frac{(-a^3bx-a^3-3a^2b^2x^2-6a^2bx-6a^2-3ab^3x^3-9ab^2x^2-18abx-18a-b^4x^4-4b^3x^3-12b^2x^2-24bx-24)e^{-a-bx}}{b^2} & \text{for } b^2 \neq 0 \\ \frac{a^3x^2}{2} + a^2bx^3 + \frac{3ab^2x^4}{4} + \frac{b^3x^5}{5} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*x*(b*x+a)**3,x)
```

```
[Out] Piecewise(((-a**3*b*x - a**3 - 3*a**2*b**2*x**2 - 6*a**2*b*x - 6*a**2 - 3*a
*b**3*x**3 - 9*a*b**2*x**2 - 18*a*b*x - 18*a - b**4*x**4 - 4*b**3*x**3 - 12
*b**2*x**2 - 24*b*x - 24)*exp(-a - b*x)/b**2, Ne(b**2, 0)), (a**3*x**2/2 +
a**2*b*x**3 + 3*a*b**2*x**4/4 + b**3*x**5/5, True))
```

3.59 $\int e^{-a-bx}(a+bx)^3\,dx$

Optimal. Leaf size=80

$$-\frac{e^{-a-bx}(a+bx)^3}{b}-\frac{3e^{-a-bx}(a+bx)^2}{b}-\frac{6e^{-a-bx}(a+bx)}{b}-\frac{6e^{-a-bx}}{b}$$

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

Rubi [A] time = 0.07, antiderivative size = 80, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {2176, 2194}

$$-\frac{e^{-a-bx}(a+bx)^3}{b}-\frac{3e^{-a-bx}(a+bx)^2}{b}-\frac{6e^{-a-bx}(a+bx)}{b}-\frac{6e^{-a-bx}}{b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(-a - b*x)*(a + b*x)^3,x]
```

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

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\begin{aligned}\int e^{-a-bx}(a+bx)^3\,dx &= -\frac{e^{-a-bx}(a+bx)^3}{b}+3\int e^{-a-bx}(a+bx)^2\,dx\\ &= -\frac{3e^{-a-bx}(a+bx)^2}{b}-\frac{e^{-a-bx}(a+bx)^3}{b}+6\int e^{-a-bx}(a+bx)\,dx\\ &= -\frac{6e^{-a-bx}(a+bx)}{b}-\frac{3e^{-a-bx}(a+bx)^2}{b}-\frac{e^{-a-bx}(a+bx)^3}{b}+6\int e^{-a-bx}\,dx\\ &= -\frac{6e^{-a-bx}}{b}-\frac{6e^{-a-bx}(a+bx)}{b}-\frac{3e^{-a-bx}(a+bx)^2}{b}-\frac{e^{-a-bx}(a+bx)^3}{b}\end{aligned}$$

Mathematica [A] time = 0.05, size = 41, normalized size = 0.51

$$\frac{e^{-a-bx}\left(-(a+bx)^3-3(a+bx)^2-6(a+bx)-6\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(-a - b*x)*(a + b*x)^3,x]
```

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

fricas [A] time = 0.41, size = 57, normalized size = 0.71

$$-\frac{\left(b^3x^3+3\,(a+1)b^2x^2+a^3+3\left(a^2+2\,a+2\right)bx+3\,a^2+6\,a+6\right)e^{(-bx-a)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.30, size = 87, normalized size = 1.09

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.00, size = 68, normalized size = 0.85

$$-\frac{\left(b^3x^3+3a\,b^2x^2+3a^2bx+3b^2x^2+a^3+6abx+3a^2+6bx+6a+6\right)\mathrm{e}^{-bx-a}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*(b*x+a)^3,x)
```

```
[Out] -(b^3*x^3+3*a*b^2*x^2+3*a^2*b*x+3*b^2*x^2+a^3+6*a*b*x+3*a^2+6*b*x+6*a+6)*ex
p(-b*x-a)/b
```

maxima [A] time = 0.70, size = 103, normalized size = 1.29

$$-\frac{3\,(bx+1)a^2e^{(-bx-a)}}{b}-\frac{a^3e^{(-bx-a)}}{b}-\frac{3\left(b^2x^2+2\,bx+2\right)ae^{(-bx-a)}}{b}-\frac{\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)e^{(-bx-a)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 0.11, size = 66, normalized size = 0.82

$$-x\,\mathrm{e}^{-a-b\,x}\,\left(3\,a^2+3\,a\,b\,x+6\,a+b^2\,x^2+3\,b\,x+6\right)-\frac{\mathrm{e}^{-a-b\,x}\,\left(a^3+3\,a^2+6\,a+6\right)}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(- a - b*x)*(a + b*x)^3,x)
```

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

sympy [A] time = 0.17, size = 104, normalized size = 1.30

$$\begin{cases} \frac{\left(-a^3-3a^2bx-3a^2-3ab^2x^2-6abx-6a-b^3x^3-3b^2x^2-6bx-6\right)e^{-a-bx}}{b} & \text{for}\ b\neq 0 \\ a^3x+\frac{3a^2bx^2}{2}+ab^2x^3+\frac{b^3x^4}{4} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**3,x)
```

```
[Out] Piecewise(((-a**3 - 3*a**2*b*x - 3*a**2 - 3*a*b**2*x**2 - 6*a*b*x - 6*a - b
**3*x**3 - 3*b**2*x**2 - 6*b*x - 6)*exp(-a - b*x)/b, Ne(b, 0)), (a**3*x + 3
*a**2*b*x**2/2 + a*b**2*x**3 + b**3*x**4/4, True))
```

3.60 $\int \frac{e^{-a-bx}(a+bx)^3}{x}\,dx$

Optimal. Leaf size=102

$$e^{-a}a^3\text{Ei}(-bx) - 3a^2e^{-a-bx} - b^2x^2e^{-a-bx} - 3ae^{-a-bx} - 3abxe^{-a-bx} - 2e^{-a-bx} - 2bxe^{-a-bx}$$

```
[Out] -2*exp(-b*x-a)-3*a*exp(-b*x-a)-3*a^2*exp(-b*x-a)-2*b*exp(-b*x-a)*x-3*a*b*ex
p(-b*x-a)*x-b^2*exp(-b*x-a)*x^2+a^3*Ei(-b*x)/exp(a)
```

Rubi [A] time = 0.16, antiderivative size = 102, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.190, Rules used = {2199, 2194, 2178, 2176}

$$e^{-a}a^3\text{Ei}(-bx) - 3a^2e^{-a-bx} - b^2x^2e^{-a-bx} - 3ae^{-a-bx} - 3abxe^{-a-bx} - 2e^{-a-bx} - 2bxe^{-a-bx}$$

Antiderivative was successfully verified.

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

```
[Out] -2*E^(-a - b*x) - 3*a*E^(-a - b*x) - 3*a^2*E^(-a - b*x) - 2*b*E^(-a - b*x)*
x - 3*a*b*E^(-a - b*x)*x - b^2*E^(-a - b*x)*x^2 + (a^3*ExpIntegralEi[-(b*x)
])/E^a
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
```

```
c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}\int \frac{e^{-a-bx}(a+bx)^3}{x}\,dx &= \int \left(3a^2be^{-a-bx}+\frac{a^3e^{-a-bx}}{x}+3ab^2e^{-a-bx}x+b^3e^{-a-bx}x^2\right)dx\\
&= a^3\int \frac{e^{-a-bx}}{x}\,dx+\left(3a^2b\right)\int e^{-a-bx}\,dx+\left(3ab^2\right)\int e^{-a-bx}x\,dx+b^3\int e^{-a-bx}x^2\,dx\\
&= -3a^2e^{-a-bx}-3abe^{-a-bx}x-b^2e^{-a-bx}x^2+a^3e^{-a}\text{Ei}(-bx)+(3ab)\int e^{-a-bx}\,dx+\left(2b^2\right)\int e^{-}\\
&= -3ae^{-a-bx}-3a^2e^{-a-bx}-2be^{-a-bx}x-3abe^{-a-bx}x-b^2e^{-a-bx}x^2+a^3e^{-a}\text{Ei}(-bx)+(2b)\int e\\
&= -2e^{-a-bx}-3ae^{-a-bx}-3a^2e^{-a-bx}-2be^{-a-bx}x-3abe^{-a-bx}x-b^2e^{-a-bx}x^2+a^3e^{-a}\text{Ei}(-bx)\end{aligned}$$

Mathematica [A] time = 0.06, size = 52, normalized size = 0.51

$$e^{-a-bx}\left(a^3e^{bx}\text{Ei}(-bx)-3a^2-3a(bx+1)-b^2x^2-2bx-2\right)$$

Antiderivative was successfully verified.

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

```
[Out] E^(-a - b*x)*(-2 - 3*a^2 - 2*b*x - b^2*x^2 - 3*a*(1 + b*x) + a^3*E^(b*x)*Ex
pIntegralEi[-(b*x)])
```

fricas [A] time = 0.40, size = 50, normalized size = 0.49

$$a^3\text{Ei}\left(-bx\right)e^{(-a)}-\left(b^2x^2+(3\,a+2)bx+3\,a^2+3\,a+2\right)e^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] a^3*Ei(-b*x)*e^(-a) - (b^2*x^2 + (3*a + 2)*b*x + 3*a^2 + 3*a + 2)*e^(-b*x -
 a)
```

giac [A] time = 0.32, size = 95, normalized size = 0.93

$$-b^2x^2e^{(-bx-a)}+a^3\text{Ei}\left(-bx\right)e^{(-a)}-3\,abxe^{(-bx-a)}-3\,a^2e^{(-bx-a)}-2\,bxe^{(-bx-a)}-3\,ae^{(-bx-a)}-2\,e^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -b^2*x^2*e^(-b*x - a) + a^3*Ei(-b*x)*e^(-a) - 3*a*b*x*e^(-b*x - a) - 3*a^2*
e^(-b*x - a) - 2*b*x*e^(-b*x - a) - 3*a*e^(-b*x - a) - 2*e^(-b*x - a)
```

maple [A] time = 0.02, size = 113, normalized size = 1.11

$$-a^3 \operatorname{Ei}(1, bx)\, e^{-a} - a^2 e^{-bx-a} + \left((-bx-a)\, e^{-bx-a} - e^{-bx-a}\right) a - (-bx-a)^2\, e^{-bx-a} + 2\,(-bx-a)\, e^{-bx-a} - 2\, e^{-bx-a}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(-b*x-a)^2*exp(-b*x-a)+2*(-b*x-a)*exp(-b*x-a)-2*exp(-b*x-a)+a*((-b*x-a)*ex
p(-b*x-a)-exp(-b*x-a))-a^2*exp(-b*x-a)-a^3*exp(-a)*Ei(1,b*x)
```

maxima [A] time = 0.70, size = 69, normalized size = 0.68

$$a^3 \operatorname{Ei}(-bx)\, e^{(-a)} - 3\,(bx+1) a e^{(-bx-a)} - 3\, a^2 e^{(-bx-a)} - \left(b^2 x^2 + 2\, bx + 2\right) e^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] a^3*Ei(-b*x)*e^(-a) - 3*(b*x + 1)*a*e^(-b*x - a) - 3*a^2*e^(-b*x - a) - (b^
2*x^2 + 2*b*x + 2)*e^(-b*x - a)
```

mupad [B] time = 3.56, size = 69, normalized size = 0.68

$$-e^{-a-b\,x}\,\left(b^2\,x^2 + 2\,b\,x + 2\right) - 3\,a^2\,e^{-a-b\,x} - 3\,a\,e^{-a-b\,x}\,(b\,x+1) - a^3\,e^{-a}\,\mathrm{expint}(b\,x)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] - exp(- a - b*x)*(2*b*x + b^2*x^2 + 2) - 3*a^2*exp(- a - b*x) - 3*a*exp(- a
 - b*x)*(b*x + 1) - a^3*exp(-a)*expint(b*x)
```

sympy [A] time = 16.64, size = 70, normalized size = 0.69

$$\left(a^3 \operatorname{Ei}(-bx) - 3a^2 e^{-bx} - 3a\left(bxe^{-bx} + e^{-bx}\right) - b^2 x^2 e^{-bx} - 2bxe^{-bx} - 2e^{-bx}\right) e^{-a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**3/x,x)
```

```
[Out] (a**3*Ei(-b*x) - 3*a**2*exp(-b*x) - 3*a*(b*x*exp(-b*x) + exp(-b*x)) - b**2*
x**2*exp(-b*x) - 2*b*x*exp(-b*x) - 2*exp(-b*x))*exp(-a)
```

3.61 $\int \frac{e^{-a-bx}(a+bx)^3}{x^2} dx$

Optimal. Leaf size=94

$$e^{-a}a^3(-b)\text{Ei}(-bx) - \frac{a^3e^{-a-bx}}{x} + 3e^{-a}a^2b\text{Ei}(-bx) - b^2xe^{-a-bx} - 3abe^{-a-bx} - be^{-a-bx}$$

```
[Out] -b*exp(-b*x-a)-3*a*b*exp(-b*x-a)-a^3*exp(-b*x-a)/x-b^2*exp(-b*x-a)*x+3*a^2*
b*Ei(-b*x)/exp(a)-a^3*b*Ei(-b*x)/exp(a)
```

Rubi [A] time = 0.16, antiderivative size = 94, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 5, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.238, Rules used = {2199, 2194, 2177, 2178, 2176}

$$e^{-a}a^3(-b)\text{Ei}(-bx) + 3e^{-a}a^2b\text{Ei}(-bx) - \frac{a^3e^{-a-bx}}{x} - b^2xe^{-a-bx} - 3abe^{-a-bx} - be^{-a-bx}$$

Antiderivative was successfully verified.

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

```
[Out] -(b*E^(-a - b*x)) - 3*a*b*E^(-a - b*x) - (a^3*E^(-a - b*x))/x - b^2*E^(-a -
 b*x)*x + (3*a^2*b*ExpIntegralEi[-(b*x)])/E^a - (a^3*b*ExpIntegralEi[-(b*x)
])/E^a
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
```

```
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}\int \frac{e^{-a-bx}(a+bx)^3}{x^2}\,dx &= \int \left(3ab^2e^{-a-bx}+\frac{a^3e^{-a-bx}}{x^2}+\frac{3a^2be^{-a-bx}}{x}+b^3e^{-a-bx}x\right)dx\\
&= a^3\int \frac{e^{-a-bx}}{x^2}\,dx+\left(3a^2b\right)\int \frac{e^{-a-bx}}{x}\,dx+\left(3ab^2\right)\int e^{-a-bx}\,dx+b^3\int e^{-a-bx}x\,dx\\
&= -3abe^{-a-bx}-\frac{a^3e^{-a-bx}}{x}-b^2e^{-a-bx}x+3a^2be^{-a}\mathrm{Ei}(-bx)-\left(a^3b\right)\int \frac{e^{-a-bx}}{x}\,dx+b^2\int e^{-a-bx}\,d\\
&= -be^{-a-bx}-3abe^{-a-bx}-\frac{a^3e^{-a-bx}}{x}-b^2e^{-a-bx}x+3a^2be^{-a}\mathrm{Ei}(-bx)-a^3be^{-a}\mathrm{Ei}(-bx)\end{aligned}$$

Mathematica [A] time = 0.07, size = 54, normalized size = 0.57

$$\frac{e^{-a-bx}\left(-a^3-(a-3)a^2bxe^{bx}\mathrm{Ei}(-bx)-3abx-bx(bx+1)\right)}{x}$$

Antiderivative was successfully verified.

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

```
[Out] (E^(-a - b*x)*(-a^3 - 3*a*b*x - b*x*(1 + b*x) - (-3 + a)*a^2*b*E^(b*x)*x*Ex
pIntegralEi[-(b*x)]))/x
```

fricas [A] time = 0.40, size = 56, normalized size = 0.60

$$-\frac{\left(a^3-3\,a^2\right)bx\mathrm{Ei}\left(-bx\right)e^{(-a)}+\left(b^2x^2+a^3+(3\,a+1)bx\right)e^{(-bx-a)}}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.45, size = 92, normalized size = 0.98

$$-\frac{a^3bx\mathrm{Ei}\left(-bx\right)e^{(-a)}-3\,a^2bx\mathrm{Ei}\left(-bx\right)e^{(-a)}+b^2x^2e^{(-bx-a)}+a^3e^{(-bx-a)}+3\,abxe^{(-bx-a)}+bxe^{(-bx-a)}}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.02, size = 92, normalized size = 0.98

$$\left(-3a^2\,\mathrm{Ei}\left(1,bx\right)\mathrm{e}^{-a}-\left(-\,\mathrm{Ei}\left(1,bx\right)\mathrm{e}^{-a}+\frac{\mathrm{e}^{-bx-a}}{bx}\right)a^3-2a\,\mathrm{e}^{-bx-a}+\left(-bx-a\right)\mathrm{e}^{-bx-a}-\mathrm{e}^{-bx-a}\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] b*((-b*x-a)*exp(-b*x-a)-exp(-b*x-a)-2*a*exp(-b*x-a)-a^3*(exp(-b*x-a)/b/x-ex
p(-a)*Ei(1,b*x))-3*a^2*exp(-a)*Ei(1,b*x))
```

maxima [A] time = 0.97, size = 61, normalized size = 0.65

$$-a^3be^{(-a)}\Gamma\left(-1,bx\right)+3\,a^2b\mathrm{Ei}\left(-bx\right)e^{(-a)}-(bx+1)be^{(-bx-a)}-3\,abe^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -a^3*b*e^(-a)*gamma(-1, b*x) + 3*a^2*b*Ei(-b*x)*e^(-a) - (b*x + 1)*b*e^(-b*
x - a) - 3*a*b*e^(-b*x - a)
```

mupad [B] time = 3.64, size = 72, normalized size = 0.77

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] a^3*b*exp(-a)*(expint(b*x) - exp(-b*x)/(b*x)) - 3*a*b*exp(- a - b*x) - b*ex
p(- a - b*x)*(b*x + 1) - 3*a^2*b*exp(-a)*expint(b*x)
```

sympy [A] time = 5.87, size = 99, normalized size = 1.05

$$-\frac{a^3e^{-a}\,\mathrm{E}_2(bx)}{x}+3a^2be^{-a}\,\mathrm{Ei}(-bx)+3ab^2\left(\begin{cases}x & \text{for } b=0\\ -\frac{e^{-bx}}{b} & \text{otherwise}\end{cases}\right)e^{-a}+b^3x\left(\begin{cases}x & \text{for } b=0\\ -\frac{e^{-bx}}{b} & \text{otherwise}\end{cases}\right)e^{-a}-b^3\left(\begin{cases}\frac{x^2}{2}\\ -\frac{\begin{cases}-\frac{e^{-bx}}{b}\\ x\end{cases}}{\ }\end{cases}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -a**3*exp(-a)*expint(2, b*x)/x + 3*a**2*b*exp(-a)*Ei(-b*x) + 3*a*b**2*Piece
wise((x, Eq(b, 0)), (-exp(-b*x)/b, True))*exp(-a) + b**3*x*Piecewise((x, Eq
(b, 0)), (-exp(-b*x)/b, True))*exp(-a) - b**3*Piecewise((x**2/2, Eq(b, 0)),
 (-Piecewise((-exp(-b*x)/b, Ne(b, 0)), (x, True))/b, True))*exp(-a)
```

3.62 $\int \frac{e^{-a-bx}(a+bx)^3}{x^3} \, dx$

Optimal. Leaf size=130

$$\frac{1}{2}e^{-a}a^3b^2\text{Ei}(-bx)-\frac{a^3e^{-a-bx}}{2x^2}+\frac{a^3be^{-a-bx}}{2x}-3e^{-a}a^2b^2\text{Ei}(-bx)-\frac{3a^2be^{-a-bx}}{x}+3e^{-a}ab^2\text{Ei}(-bx)-b^2e^{-a-bx}$$

```
[Out] -b^2*exp(-b*x-a)-1/2*a^3*exp(-b*x-a)/x^2-3*a^2*b*exp(-b*x-a)/x+1/2*a^3*b*ex
p(-b*x-a)/x+3*a*b^2*Ei(-b*x)/exp(a)-3*a^2*b^2*Ei(-b*x)/exp(a)+1/2*a^3*b^2*E
i(-b*x)/exp(a)
```

Rubi [A] time = 0.21, antiderivative size = 130, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 4, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.190, Rules used = {2199, 2194, 2177, 2178}

$$\frac{1}{2}e^{-a}a^3b^2\text{Ei}(-bx)-3e^{-a}a^2b^2\text{Ei}(-bx)-\frac{a^3e^{-a-bx}}{2x^2}+\frac{a^3be^{-a-bx}}{2x}-\frac{3a^2be^{-a-bx}}{x}+3e^{-a}ab^2\text{Ei}(-bx)-b^2e^{-a-bx}$$

Antiderivative was successfully verified.

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

```
[Out] -(b^2*E^(-a - b*x)) - (a^3*E^(-a - b*x))/(2*x^2) - (3*a^2*b*E^(-a - b*x))/x
 + (a^3*b*E^(-a - b*x))/(2*x) + (3*a*b^2*ExpIntegralEi[-(b*x)])/E^a - (3*a^
2*b^2*ExpIntegralEi[-(b*x)])/E^a + (a^3*b^2*ExpIntegralEi[-(b*x)])/(2*E^a)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}\int \frac{e^{-a-bx}(a+bx)^3}{x^3}\,dx &= \int \left(b^3e^{-a-bx}+\frac{a^3e^{-a-bx}}{x^3}+\frac{3a^2be^{-a-bx}}{x^2}+\frac{3ab^2e^{-a-bx}}{x}\right)dx\\
&= a^3\int \frac{e^{-a-bx}}{x^3}\,dx+\left(3a^2b\right)\int \frac{e^{-a-bx}}{x^2}\,dx+\left(3ab^2\right)\int \frac{e^{-a-bx}}{x}\,dx+b^3\int e^{-a-bx}\,dx\\
&= -b^2e^{-a-bx}-\frac{a^3e^{-a-bx}}{2x^2}-\frac{3a^2be^{-a-bx}}{x}+3ab^2e^{-a}\text{Ei}(-bx)-\frac{1}{2}\left(a^3b\right)\int \frac{e^{-a-bx}}{x^2}\,dx-\left(3a^2b^2\right)\int\\
&= -b^2e^{-a-bx}-\frac{a^3e^{-a-bx}}{2x^2}-\frac{3a^2be^{-a-bx}}{x}+\frac{a^3be^{-a-bx}}{2x}+3ab^2e^{-a}\text{Ei}(-bx)-3a^2b^2e^{-a}\text{Ei}(-bx)+\frac{1}{2}\\
&= -b^2e^{-a-bx}-\frac{a^3e^{-a-bx}}{2x^2}-\frac{3a^2be^{-a-bx}}{x}+\frac{a^3be^{-a-bx}}{2x}+3ab^2e^{-a}\text{Ei}(-bx)-3a^2b^2e^{-a}\text{Ei}(-bx)+\frac{1}{2}\end{aligned}$$

Mathematica [A] time = 0.08, size = 68, normalized size = 0.52

$$\frac{e^{-a-bx}\left(a^3(bx-1)+\left(a^2-6a+6\right)ab^2x^2e^{bx}\text{Ei}(-bx)-6a^2bx-2b^2x^2\right)}{2x^2}$$

Antiderivative was successfully verified.

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

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

fricas [A] time = 0.42, size = 70, normalized size = 0.54

$$\frac{\left(a^3-6\,a^2+6\,a\right)b^2x^2\text{Ei}\left(-bx\right)e^{(-a)}-\left(2\,b^2x^2+a^3-\left(a^3-6\,a^2\right)bx\right)e^{(-bx-a)}}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.33, size = 125, normalized size = 0.96

$$\frac{a^3b^2x^2\mathrm{Ei}\left(-bx\right)e^{(-a)} - 6\,a^2b^2x^2\mathrm{Ei}\left(-bx\right)e^{(-a)} + 6\,ab^2x^2\mathrm{Ei}\left(-bx\right)e^{(-a)} + a^3bxe^{(-bx-a)} - 6\,a^2bxe^{(-bx-a)} - 2\,b^2x^2e^{(-bx-}}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.02, size = 112, normalized size = 0.86

$$-\left(-\left(-\frac{\mathrm{Ei}\left(1,bx\right)\mathrm{e}^{-a}}{2} + \frac{\mathrm{e}^{-bx-a}}{2bx} - \frac{\mathrm{e}^{-bx-a}}{2b^2x^2}\right)a^3 + 3a\,\mathrm{Ei}\left(1,bx\right)\mathrm{e}^{-a} + 3\left(-\,\mathrm{Ei}\left(1,bx\right)\mathrm{e}^{-a} + \frac{\mathrm{e}^{-bx-a}}{bx}\right)a^2 + \mathrm{e}^{-bx-a}\right)b^2$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -b^2*(exp(-b*x-a)+3*a^2*(1/b/x*exp(-b*x-a)-exp(-a)*Ei(1,b*x))+3*a*exp(-a)*E
i(1,b*x)-a^3*(-1/2*exp(-b*x-a)/b^2/x^2+1/2/b/x*exp(-b*x-a)-1/2*exp(-a)*Ei(1
,b*x)))
```

maxima [A] time = 1.24, size = 64, normalized size = 0.49

$$-a^3b^2e^{(-a)}\Gamma\left(-2,bx\right) - 3\,a^2b^2e^{(-a)}\Gamma\left(-1,bx\right) + 3\,ab^2\mathrm{Ei}\left(-bx\right)e^{(-a)} - b^2e^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -a^3*b^2*e^(-a)*gamma(-2, b*x) - 3*a^2*b^2*e^(-a)*gamma(-1, b*x) + 3*a*b^2*
Ei(-b*x)*e^(-a) - b^2*e^(-b*x - a)
```

mupad [B] time = 3.64, size = 100, normalized size = 0.77

$$3\,a^2\,b^2\,\mathrm{e}^{-a}\,\left(\mathrm{expint}\left(b\,x\right)-\frac{\mathrm{e}^{-b\,x}}{b\,x}\right)-3\,a\,b^2\,\mathrm{e}^{-a}\,\mathrm{expint}\left(b\,x\right)-b^2\,\mathrm{e}^{-a-b\,x}+a^3\,b^2\,\mathrm{e}^{-a}\,\left(\mathrm{e}^{-b\,x}\,\left(\frac{1}{2\,b\,x}-\frac{1}{2\,b^2\,x^2}\right)-\frac{\mathrm{expint}\,(}{2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

sympy [A] time = 5.30, size = 56, normalized size = 0.43

$$\left(-\frac{a^3 \operatorname{E}_3(bx)}{x^2} - \frac{3a^2 b \operatorname{E}_2(bx)}{x} + 3ab^2 \operatorname{Ei}(-bx) + b^3 \left(\begin{cases} x & \text{for } b = 0 \\ -\frac{e^{-bx}}{b} & \text{otherwise} \end{cases}\right)\right) e^{-a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**3/x**3,x)
```

```
[Out] (-a**3*expint(3, b*x)/x**2 - 3*a**2*b*expint(2, b*x)/x + 3*a*b**2*Ei(-b*x)
+ b**3*Piecewise((x, Eq(b, 0)), (-exp(-b*x)/b, True)))*exp(-a)
```

3.63 $\int \frac{e^{-a-bx}(a+bx)^3}{x^4}\,dx$

Optimal. Leaf size=198

$$-\frac{1}{6}e^{-a}a^3b^3\text{Ei}(-bx)-\frac{a^3b^2e^{-a-bx}}{6x}-\frac{a^3e^{-a-bx}}{3x^3}+\frac{a^3be^{-a-bx}}{6x^2}+\frac{3}{2}e^{-a}a^2b^3\text{Ei}(-bx)+\frac{3a^2b^2e^{-a-bx}}{2x}-\frac{3a^2be^{-a-bx}}{2x^2}-3e^{-a}ab^3\text{Ei}(-b$$

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

Rubi [A] time = 0.29, antiderivative size = 198, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 3, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143, Rules used = {2199, 2177, 2178}

$$-\frac{1}{6}e^{-a}a^3b^3\text{Ei}(-bx)+\frac{3}{2}e^{-a}a^2b^3\text{Ei}(-bx)-\frac{a^3b^2e^{-a-bx}}{6x}+\frac{3a^2b^2e^{-a-bx}}{2x}+\frac{a^3be^{-a-bx}}{6x^2}-\frac{a^3e^{-a-bx}}{3x^3}-\frac{3a^2be^{-a-bx}}{2x^2}-3e^{-a}ab^3\text{Ei}(-b$$

Antiderivative was successfully verified.

```
[In] Int[(E^(-a - b*x)*(a + b*x)^3)/x^4,x]
```

```
[Out] -(a^3*E^(-a - b*x))/(3*x^3) - (3*a^2*b*E^(-a - b*x))/(2*x^2) + (a^3*b*E^(-a
 - b*x))/(6*x^2) - (3*a*b^2*E^(-a - b*x))/x + (3*a^2*b^2*E^(-a - b*x))/(2*x
) - (a^3*b^2*E^(-a - b*x))/(6*x) + (b^3*ExpIntegralEi[-(b*x)])/E^a - (3*a*b
^3*ExpIntegralEi[-(b*x)])/E^a + (3*a^2*b^3*ExpIntegralEi[-(b*x)])/(2*E^a) -
 (a^3*b^3*ExpIntegralEi[-(b*x)])/(6*E^a)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{e^{-a-bx}(a+bx)^3}{x^4}\,dx = \int \left(\frac{a^3e^{-a-bx}}{x^4}+\frac{3a^2be^{-a-bx}}{x^3}+\frac{3ab^2e^{-a-bx}}{x^2}+\frac{b^3e^{-a-bx}}{x}\right)dx$$
$$= a^3\int \frac{e^{-a-bx}}{x^4}\,dx+\left(3a^2b\right)\int \frac{e^{-a-bx}}{x^3}\,dx+\left(3ab^2\right)\int \frac{e^{-a-bx}}{x^2}\,dx+b^3\int \frac{e^{-a-bx}}{x}\,dx$$
$$= -\frac{a^3e^{-a-bx}}{3x^3}-\frac{3a^2be^{-a-bx}}{2x^2}-\frac{3ab^2e^{-a-bx}}{x}+b^3e^{-a}\text{Ei}(-bx)-\frac{1}{3}\left(a^3b\right)\int \frac{e^{-a-bx}}{x^3}\,dx-\frac{1}{2}\left(3a^2b^2\right)$$
$$= -\frac{a^3e^{-a-bx}}{3x^3}-\frac{3a^2be^{-a-bx}}{2x^2}+\frac{a^3be^{-a-bx}}{6x^2}-\frac{3ab^2e^{-a-bx}}{x}+\frac{3a^2b^2e^{-a-bx}}{2x}+b^3e^{-a}\text{Ei}(-bx)-3ab^3e$$
$$= -\frac{a^3e^{-a-bx}}{3x^3}-\frac{3a^2be^{-a-bx}}{2x^2}+\frac{a^3be^{-a-bx}}{6x^2}-\frac{3ab^2e^{-a-bx}}{x}+\frac{3a^2b^2e^{-a-bx}}{2x}-\frac{a^3b^2e^{-a-bx}}{6x}+b^3e^{-a}\text{Ei}$$
$$= -\frac{a^3e^{-a-bx}}{3x^3}-\frac{3a^2be^{-a-bx}}{2x^2}+\frac{a^3be^{-a-bx}}{6x^2}-\frac{3ab^2e^{-a-bx}}{x}+\frac{3a^2b^2e^{-a-bx}}{2x}-\frac{a^3b^2e^{-a-bx}}{6x}+b^3e^{-a}\text{Ei}$$

Mathematica [A] time = 0.11, size = 81, normalized size = 0.41

$$\frac{1}{6}e^{-a}\left(-\frac{ae^{-bx}\left(a^2\left(b^2x^2-bx+2\right)-9abx(bx-1)+18b^2x^2\right)}{x^3}-\left(\left(a^3-9a^2+18a-6\right)b^3\text{Ei}(-bx)\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(E^(-a - b*x)*(a + b*x)^3)/x^4,x]
```

```
[Out] (-((a*(18*b^2*x^2 - 9*a*b*x*(-1 + b*x) + a^2*(2 - b*x + b^2*x^2)))/(E^(b*x)
*x^3)) - (-6 + 18*a - 9*a^2 + a^3)*b^3*ExpIntegralEi[-(b*x)])/(6*E^a)
```

fricas [A] time = 0.40, size = 83, normalized size = 0.42

$$-\frac{\left(a^3-9\,a^2+18\,a-6\right)b^3x^3\text{Ei}\left(-bx\right)e^{(-a)}+\left(\left(a^3-9\,a^2+18\,a\right)b^2x^2+2\,a^3-\left(a^3-9\,a^2\right)bx\right)e^{(-bx-a)}}{6\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^3/x^4,x, algorithm="fricas")
```

```
[Out] -1/6*((a^3 - 9*a^2 + 18*a - 6)*b^3*x^3*Ei(-b*x)*e^(-a) + ((a^3 - 9*a^2 + 18
*a)*b^2*x^2 + 2*a^3 - (a^3 - 9*a^2)*b*x)*e^(-b*x - a))/x^3
```

giac [A] time = 0.41, size = 183, normalized size = 0.92

$$-\frac{a^3b^3x^3\text{Ei}(-bx)e^{(-a)} - 9a^2b^3x^3\text{Ei}(-bx)e^{(-a)} + 18ab^3x^3\text{Ei}(-bx)e^{(-a)} + a^3b^2x^2e^{(-bx-a)} - 6b^3x^3\text{Ei}(-bx)e^{(-a)} - 9}{6x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^3/x^4,x, algorithm="giac")
```

```
[Out] -1/6*(a^3*b^3*x^3*Ei(-b*x)*e^(-a) - 9*a^2*b^3*x^3*Ei(-b*x)*e^(-a) + 18*a*b^
3*x^3*Ei(-b*x)*e^(-a) + a^3*b^2*x^2*e^(-b*x - a) - 6*b^3*x^3*Ei(-b*x)*e^(-a
) - 9*a^2*b^2*x^2*e^(-b*x - a) - a^3*b*x*e^(-b*x - a) + 18*a*b^2*x^2*e^(-b*
x - a) + 9*a^2*b*x*e^(-b*x - a) + 2*a^3*e^(-b*x - a))/x^3
```

maple [A] time = 0.02, size = 167, normalized size = 0.84

$$\left(-\left(-\frac{\text{Ei}(1,bx)\,\mathrm{e}^{-a}}{6} + \frac{\mathrm{e}^{-bx-a}}{6bx} - \frac{\mathrm{e}^{-bx-a}}{6b^2x^2} + \frac{\mathrm{e}^{-bx-a}}{3b^3x^3}\right)a^3 + 3\left(-\frac{\text{Ei}(1,bx)\,\mathrm{e}^{-a}}{2} + \frac{\mathrm{e}^{-bx-a}}{2bx} - \frac{\mathrm{e}^{-bx-a}}{2b^2x^2}\right)a^2 - \text{Ei}(1,bx)\,\mathrm{e}^{-a} - 3$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*(b*x+a)^3/x^4,x)
```

```
[Out] b^3*(-3*a*(1/b/x*exp(-b*x-a)-exp(-a)*Ei(1,b*x))-a^3*(1/3*exp(-b*x-a)/b^3/x^
3-1/6/b^2/x^2*exp(-b*x-a)+1/6/b/x*exp(-b*x-a)-1/6*exp(-a)*Ei(1,b*x))-exp(-a
)*Ei(1,b*x)+3*a^2*(-1/2/b^2/x^2*exp(-b*x-a)+1/2/b/x*exp(-b*x-a)-1/2*exp(-a)
*Ei(1,b*x)))
```

maxima [A] time = 1.17, size = 63, normalized size = 0.32

$$-a^3b^3e^{(-a)}\Gamma(-3,bx) - 3a^2b^3e^{(-a)}\Gamma(-2,bx) - 3ab^3e^{(-a)}\Gamma(-1,bx) + b^3\text{Ei}(-bx)e^{(-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^3/x^4,x, algorithm="maxima")
```

```
[Out] -a^3*b^3*e^(-a)*gamma(-3, b*x) - 3*a^2*b^3*e^(-a)*gamma(-2, b*x) - 3*a*b^3*
e^(-a)*gamma(-1, b*x) + b^3*Ei(-b*x)*e^(-a)
```

mupad [B] time = 3.57, size = 142, normalized size = 0.72

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(- a - b*x)*(a + b*x)^3)/x^4,x)
```

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

sympy [A] time = 5.33, size = 53, normalized size = 0.27

$$\left(-\frac{a^3 \operatorname{E}_4(bx)}{x^3} - \frac{3a^2 b \operatorname{E}_3(bx)}{x^2} - \frac{3ab^2 \operatorname{E}_2(bx)}{x} + b^3 \operatorname{Ei}(-bx)\right) e^{-a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**3/x**4,x)
```

```
[Out] (-a**3*expint(4, b*x)/x**3 - 3*a**2*b*expint(3, b*x)/x**2 - 3*a*b**2*expint
(2, b*x)/x + b**3*Ei(-b*x))*exp(-a)
```

3.64 $\int F^{a+b(c+dx)}x^m(e+fx)^2\,dx$

Optimal. Leaf size=139

$$\frac{f^2x^mF^{a+bc}(-bdx\log(F))^{-m}\Gamma(m+3,-bdx\log(F))}{b^3d^3\log^3(F)}-\frac{2efx^mF^{a+bc}(-bdx\log(F))^{-m}\Gamma(m+2,-bdx\log(F))}{b^2d^2\log^2(F)}+\frac{e^2x^mF^{a+}}{}$$

```
[Out] f^2*F^(b*c+a)*x^m*GAMMA(3+m,-b*d*x*ln(F))/b^3/d^3/ln(F)^3/((-b*d*x*ln(F))^m
)-2*e*f*F^(b*c+a)*x^m*GAMMA(2+m,-b*d*x*ln(F))/b^2/d^2/ln(F)^2/((-b*d*x*ln(F
))^m)+e^2*F^(b*c+a)*x^m*GAMMA(1+m,-b*d*x*ln(F))/b/d/ln(F)/((-b*d*x*ln(F))^m
)
```

Rubi [A] time = 0.31, antiderivative size = 139, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 2, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.091, Rules used = {2199, 2181}

$$-\frac{2efx^mF^{a+bc}(-bdx\log(F))^{-m}\text{Gamma}(m+2,-bdx\log(F))}{b^2d^2\log^2(F)}+\frac{f^2x^mF^{a+bc}(-bdx\log(F))^{-m}\text{Gamma}(m+3,-bdx\,\text{l}}{b^3d^3\log^3(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(a + b*(c + d*x))*x^m*(e + f*x)^2,x]
```

```
[Out] (f^2*F^(a + b*c)*x^m*Gamma[3 + m, -(b*d*x*Log[F])])/(b^3*d^3*Log[F]^3*(-(b*
d*x*Log[F]))^m) - (2*e*f*F^(a + b*c)*x^m*Gamma[2 + m, -(b*d*x*Log[F])])/(b^
2*d^2*Log[F]^2*(-(b*d*x*Log[F]))^m) + (e^2*F^(a + b*c)*x^m*Gamma[1 + m, -(b
*d*x*Log[F])])/(b*d*Log[F]*(-(b*d*x*Log[F]))^m)
```

Rule 2181

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))*((c_.) + (d_.)*(x_))^(m_), x_Symbol]
:> -Simp[(F^(g*(e - (c*f)/d))*(c + d*x)^FracPart[m]*Gamma[m + 1, (-((f*g*Lo
g[F])/d))*(c + d*x)])/(d*(-((f*g*Log[F])/d))^(IntPart[m] + 1)*(-((f*g*Log[F
]*(c + d*x))/d))^FracPart[m]), x] /; FreeQ[{F, c, d, e, f, g, m}, x] &&  !I
ntegerQ[m]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\int F^{a+b(c+dx)}x^m(e+fx)^2\,dx = \int \left(e^2F^{a+bc+bdx}x^m + 2efF^{a+bc+bdx}x^{1+m} + f^2F^{a+bc+bdx}x^{2+m}\right)dx$$
$$= e^2\int F^{a+bc+bdx}x^m\,dx + (2ef)\int F^{a+bc+bdx}x^{1+m}\,dx + f^2\int F^{a+bc+bdx}x^{2+m}\,dx$$
$$= \frac{f^2F^{a+bc}x^m\Gamma(3+m,-bdx\log(F))(-bdx\log(F))^{-m}}{b^3d^3\log^3(F)} - \frac{2efF^{a+bc}x^m\Gamma(2+m,-bdx\log(}{b^2d^2\log^2(F}$$

Mathematica [A] time = 0.13, size = 86, normalized size = 0.62

$$\frac{x^mF^{a+bc}(-bdx\log(F))^{-m}\left(bde\log(F)(bde\log(F)\Gamma(m+1,-bdx\log(F))-2f\Gamma(m+2,-bdx\log(F)))+f^2\Gamma(m+3,\right.}{b^3d^3\log^3(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*(c + d*x))*x^m*(e + f*x)^2,x]
```

```
[Out] (F^(a + b*c)*x^m*(f^2*Gamma[3 + m, -(b*d*x*Log[F])] + b*d*e*Log[F]*(-2*f*Ga
mma[2 + m, -(b*d*x*Log[F])] + b*d*e*Gamma[1 + m, -(b*d*x*Log[F])]*Log[F])))
/(b^3*d^3*Log[F]^3*(-(b*d*x*Log[F]))^m)
```

fricas [A] time = 0.44, size = 161, normalized size = 1.16

$$-\frac{\left(\left(bdf^2m+2\,bdf^2\right)x\log(F)-\left(b^2d^2f^2x^2+2\,b^2d^2efx\right)\log(F)^2\right)F^{bdx+bc+a}x^m-\left(b^2d^2e^2\log(F)^2+f^2m^2+3\,f^2m+\right.}{b^3d^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*x^m*(f*x+e)^2,x, algorithm="fricas")
```

```
[Out] -(((b*d*f^2*m + 2*b*d*f^2)*x*log(F) - (b^2*d^2*f^2*x^2 + 2*b^2*d^2*e*f*x)*l
og(F)^2)*F^(b*d*x + b*c + a)*x^m - (b^2*d^2*e^2*log(F)^2 + f^2*m^2 + 3*f^2*
m + 2*f^2 - 2*(b*d*e*f*m + b*d*e*f)*log(F))*e^(-m*log(-b*d*log(F)) + (b*c +
 a)*log(F))*gamma(m + 1, -b*d*x*log(F)))/(b^3*d^3*log(F)^3)
```

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

$$\int \left(fx+e\right)^2 F^{(dx+c)b+a}x^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*x^m*(f*x+e)^2,x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*F^((d*x + c)*b + a)*x^m, x)
```

maple [B] time = 0.12, size = 433, normalized size = 3.12

$$-\frac{\left(m\,x^{m}\left(-bd\right)^{m}\left(-bdx\ln(F)\right)^{-m}\ln(F)^{m}\Gamma(m)-m\,x^{m}\left(-bd\right)^{m}\left(-bdx\ln(F)\right)^{-m}\ln(F)^{m}\Gamma\left(m,-bdx\ln(F)\right)-x^{m}\left(-bd\right)^{m}}{bd}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*x^m*(f*x+e)^2,x)
```

```
[Out] -(-b*d)^(-m)*ln(F)^(-3-m)/b^3/d^3*F^(b*c+a)*f^2*(x^m*(-b*d)^m*ln(F)^m*m*(m^
2+3*m+2)*GAMMA(m)*(-b*d*x*ln(F))^(-m)-x^m*(-b*d)^m*ln(F)^m*(b^2*d^2*x^2*ln(
F)^2-m*b*d*x*ln(F)+m^2-2*b*d*x*ln(F)+3*m+2)*exp(b*d*x*ln(F))-x^m*(-b*d)^m*l
n(F)^m*m*(m^2+3*m+2)*(-b*d*x*ln(F))^(-m)*GAMMA(m,-b*d*x*ln(F)))+2*(-b*d)^(-
m)*ln(F)^(-m-2)/b^2/d^2*F^(b*c+a)*f*e*(x^m*(-b*d)^m*ln(F)^m*(m+1)*m*GAMMA(m
)*(-b*d*x*ln(F))^(-m)+x^m*(-b*d)^m*ln(F)^m*(b*d*x*ln(F)-m-1)*exp(b*d*x*ln(F
))-x^m*(-b*d)^m*ln(F)^m*(m+1)*m*(-b*d*x*ln(F))^(-m)*GAMMA(m,-b*d*x*ln(F)))-
F^(b*c+a)*(-b*d)^(-m)*ln(F)^(-m-1)*e^2/b/d*(x^m*(-b*d)^m*ln(F)^m*m*GAMMA(m)
*(-b*d*x*ln(F))^(-m)-x^m*(-b*d)^m*ln(F)^m*exp(b*d*x*ln(F))-x^m*(-b*d)^m*ln(
F)^m*m*(-b*d*x*ln(F))^(-m)*GAMMA(m,-b*d*x*ln(F)))
```

maxima [A] time = 1.13, size = 123, normalized size = 0.88

$$-\left(-bdx\log(F)\right)^{-m-3}F^{bc+a}f^{2}x^{m+3}\Gamma\left(m+3,-bdx\log(F)\right)-2\left(-bdx\log(F)\right)^{-m-2}F^{bc+a}efx^{m+2}\Gamma\left(m+2,-bdx\log(\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*x^m*(f*x+e)^2,x, algorithm="maxima")
```

```
[Out] -(-b*d*x*log(F))^(-m - 3)*F^(b*c + a)*f^2*x^(m + 3)*gamma(m + 3, -b*d*x*log
(F)) - 2*(-b*d*x*log(F))^(-m - 2)*F^(b*c + a)*e*f*x^(m + 2)*gamma(m + 2, -b
*d*x*log(F)) - (-b*d*x*log(F))^(-m - 1)*F^(b*c + a)*e^2*x^(m + 1)*gamma(m +
 1, -b*d*x*log(F))
```

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

$$\int F^{a+b\,(c+d\,x)}\,x^m\,{\left(e+f\,x\right)}^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a + b*(c + d*x))*x^m*(e + f*x)^2,x)
```

```
[Out] int(F^(a + b*(c + d*x))*x^m*(e + f*x)^2, x)
```

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

$$\int F^{a+b(c+dx)}x^{m}\left(e+fx\right)^{2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*x**m*(f*x+e)**2,x)
```

```
[Out] Integral(F**(a + b*(c + d*x))*x**m*(e + f*x)**2, x)
```

3.65 $\int F^{a+b(c+dx)}x^3(e+fx)^2\,dx$

Optimal. Leaf size=414

$$-\frac{120f^2F^{a+bc+bdx}}{b^6d^6\log^6(F)}+\frac{48efF^{a+bc+bdx}}{b^5d^5\log^5(F)}+\frac{120f^2xF^{a+bc+bdx}}{b^5d^5\log^5(F)}-\frac{6e^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{48efxF^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{60f^2x^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{6e^2xF^{a+}}{b^3d^3\log}$$

```
[Out] -120*f^2*F^(b*d*x+b*c+a)/b^6/d^6/ln(F)^6+48*e*f*F^(b*d*x+b*c+a)/b^5/d^5/ln(
F)^5+120*f^2*F^(b*d*x+b*c+a)*x/b^5/d^5/ln(F)^5-6*e^2*F^(b*d*x+b*c+a)/b^4/d^
4/ln(F)^4-48*e*f*F^(b*d*x+b*c+a)*x/b^4/d^4/ln(F)^4-60*f^2*F^(b*d*x+b*c+a)*x
^2/b^4/d^4/ln(F)^4+6*e^2*F^(b*d*x+b*c+a)*x/b^3/d^3/ln(F)^3+24*e*f*F^(b*d*x+
b*c+a)*x^2/b^3/d^3/ln(F)^3+20*f^2*F^(b*d*x+b*c+a)*x^3/b^3/d^3/ln(F)^3-3*e^2
*F^(b*d*x+b*c+a)*x^2/b^2/d^2/ln(F)^2-8*e*f*F^(b*d*x+b*c+a)*x^3/b^2/d^2/ln(F
)^2-5*f^2*F^(b*d*x+b*c+a)*x^4/b^2/d^2/ln(F)^2+e^2*F^(b*d*x+b*c+a)*x^3/b/d/l
n(F)+2*e*f*F^(b*d*x+b*c+a)*x^4/b/d/ln(F)+f^2*F^(b*d*x+b*c+a)*x^5/b/d/ln(F)
```

Rubi [A] time = 0.67, antiderivative size = 414, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.136, Rules used = {2196, 2176, 2194}

$$-\frac{3e^2x^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{6e^2xF^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{6e^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{8efx^3F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{24efx^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{48efxF^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{48efF^{a+bc}}{b^5d^5\log^5}$$

Antiderivative was successfully verified.

```
[In] Int[F^(a + b*(c + d*x))*x^3*(e + f*x)^2,x]
```

```
[Out] (-120*f^2*F^(a + b*c + b*d*x))/(b^6*d^6*Log[F]^6) + (48*e*f*F^(a + b*c + b*
d*x))/(b^5*d^5*Log[F]^5) + (120*f^2*F^(a + b*c + b*d*x)*x)/(b^5*d^5*Log[F]^
5) - (6*e^2*F^(a + b*c + b*d*x))/(b^4*d^4*Log[F]^4) - (48*e*f*F^(a + b*c +
b*d*x)*x)/(b^4*d^4*Log[F]^4) - (60*f^2*F^(a + b*c + b*d*x)*x^2)/(b^4*d^4*Lo
g[F]^4) + (6*e^2*F^(a + b*c + b*d*x)*x)/(b^3*d^3*Log[F]^3) + (24*e*f*F^(a +
 b*c + b*d*x)*x^2)/(b^3*d^3*Log[F]^3) + (20*f^2*F^(a + b*c + b*d*x)*x^3)/(b
^3*d^3*Log[F]^3) - (3*e^2*F^(a + b*c + b*d*x)*x^2)/(b^2*d^2*Log[F]^2) - (8*
e*f*F^(a + b*c + b*d*x)*x^3)/(b^2*d^2*Log[F]^2) - (5*f^2*F^(a + b*c + b*d*x
)*x^4)/(b^2*d^2*Log[F]^2) + (e^2*F^(a + b*c + b*d*x)*x^3)/(b*d*Log[F]) + (2
*e*f*F^(a + b*c + b*d*x)*x^4)/(b*d*Log[F]) + (f^2*F^(a + b*c + b*d*x)*x^5)/
(b*d*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
```

```
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}
\int F^{a+b(c+dx)}x^3(e+fx)^2\,dx &= \int \left(e^2F^{a+bc+bdx}x^3+2efF^{a+bc+bdx}x^4+f^2F^{a+bc+bdx}x^5\right)dx\\
&= e^2\int F^{a+bc+bdx}x^3\,dx+(2ef)\int F^{a+bc+bdx}x^4\,dx+f^2\int F^{a+bc+bdx}x^5\,dx\\
&= \frac{e^2F^{a+bc+bdx}x^3}{bd\log(F)}+\frac{2efF^{a+bc+bdx}x^4}{bd\log(F)}+\frac{f^2F^{a+bc+bdx}x^5}{bd\log(F)}-\frac{\left(3e^2\right)\int F^{a+bc+bdx}x^2\,dx}{bd\log(F)}-\frac{(8ef)\ldots}{}\\
&= -\frac{3e^2F^{a+bc+bdx}x^2}{b^2d^2\log^2(F)}-\frac{8efF^{a+bc+bdx}x^3}{b^2d^2\log^2(F)}-\frac{5f^2F^{a+bc+bdx}x^4}{b^2d^2\log^2(F)}+\frac{e^2F^{a+bc+bdx}x^3}{bd\log(F)}+\frac{2efF^{a+bc+b\ldots}}{bd\log(\ldots}\\
&= \frac{6e^2F^{a+bc+bdx}x}{b^3d^3\log^3(F)}+\frac{24efF^{a+bc+bdx}x^2}{b^3d^3\log^3(F)}+\frac{20f^2F^{a+bc+bdx}x^3}{b^3d^3\log^3(F)}-\frac{3e^2F^{a+bc+bdx}x^2}{b^2d^2\log^2(F)}-\frac{8efF^{a+bc+\ldots}}{b^2d^2\log\ldots}\\
&= -\frac{6e^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{48efF^{a+bc+bdx}x}{b^4d^4\log^4(F)}-\frac{60f^2F^{a+bc+bdx}x^2}{b^4d^4\log^4(F)}+\frac{6e^2F^{a+bc+bdx}x}{b^3d^3\log^3(F)}+\frac{24efF^{a+bc+\ldots}}{b^3d^3\log^3\ldots}\\
&= \frac{48efF^{a+bc+bdx}}{b^5d^5\log^5(F)}+\frac{120f^2F^{a+bc+bdx}x}{b^5d^5\log^5(F)}-\frac{6e^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{48efF^{a+bc+bdx}x}{b^4d^4\log^4(F)}-\frac{60f^2F^{a+bc+b\ldots}}{b^4d^4\log^4(\ldots}\\
&= -\frac{120f^2F^{a+bc+bdx}}{b^6d^6\log^6(F)}+\frac{48efF^{a+bc+bdx}}{b^5d^5\log^5(F)}+\frac{120f^2F^{a+bc+bdx}x}{b^5d^5\log^5(F)}-\frac{6e^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{48efF^{a+bc+\ldots}}{b^4d^4\log^4\ldots}
\end{aligned}$$

Mathematica [A] time = 0.13, size = 159, normalized size = 0.38

$$\frac{F^{a+b(c+dx)}\left(b^5d^5x^3\log^5(F)(e+fx)^2-b^4d^4x^2\log^4(F)\left(3e^2+8efx+5f^2x^2\right)+2b^3d^3x\log^3(F)\left(3e^2+12efx+10f^2\ldots\right.\right.}{b^6d^6\log^6(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*(c + d*x))*x^3*(e + f*x)^2,x]
```

```
[Out] (F^(a + b*(c + d*x))*(-120*f^2 + 24*b*d*f*(2*e + 5*f*x)*Log[F] - 6*b^2*d^2*
(e^2 + 8*e*f*x + 10*f^2*x^2)*Log[F]^2 + 2*b^3*d^3*x*(3*e^2 + 12*e*f*x + 10*
f^2*x^2)*Log[F]^3 - b^4*d^4*x^2*(3*e^2 + 8*e*f*x + 5*f^2*x^2)*Log[F]^4 + b^
5*d^5*x^3*(e + f*x)^2*Log[F]^5))/(b^6*d^6*Log[F]^6)
```

fricas [A] time = 0.42, size = 228, normalized size = 0.55

$$\frac{\left(\left(b^5d^5f^2x^5+2\,b^5d^5efx^4+b^5d^5e^2x^3\right)\log(F)^5-\left(5\,b^4d^4f^2x^4+8\,b^4d^4efx^3+3\,b^4d^4e^2x^2\right)\log(F)^4+2\left(10\,b^3d^3f^2x\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^5*d^5*f^2*x^5 + 2*b^5*d^5*e*f*x^4 + b^5*d^5*e^2*x^3)*log(F)^5 - (5*b^4*
d^4*f^2*x^4 + 8*b^4*d^4*e*f*x^3 + 3*b^4*d^4*e^2*x^2)*log(F)^4 + 2*(10*b^3*d
^3*f^2*x^3 + 12*b^3*d^3*e*f*x^2 + 3*b^3*d^3*e^2*x)*log(F)^3 - 6*(10*b^2*d^2
*f^2*x^2 + 8*b^2*d^2*e*f*x + b^2*d^2*e^2)*log(F)^2 - 120*f^2 + 24*(5*b*d*f^
2*x + 2*b*d*e*f)*log(F))*F^(b*d*x + b*c + a)/(b^6*d^6*log(F)^6)
```

giac [C] time = 1.52, size = 9953, normalized size = 24.04

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((4*(pi^3*b^3*d^3*x^3*sgn(F) - 3*pi*b^3*d^3*x^3*log(abs(F))^2*sgn(F) - pi^3
*b^3*d^3*x^3 + 3*pi*b^3*d^3*x^3*log(abs(F))^2 + 6*pi*b^2*d^2*x^2*log(abs(F)
)*sgn(F) - 6*pi*b^2*d^2*x^2*log(abs(F)) - 6*pi*b*d*x*sgn(F) + 6*pi*b*d*x)*(
pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^
4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)/((pi^4*b^4*d^4*sgn(F) - 6*pi^
2*b^4*d^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^
2 - 2*b^4*d^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b
^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs
(F))^3)^2) - (pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - p
i^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^4*log(abs(F))^4)*(3*pi
^2*b^3*d^3*x^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*x^3*log(abs(F)) + 2*b^3*
d^3*x^3*log(abs(F))^3 - 3*pi^2*b^2*d^2*x^2*sgn(F) + 3*pi^2*b^2*d^2*x^2 - 6*
b^2*d^2*x^2*log(abs(F))^2 + 12*b*d*x*log(abs(F)) - 12)/((pi^4*b^4*d^4*sgn(F
) - 6*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log
(abs(F))^2 - 2*b^4*d^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*d^4*log(abs(F))*sgn(
F) - pi*b^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^
4*log(abs(F))^3)^2))*cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*s
```

```
gn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a) + ((pi^4*b^4*d^4*sgn(F) -
6*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs
(F))^2 - 2*b^4*d^4*log(abs(F))^4)*(pi^3*b^3*d^3*x^3*sgn(F) - 3*pi*b^3*d^3*x
^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3*x^3 + 3*pi*b^3*d^3*x^3*log(abs(F))^2
 + 6*pi*b^2*d^2*x^2*log(abs(F))*sgn(F) - 6*pi*b^2*d^2*x^2*log(abs(F)) - 6*p
i*b*d*x*sgn(F) + 6*pi*b*d*x)/((pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*log(abs
(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^4*log
(abs(F))^4)^2 + 16*(pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F)
)^3*sgn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)^2) + 4*(p
i^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^4
*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)*(3*pi^2*b^3*d^3*x^3*log(abs(F)
)*sgn(F) - 3*pi^2*b^3*d^3*x^3*log(abs(F)) + 2*b^3*d^3*x^3*log(abs(F))^3 - 3
*pi^2*b^2*d^2*x^2*sgn(F) + 3*pi^2*b^2*d^2*x^2 - 6*b^2*d^2*x^2*log(abs(F))^2
 + 12*b*d*x*log(abs(F)) - 12)/((pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*log(ab
s(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^4*lo
g(abs(F))^4)^2 + 16*(pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F
))^3*sgn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)^2))*sin(
-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*
pi*a*sgn(F) + 1/2*pi*a))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs
(F)) + 2) - 1/2*I*((8*pi^3*b^3*d^3*x^3*sgn(F) + 24*I*pi^2*b^3*d^3*x^3*log(a
bs(F))*sgn(F) - 24*pi*b^3*d^3*x^3*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*d^3*x^3
 - 24*I*pi^2*b^3*d^3*x^3*log(abs(F)) + 24*pi*b^3*d^3*x^3*log(abs(F))^2 + 16
*I*b^3*d^3*x^3*log(abs(F))^3 - 24*I*pi^2*b^2*d^2*x^2*sgn(F) + 48*pi*b^2*d^2
*x^2*log(abs(F))*sgn(F) + 24*I*pi^2*b^2*d^2*x^2 - 48*pi*b^2*d^2*x^2*log(abs
(F)) - 48*I*b^2*d^2*x^2*log(abs(F))^2 - 48*pi*b*d*x*sgn(F) + 48*pi*b*d*x +
96*I*b*d*x*log(abs(F)) - 96*I)*e^(1/2*I*pi*b*d*x*sgn(F) - 1/2*I*pi*b*d*x +
1/2*I*pi*b*c*sgn(F) - 1/2*I*pi*b*c + 1/2*I*pi*a*sgn(F) - 1/2*I*pi*a)/(8*pi^
4*b^4*d^4*sgn(F) + 32*I*pi^3*b^4*d^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*d^4*l
og(abs(F))^2*sgn(F) - 32*I*pi*b^4*d^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*d^4
 - 32*I*pi^3*b^4*d^4*log(abs(F)) + 48*pi^2*b^4*d^4*log(abs(F))^2 + 32*I*pi*
b^4*d^4*log(abs(F))^3 - 16*b^4*d^4*log(abs(F))^4) + (8*pi^3*b^3*d^3*x^3*sgn
(F) - 24*I*pi^2*b^3*d^3*x^3*log(abs(F))*sgn(F) - 24*pi*b^3*d^3*x^3*log(abs(
F))^2*sgn(F) - 8*pi^3*b^3*d^3*x^3 + 24*I*pi^2*b^3*d^3*x^3*log(abs(F)) + 24*
pi*b^3*d^3*x^3*log(abs(F))^2 - 16*I*b^3*d^3*x^3*log(abs(F))^3 + 24*I*pi^2*b
^2*d^2*x^2*sgn(F) + 48*pi*b^2*d^2*x^2*log(abs(F))*sgn(F) - 24*I*pi^2*b^2*d^
2*x^2 - 48*pi*b^2*d^2*x^2*log(abs(F)) + 48*I*b^2*d^2*x^2*log(abs(F))^2 - 48
*pi*b*d*x*sgn(F) + 48*pi*b*d*x - 96*I*b*d*x*log(abs(F)) + 96*I)*e^(-1/2*I*p
i*b*d*x*sgn(F) + 1/2*I*pi*b*d*x - 1/2*I*pi*b*c*sgn(F) + 1/2*I*pi*b*c - 1/2*
I*pi*a*sgn(F) + 1/2*I*pi*a)/(8*pi^4*b^4*d^4*sgn(F) - 32*I*pi^3*b^4*d^4*log(
abs(F))*sgn(F) - 48*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) + 32*I*pi*b^4*d^4*log
(abs(F))^3*sgn(F) - 8*pi^4*b^4*d^4 + 32*I*pi^3*b^4*d^4*log(abs(F)) + 48*pi^
2*b^4*d^4*log(abs(F))^2 - 32*I*pi*b^4*d^4*log(abs(F))^3 - 16*b^4*d^4*log(ab
s(F))^4))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)) + 2) - 2*(
(4*(pi^3*b^4*d^4*f*x^4*log(abs(F))*sgn(F) - pi*b^4*d^4*f*x^4*log(abs(F))^3*
sgn(F) - pi^3*b^4*d^4*f*x^4*log(abs(F)) + pi*b^4*d^4*f*x^4*log(abs(F))^3 -
```

```
pi^3*b^3*d^3*f*x^3*sgn(F) + 3*pi*b^3*d^3*f*x^3*log(abs(F))^2*sgn(F) + pi^3*
b^3*d^3*f*x^3 - 3*pi*b^3*d^3*f*x^3*log(abs(F))^2 - 6*pi*b^2*d^2*f*x^2*log(a
bs(F))*sgn(F) + 6*pi*b^2*d^2*f*x^2*log(abs(F)) + 6*pi*b*d*f*x*sgn(F) - 6*pi
*b*d*f*x)*(pi^5*b^5*d^5*sgn(F) - 10*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) + 5*p
i*b^5*d^5*log(abs(F))^4*sgn(F) - pi^5*b^5*d^5 + 10*pi^3*b^5*d^5*log(abs(F))
^2 - 5*pi*b^5*d^5*log(abs(F))^4)/((pi^5*b^5*d^5*sgn(F) - 10*pi^3*b^5*d^5*lo
g(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F))^4*sgn(F) - pi^5*b^5*d^5 + 10*
pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*log(abs(F))^4)^2 + (5*pi^4*b^5*d^
5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^
5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(F))^3 - 2*b^5*d^5*log(abs(F))^5)^2)
 - (pi^4*b^4*d^4*f*x^4*sgn(F) - 6*pi^2*b^4*d^4*f*x^4*log(abs(F))^2*sgn(F) -
 pi^4*b^4*d^4*f*x^4 + 6*pi^2*b^4*d^4*f*x^4*log(abs(F))^2 - 2*b^4*d^4*f*x^4*
log(abs(F))^4 + 12*pi^2*b^3*d^3*f*x^3*log(abs(F))*sgn(F) - 12*pi^2*b^3*d^3*
f*x^3*log(abs(F)) + 8*b^3*d^3*f*x^3*log(abs(F))^3 - 12*pi^2*b^2*d^2*f*x^2*s
gn(F) + 12*pi^2*b^2*d^2*f*x^2 - 24*b^2*d^2*f*x^2*log(abs(F))^2 + 48*b*d*f*x
*log(abs(F)) - 48*f)*(5*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*l
og(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(
F))^3 - 2*b^5*d^5*log(abs(F))^5)/((pi^5*b^5*d^5*sgn(F) - 10*pi^3*b^5*d^5*lo
g(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F))^4*sgn(F) - pi^5*b^5*d^5 + 10*
pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*log(abs(F))^4)^2 + (5*pi^4*b^5*d^
5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^
5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(F))^3 - 2*b^5*d^5*log(abs(F))^5)^2)
)*cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c
 - 1/2*pi*a*sgn(F) + 1/2*pi*a) - ((pi^4*b^4*d^4*f*x^4*sgn(F) - 6*pi^2*b^4*d^
4*f*x^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4*f*x^4 + 6*pi^2*b^4*d^4*f*x^4*lo
g(abs(F))^2 - 2*b^4*d^4*f*x^4*log(abs(F))^4 + 12*pi^2*b^3*d^3*f*x^3*log(abs
(F))*sgn(F) - 12*pi^2*b^3*d^3*f*x^3*log(abs(F)) + 8*b^3*d^3*f*x^3*log(abs(F
))^3 - 12*pi^2*b^2*d^2*f*x^2*sgn(F) + 12*pi^2*b^2*d^2*f*x^2 - 24*b^2*d^2*f*
x^2*log(abs(F))^2 + 48*b*d*f*x*log(abs(F)) - 48*f)*(pi^5*b^5*d^5*sgn(F) - 1
0*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F))^4*sgn(F) - p
i^5*b^5*d^5 + 10*pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*log(abs(F))^4)/(
(pi^5*b^5*d^5*sgn(F) - 10*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*
log(abs(F))^4*sgn(F) - pi^5*b^5*d^5 + 10*pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*
b^5*d^5*log(abs(F))^4)^2 + (5*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 10*pi^2*b^5
*d^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(abs(F)) + 10*pi^2*b^5*d^5*lo
g(abs(F))^3 - 2*b^5*d^5*log(abs(F))^5)^2) + 4*(pi^3*b^4*d^4*f*x^4*log(abs(F
))*sgn(F) - pi*b^4*d^4*f*x^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*f*x^4*log(
abs(F)) + pi*b^4*d^4*f*x^4*log(abs(F))^3 - pi^3*b^3*d^3*f*x^3*sgn(F) + 3*pi
*b^3*d^3*f*x^3*log(abs(F))^2*sgn(F) + pi^3*b^3*d^3*f*x^3 - 3*pi*b^3*d^3*f*x
^3*log(abs(F))^2 - 6*pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) + 6*pi*b^2*d^2*f*x
^2*log(abs(F)) + 6*pi*b*d*f*x*sgn(F) - 6*pi*b*d*f*x)*(5*pi^4*b^5*d^5*log(ab
s(F))*sgn(F) - 10*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(ab
s(F)) + 10*pi^2*b^5*d^5*log(abs(F))^3 - 2*b^5*d^5*log(abs(F))^5)/((pi^5*b^5
*d^5*sgn(F) - 10*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F
))^4*sgn(F) - pi^5*b^5*d^5 + 10*pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*l
```

og(abs(F))^4)^2 + (5*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*log(
abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(F))
^3 - 2*b^5*d^5*log(abs(F))^5)^2))*sin(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x -
 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a))*e^(b*d*x*log
(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)) + 1) + 1/2*I*((-32*I*pi^4*b^4*d^
4*f*x^4*sgn(F) + 128*pi^3*b^4*d^4*f*x^4*log(abs(F))*sgn(F) + 192*I*pi^2*b^4
*d^4*f*x^4*log(abs(F))^2*sgn(F) - 128*pi*b^4*d^4*f*x^4*log(abs(F))^3*sgn(F)
 + 32*I*pi^4*b^4*d^4*f*x^4 - 128*pi^3*b^4*d^4*f*x^4*log(abs(F)) - 192*I*pi^
2*b^4*d^4*f*x^4*log(abs(F))^2 + 128*pi*b^4*d^4*f*x^4*log(abs(F))^3 + 64*I*b
^4*d^4*f*x^4*log(abs(F))^4 - 128*pi^3*b^3*d^3*f*x^3*sgn(F) - 384*I*pi^2*b^3
*d^3*f*x^3*log(abs(F))*sgn(F) + 384*pi*b^3*d^3*f*x^3*log(abs(F))^2*sgn(F) +
 128*pi^3*b^3*d^3*f*x^3 + 384*I*pi^2*b^3*d^3*f*x^3*log(abs(F)) - 384*pi*b^3
*d^3*f*x^3*log(abs(F))^2 - 256*I*b^3*d^3*f*x^3*log(abs(F))^3 + 384*I*pi^2*b
^2*d^2*f*x^2*sgn(F) - 768*pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) - 384*I*pi^2*
b^2*d^2*f*x^2 + 768*pi*b^2*d^2*f*x^2*log(abs(F)) + 768*I*b^2*d^2*f*x^2*log(
abs(F))^2 + 768*pi*b*d*f*x*sgn(F) - 768*pi*b*d*f*x - 1536*I*b*d*f*x*log(abs
(F)) + 1536*I*f)*e^(1/2*I*pi*b*d*x*sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*b*c*s
gn(F) - 1/2*I*pi*b*c + 1/2*I*pi*a*sgn(F) - 1/2*I*pi*a)/(16*I*pi^5*b^5*d^5*s
gn(F) - 80*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 160*I*pi^3*b^5*d^5*log(abs(F))
^2*sgn(F) + 160*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) + 80*I*pi*b^5*d^5*log(abs
(F))^4*sgn(F) - 16*I*pi^5*b^5*d^5 + 80*pi^4*b^5*d^5*log(abs(F)) + 160*I*pi^
3*b^5*d^5*log(abs(F))^2 - 160*pi^2*b^5*d^5*log(abs(F))^3 - 80*I*pi*b^5*d^5*
log(abs(F))^4 + 32*b^5*d^5*log(abs(F))^5) - (-32*I*pi^4*b^4*d^4*f*x^4*sgn(F
) - 128*pi^3*b^4*d^4*f*x^4*log(abs(F))*sgn(F) + 192*I*pi^2*b^4*d^4*f*x^4*lo
g(abs(F))^2*sgn(F) + 128*pi*b^4*d^4*f*x^4*log(abs(F))^3*sgn(F) + 32*I*pi^4*
b^4*d^4*f*x^4 + 128*pi^3*b^4*d^4*f*x^4*log(abs(F)) - 192*I*pi^2*b^4*d^4*f*x
^4*log(abs(F))^2 - 128*pi*b^4*d^4*f*x^4*log(abs(F))^3 + 64*I*b^4*d^4*f*x^4*
log(abs(F))^4 + 128*pi^3*b^3*d^3*f*x^3*sgn(F) - 384*I*pi^2*b^3*d^3*f*x^3*lo
g(abs(F))*sgn(F) - 384*pi*b^3*d^3*f*x^3*log(abs(F))^2*sgn(F) - 128*pi^3*b^3
*d^3*f*x^3 + 384*I*pi^2*b^3*d^3*f*x^3*log(abs(F)) + 384*pi*b^3*d^3*f*x^3*lo
g(abs(F))^2 - 256*I*b^3*d^3*f*x^3*log(abs(F))^3 + 384*I*pi^2*b^2*d^2*f*x^2*
sgn(F) + 768*pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) - 384*I*pi^2*b^2*d^2*f*x^2
 - 768*pi*b^2*d^2*f*x^2*log(abs(F)) + 768*I*b^2*d^2*f*x^2*log(abs(F))^2 - 7
68*pi*b*d*f*x*sgn(F) + 768*pi*b*d*f*x - 1536*I*b*d*f*x*log(abs(F)) + 1536*I
*f)*e^(-1/2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b*d*x - 1/2*I*pi*b*c*sgn(F) + 1/2*
I*pi*b*c - 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)/(-16*I*pi^5*b^5*d^5*sgn(F) - 80*
pi^4*b^5*d^5*log(abs(F))*sgn(F) + 160*I*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) +
 160*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 80*I*pi*b^5*d^5*log(abs(F))^4*sgn(
F) + 16*I*pi^5*b^5*d^5 + 80*pi^4*b^5*d^5*log(abs(F)) - 160*I*pi^3*b^5*d^5*l
og(abs(F))^2 - 160*pi^2*b^5*d^5*log(abs(F))^3 + 80*I*pi*b^5*d^5*log(abs(F))
^4 + 32*b^5*d^5*log(abs(F))^5))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*
log(abs(F)) + 1) - (((5*pi^4*b^5*d^5*f^2*x^5*log(abs(F))*sgn(F) - 10*pi^2*b
^5*d^5*f^2*x^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*f^2*x^5*log(abs(F)) +
10*pi^2*b^5*d^5*f^2*x^5*log(abs(F))^3 - 2*b^5*d^5*f^2*x^5*log(abs(F))^5 - 5
*pi^4*b^4*d^4*f^2*x^4*sgn(F) + 30*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2*sgn(F)

```
 + 5*pi^4*b^4*d^4*f^2*x^4 - 30*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2 + 10*b^4*
d^4*f^2*x^4*log(abs(F))^4 - 60*pi^2*b^3*d^3*f^2*x^3*log(abs(F))*sgn(F) + 60
*pi^2*b^3*d^3*f^2*x^3*log(abs(F)) - 40*b^3*d^3*f^2*x^3*log(abs(F))^3 + 60*p
i^2*b^2*d^2*f^2*x^2*sgn(F) - 60*pi^2*b^2*d^2*f^2*x^2 + 120*b^2*d^2*f^2*x^2*
log(abs(F))^2 - 240*b*d*f^2*x*log(abs(F)) + 240*f^2)*(pi^6*b^6*d^6*sgn(F) -
 15*pi^4*b^6*d^6*log(abs(F))^2*sgn(F) + 15*pi^2*b^6*d^6*log(abs(F))^4*sgn(F
) - pi^6*b^6*d^6 + 15*pi^4*b^6*d^6*log(abs(F))^2 - 15*pi^2*b^6*d^6*log(abs(
F))^4 + 2*b^6*d^6*log(abs(F))^6)/((pi^6*b^6*d^6*sgn(F) - 15*pi^4*b^6*d^6*lo
g(abs(F))^2*sgn(F) + 15*pi^2*b^6*d^6*log(abs(F))^4*sgn(F) - pi^6*b^6*d^6 +
15*pi^4*b^6*d^6*log(abs(F))^2 - 15*pi^2*b^6*d^6*log(abs(F))^4 + 2*b^6*d^6*l
og(abs(F))^6)^2 + 4*(3*pi^5*b^6*d^6*log(abs(F))*sgn(F) - 10*pi^3*b^6*d^6*lo
g(abs(F))^3*sgn(F) + 3*pi*b^6*d^6*log(abs(F))^5*sgn(F) - 3*pi^5*b^6*d^6*log
(abs(F)) + 10*pi^3*b^6*d^6*log(abs(F))^3 - 3*pi*b^6*d^6*log(abs(F))^5)^2) -
 2*(pi^5*b^5*d^5*f^2*x^5*sgn(F) - 10*pi^3*b^5*d^5*f^2*x^5*log(abs(F))^2*sgn
(F) + 5*pi*b^5*d^5*f^2*x^5*log(abs(F))^4*sgn(F) - pi^5*b^5*d^5*f^2*x^5 + 10
*pi^3*b^5*d^5*f^2*x^5*log(abs(F))^2 - 5*pi*b^5*d^5*f^2*x^5*log(abs(F))^4 +
20*pi^3*b^4*d^4*f^2*x^4*log(abs(F))*sgn(F) - 20*pi*b^4*d^4*f^2*x^4*log(abs(
F))^3*sgn(F) - 20*pi^3*b^4*d^4*f^2*x^4*log(abs(F)) + 20*pi*b^4*d^4*f^2*x^4*
log(abs(F))^3 - 20*pi^3*b^3*d^3*f^2*x^3*sgn(F) + 60*pi*b^3*d^3*f^2*x^3*log(
abs(F))^2*sgn(F) + 20*pi^3*b^3*d^3*f^2*x^3 - 60*pi*b^3*d^3*f^2*x^3*log(abs(
F))^2 - 120*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) + 120*pi*b^2*d^2*f^2*x^2*
log(abs(F)) + 120*pi*b*d*f^2*x*sgn(F) - 120*pi*b*d*f^2*x)*(3*pi^5*b^6*d^6*l
og(abs(F))*sgn(F) - 10*pi^3*b^6*d^6*log(abs(F))^3*sgn(F) + 3*pi*b^6*d^6*log
(abs(F))^5*sgn(F) - 3*pi^5*b^6*d^6*log(abs(F)) + 10*pi^3*b^6*d^6*log(abs(F)
)^3 - 3*pi*b^6*d^6*log(abs(F))^5)/((pi^6*b^6*d^6*sgn(F) - 15*pi^4*b^6*d^6*l
og(abs(F))^2*sgn(F) + 15*pi^2*b^6*d^6*log(abs(F))^4*sgn(F) - pi^6*b^6*d^6 +
 15*pi^4*b^6*d^6*log(abs(F))^2 - 15*pi^2*b^6*d^6*log(abs(F))^4 + 2*b^6*d^6*
log(abs(F))^6)^2 + 4*(3*pi^5*b^6*d^6*log(abs(F))*sgn(F) - 10*pi^3*b^6*d^6*l
og(abs(F))^3*sgn(F) + 3*pi*b^6*d^6*log(abs(F))^5*sgn(F) - 3*pi^5*b^6*d^6*lo
g(abs(F)) + 10*pi^3*b^6*d^6*log(abs(F))^3 - 3*pi*b^6*d^6*log(abs(F))^5)^2))
*cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c -
 1/2*pi*a*sgn(F) + 1/2*pi*a) - ((pi^5*b^5*d^5*f^2*x^5*sgn(F) - 10*pi^3*b^5*
d^5*f^2*x^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*f^2*x^5*log(abs(F))^4*sgn(F
) - pi^5*b^5*d^5*f^2*x^5 + 10*pi^3*b^5*d^5*f^2*x^5*log(abs(F))^2 - 5*pi*b^5
*d^5*f^2*x^5*log(abs(F))^4 + 20*pi^3*b^4*d^4*f^2*x^4*log(abs(F))*sgn(F) - 2
0*pi*b^4*d^4*f^2*x^4*log(abs(F))^3*sgn(F) - 20*pi^3*b^4*d^4*f^2*x^4*log(abs
(F)) + 20*pi*b^4*d^4*f^2*x^4*log(abs(F))^3 - 20*pi^3*b^3*d^3*f^2*x^3*sgn(F)
 + 60*pi*b^3*d^3*f^2*x^3*log(abs(F))^2*sgn(F) + 20*pi^3*b^3*d^3*f^2*x^3 - 6
0*pi*b^3*d^3*f^2*x^3*log(abs(F))^2 - 120*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn
(F) + 120*pi*b^2*d^2*f^2*x^2*log(abs(F)) + 120*pi*b*d*f^2*x*sgn(F) - 120*pi
*b*d*f^2*x)*(pi^6*b^6*d^6*sgn(F) - 15*pi^4*b^6*d^6*log(abs(F))^2*sgn(F) + 1
5*pi^2*b^6*d^6*log(abs(F))^4*sgn(F) - pi^6*b^6*d^6 + 15*pi^4*b^6*d^6*log(ab
s(F))^2 - 15*pi^2*b^6*d^6*log(abs(F))^4 + 2*b^6*d^6*log(abs(F))^6)/((pi^6*b
^6*d^6*sgn(F) - 15*pi^4*b^6*d^6*log(abs(F))^2*sgn(F) + 15*pi^2*b^6*d^6*log(
abs(F))^4*sgn(F) - pi^6*b^6*d^6 + 15*pi^4*b^6*d^6*log(abs(F))^2 - 15*pi^2*b
```

```
^6*d^6*log(abs(F))^4 + 2*b^6*d^6*log(abs(F))^6)^2 + 4*(3*pi^5*b^6*d^6*log(a
bs(F))*sgn(F) - 10*pi^3*b^6*d^6*log(abs(F))^3*sgn(F) + 3*pi*b^6*d^6*log(abs
(F))^5*sgn(F) - 3*pi^5*b^6*d^6*log(abs(F)) + 10*pi^3*b^6*d^6*log(abs(F))^3
- 3*pi*b^6*d^6*log(abs(F))^5)^2) + 2*(5*pi^4*b^5*d^5*f^2*x^5*log(abs(F))*sg
n(F) - 10*pi^2*b^5*d^5*f^2*x^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*f^2*x^
5*log(abs(F)) + 10*pi^2*b^5*d^5*f^2*x^5*log(abs(F))^3 - 2*b^5*d^5*f^2*x^5*l
og(abs(F))^5 - 5*pi^4*b^4*d^4*f^2*x^4*sgn(F) + 30*pi^2*b^4*d^4*f^2*x^4*log(
abs(F))^2*sgn(F) + 5*pi^4*b^4*d^4*f^2*x^4 - 30*pi^2*b^4*d^4*f^2*x^4*log(abs
(F))^2 + 10*b^4*d^4*f^2*x^4*log(abs(F))^4 - 60*pi^2*b^3*d^3*f^2*x^3*log(abs
(F))*sgn(F) + 60*pi^2*b^3*d^3*f^2*x^3*log(abs(F)) - 40*b^3*d^3*f^2*x^3*log(
abs(F))^3 + 60*pi^2*b^2*d^2*f^2*x^2*sgn(F) - 60*pi^2*b^2*d^2*f^2*x^2 + 120*
b^2*d^2*f^2*x^2*log(abs(F))^2 - 240*b*d*f^2*x*log(abs(F)) + 240*f^2)*(3*pi^
5*b^6*d^6*log(abs(F))*sgn(F) - 10*pi^3*b^6*d^6*log(abs(F))^3*sgn(F) + 3*pi*
b^6*d^6*log(abs(F))^5*sgn(F) - 3*pi^5*b^6*d^6*log(abs(F)) + 10*pi^3*b^6*d^6
*log(abs(F))^3 - 3*pi*b^6*d^6*log(abs(F))^5)/((pi^6*b^6*d^6*sgn(F) - 15*pi^
4*b^6*d^6*log(abs(F))^2*sgn(F) + 15*pi^2*b^6*d^6*log(abs(F))^4*sgn(F) - pi^
6*b^6*d^6 + 15*pi^4*b^6*d^6*log(abs(F))^2 - 15*pi^2*b^6*d^6*log(abs(F))^4 +
 2*b^6*d^6*log(abs(F))^6)^2 + 4*(3*pi^5*b^6*d^6*log(abs(F))*sgn(F) - 10*pi^
3*b^6*d^6*log(abs(F))^3*sgn(F) + 3*pi*b^6*d^6*log(abs(F))^5*sgn(F) - 3*pi^5
*b^6*d^6*log(abs(F)) + 10*pi^3*b^6*d^6*log(abs(F))^3 - 3*pi*b^6*d^6*log(abs
(F))^5)^2))*sin(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1
/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a))*e^(b*d*x*log(abs(F)) + b*c*log(abs
(F)) + a*log(abs(F))) - 1/2*I*((32*pi^5*b^5*d^5*f^2*x^5*sgn(F) + 160*I*pi^4
*b^5*d^5*f^2*x^5*log(abs(F))*sgn(F) - 320*pi^3*b^5*d^5*f^2*x^5*log(abs(F))^
2*sgn(F) - 320*I*pi^2*b^5*d^5*f^2*x^5*log(abs(F))^3*sgn(F) + 160*pi*b^5*d^5
*f^2*x^5*log(abs(F))^4*sgn(F) - 32*pi^5*b^5*d^5*f^2*x^5 - 160*I*pi^4*b^5*d^
5*f^2*x^5*log(abs(F)) + 320*pi^3*b^5*d^5*f^2*x^5*log(abs(F))^2 + 320*I*pi^2
*b^5*d^5*f^2*x^5*log(abs(F))^3 - 160*pi*b^5*d^5*f^2*x^5*log(abs(F))^4 - 64*
I*b^5*d^5*f^2*x^5*log(abs(F))^5 - 160*I*pi^4*b^4*d^4*f^2*x^4*sgn(F) + 640*p
i^3*b^4*d^4*f^2*x^4*log(abs(F))*sgn(F) + 960*I*pi^2*b^4*d^4*f^2*x^4*log(abs
(F))^2*sgn(F) - 640*pi*b^4*d^4*f^2*x^4*log(abs(F))^3*sgn(F) + 160*I*pi^4*b^
4*d^4*f^2*x^4 - 640*pi^3*b^4*d^4*f^2*x^4*log(abs(F)) - 960*I*pi^2*b^4*d^4*f
^2*x^4*log(abs(F))^2 + 640*pi*b^4*d^4*f^2*x^4*log(abs(F))^3 + 320*I*b^4*d^4
*f^2*x^4*log(abs(F))^4 - 640*pi^3*b^3*d^3*f^2*x^3*sgn(F) - 1920*I*pi^2*b^3*
d^3*f^2*x^3*log(abs(F))*sgn(F) + 1920*pi*b^3*d^3*f^2*x^3*log(abs(F))^2*sgn(
F) + 640*pi^3*b^3*d^3*f^2*x^3 + 1920*I*pi^2*b^3*d^3*f^2*x^3*log(abs(F)) - 1
920*pi*b^3*d^3*f^2*x^3*log(abs(F))^2 - 1280*I*b^3*d^3*f^2*x^3*log(abs(F))^3
 + 1920*I*pi^2*b^2*d^2*f^2*x^2*sgn(F) - 3840*pi*b^2*d^2*f^2*x^2*log(abs(F))
*sgn(F) - 1920*I*pi^2*b^2*d^2*f^2*x^2 + 3840*pi*b^2*d^2*f^2*x^2*log(abs(F))
 + 3840*I*b^2*d^2*f^2*x^2*log(abs(F))^2 + 3840*pi*b*d*f^2*x*sgn(F) - 3840*p
i*b*d*f^2*x - 7680*I*b*d*f^2*x*log(abs(F)) + 7680*I*f^2)*e^(1/2*I*pi*b*d*x*
sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*b*c*sgn(F) - 1/2*I*pi*b*c + 1/2*I*pi*a*s
gn(F) - 1/2*I*pi*a)/(32*pi^6*b^6*d^6*sgn(F) + 192*I*pi^5*b^6*d^6*log(abs(F)
)*sgn(F) - 480*pi^4*b^6*d^6*log(abs(F))^2*sgn(F) - 640*I*pi^3*b^6*d^6*log(a
bs(F))^3*sgn(F) + 480*pi^2*b^6*d^6*log(abs(F))^4*sgn(F) + 192*I*pi*b^6*d^6*
```

```
log(abs(F))^5*sgn(F) - 32*pi^6*b^6*d^6 - 192*I*pi^5*b^6*d^6*log(abs(F)) + 4
80*pi^4*b^6*d^6*log(abs(F))^2 + 640*I*pi^3*b^6*d^6*log(abs(F))^3 - 480*pi^2
*b^6*d^6*log(abs(F))^4 - 192*I*pi*b^6*d^6*log(abs(F))^5 + 64*b^6*d^6*log(ab
s(F))^6) + (32*pi^5*b^5*d^5*f^2*x^5*sgn(F) - 160*I*pi^4*b^5*d^5*f^2*x^5*log
(abs(F))*sgn(F) - 320*pi^3*b^5*d^5*f^2*x^5*log(abs(F))^2*sgn(F) + 320*I*pi^
2*b^5*d^5*f^2*x^5*log(abs(F))^3*sgn(F) + 160*pi*b^5*d^5*f^2*x^5*log(abs(F))
^4*sgn(F) - 32*pi^5*b^5*d^5*f^2*x^5 + 160*I*pi^4*b^5*d^5*f^2*x^5*log(abs(F)
) + 320*pi^3*b^5*d^5*f^2*x^5*log(abs(F))^2 - 320*I*pi^2*b^5*d^5*f^2*x^5*log
(abs(F))^3 - 160*pi*b^5*d^5*f^2*x^5*log(abs(F))^4 + 64*I*b^5*d^5*f^2*x^5*lo
g(abs(F))^5 + 160*I*pi^4*b^4*d^4*f^2*x^4*sgn(F) + 640*pi^3*b^4*d^4*f^2*x^4*
log(abs(F))*sgn(F) - 960*I*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2*sgn(F) - 640*
pi*b^4*d^4*f^2*x^4*log(abs(F))^3*sgn(F) - 160*I*pi^4*b^4*d^4*f^2*x^4 - 640*
pi^3*b^4*d^4*f^2*x^4*log(abs(F)) + 960*I*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2
 + 640*pi*b^4*d^4*f^2*x^4*log(abs(F))^3 - 320*I*b^4*d^4*f^2*x^4*log(abs(F))
^4 - 640*pi^3*b^3*d^3*f^2*x^3*sgn(F) + 1920*I*pi^2*b^3*d^3*f^2*x^3*log(abs(
F))*sgn(F) + 1920*pi*b^3*d^3*f^2*x^3*log(abs(F))^2*sgn(F) + 640*pi^3*b^3*d^
3*f^2*x^3 - 1920*I*pi^2*b^3*d^3*f^2*x^3*log(abs(F)) - 1920*pi*b^3*d^3*f^2*x
^3*log(abs(F))^2 + 1280*I*b^3*d^3*f^2*x^3*log(abs(F))^3 - 1920*I*pi^2*b^2*d
^2*f^2*x^2*sgn(F) - 3840*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) + 1920*I*pi^
2*b^2*d^2*f^2*x^2 + 3840*pi*b^2*d^2*f^2*x^2*log(abs(F)) - 3840*I*b^2*d^2*f^
2*x^2*log(abs(F))^2 + 3840*pi*b*d*f^2*x*sgn(F) - 3840*pi*b*d*f^2*x + 7680*I
*b*d*f^2*x*log(abs(F)) - 7680*I*f^2)*e^(-1/2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b
*d*x - 1/2*I*pi*b*c*sgn(F) + 1/2*I*pi*b*c - 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)
/(32*pi^6*b^6*d^6*sgn(F) - 192*I*pi^5*b^6*d^6*log(abs(F))*sgn(F) - 480*pi^4
*b^6*d^6*log(abs(F))^2*sgn(F) + 640*I*pi^3*b^6*d^6*log(abs(F))^3*sgn(F) + 4
80*pi^2*b^6*d^6*log(abs(F))^4*sgn(F) - 192*I*pi*b^6*d^6*log(abs(F))^5*sgn(F
) - 32*pi^6*b^6*d^6 + 192*I*pi^5*b^6*d^6*log(abs(F)) + 480*pi^4*b^6*d^6*log
(abs(F))^2 - 640*I*pi^3*b^6*d^6*log(abs(F))^3 - 480*pi^2*b^6*d^6*log(abs(F)
)^4 + 192*I*pi*b^6*d^6*log(abs(F))^5 + 64*b^6*d^6*log(abs(F))^6))*e^(b*d*x*
log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)))
```

maple [A] time = 0.01, size = 250, normalized size = 0.60

$$\frac{\left(b^5d^5f^2x^5\ln(F)^5+2b^5d^5ef\,x^4\ln(F)^5+b^5d^5e^2x^3\ln(F)^5-5b^4d^4f^2x^4\ln(F)^4-8b^4d^4ef\,x^3\ln(F)^4-3b^4d^4e^2x^2\ln(\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*x^3*(f*x+e)^2,x)
```

```
[Out] (f^2*x^5*ln(F)^5*b^5*d^5+2*ln(F)^5*b^5*d^5*e*f*x^4+ln(F)^5*b^5*d^5*e^2*x^3-
5*ln(F)^4*b^4*d^4*f^2*x^4-8*ln(F)^4*b^4*d^4*e*f*x^3-3*ln(F)^4*b^4*d^4*e^2*x
^2+20*ln(F)^3*b^3*d^3*f^2*x^3+24*ln(F)^3*b^3*d^3*e*f*x^2+6*ln(F)^3*b^3*d^3*
e^2*x-60*ln(F)^2*b^2*d^2*f^2*x^2-48*ln(F)^2*b^2*d^2*e*f*x-6*ln(F)^2*b^2*d^2
*e^2+120*ln(F)*b*d*f^2*x+48*e*f*ln(F)*b*d-120*f^2)*F^(b*d*x+b*c+a)/ln(F)^6/
b^6/d^6
```

maxima [A] time = 0.80, size = 328, normalized size = 0.79

$$\frac{\left(F^{bc+a}b^3d^3x^3\log(F)^3-3F^{bc+a}b^2d^2x^2\log(F)^2+6F^{bc+a}bdx\log(F)-6F^{bc+a}\right)F^{bdx}e^2}{b^4d^4\log(F)^4}+\frac{2\left(F^{bc+a}b^4d^4x^4\log(F)^4-4F^{b}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*x^3*(f*x+e)^2,x, algorithm="maxima")
```

```
[Out] (F^(b*c + a)*b^3*d^3*x^3*log(F)^3 - 3*F^(b*c + a)*b^2*d^2*x^2*log(F)^2 + 6*
F^(b*c + a)*b*d*x*log(F) - 6*F^(b*c + a))*F^(b*d*x)*e^2/(b^4*d^4*log(F)^4)
+ 2*(F^(b*c + a)*b^4*d^4*x^4*log(F)^4 - 4*F^(b*c + a)*b^3*d^3*x^3*log(F)^3
+ 12*F^(b*c + a)*b^2*d^2*x^2*log(F)^2 - 24*F^(b*c + a)*b*d*x*log(F) + 24*F^
(b*c + a))*F^(b*d*x)*e*f/(b^5*d^5*log(F)^5) + (F^(b*c + a)*b^5*d^5*x^5*log(
F)^5 - 5*F^(b*c + a)*b^4*d^4*x^4*log(F)^4 + 20*F^(b*c + a)*b^3*d^3*x^3*log(
F)^3 - 60*F^(b*c + a)*b^2*d^2*x^2*log(F)^2 + 120*F^(b*c + a)*b*d*x*log(F) -
 120*F^(b*c + a))*F^(b*d*x)*f^2/(b^6*d^6*log(F)^6)
```

mupad [B] time = 3.65, size = 249, normalized size = 0.60

$$\frac{F^{a+b\,c+b\,d\,x}\,\left(b^5\,d^5\,e^2\,x^3\,\ln(F)^5+2\,b^5\,d^5\,e\,f\,x^4\,\ln(F)^5+b^5\,d^5\,f^2\,x^5\,\ln(F)^5-3\,b^4\,d^4\,e^2\,x^2\,\ln(F)^4-8\,b^4\,d^4\,e\,f\,x^3\,\ln(F)^4\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a + b*(c + d*x))*x^3*(e + f*x)^2,x)
```

```
[Out] (F^(a + b*c + b*d*x)*(120*b*d*f^2*x*log(F) - 6*b^2*d^2*e^2*log(F)^2 - 120*f
^2 + 6*b^3*d^3*e^2*x*log(F)^3 - 3*b^4*d^4*e^2*x^2*log(F)^4 + b^5*d^5*e^2*x^
3*log(F)^5 - 60*b^2*d^2*f^2*x^2*log(F)^2 + 20*b^3*d^3*f^2*x^3*log(F)^3 - 5*
b^4*d^4*f^2*x^4*log(F)^4 + b^5*d^5*f^2*x^5*log(F)^5 + 48*b*d*e*f*log(F) - 4
8*b^2*d^2*e*f*x*log(F)^2 + 24*b^3*d^3*e*f*x^2*log(F)^3 - 8*b^4*d^4*e*f*x^3*
log(F)^4 + 2*b^5*d^5*e*f*x^4*log(F)^5))/(b^6*d^6*log(F)^6)
```

sympy [A] time = 0.28, size = 323, normalized size = 0.78

$$\begin{cases} \frac{F^{a+b(c+dx)}\left(b^5d^5e^2x^3\log(F)^5+2b^5d^5efx^4\log(F)^5+b^5d^5f^2x^5\log(F)^5-3b^4d^4e^2x^2\log(F)^4-8b^4d^4efx^3\log(F)^4-5b^4d^4f^2x^4\log(F)^4+6b^3d^3e^2x\log(F)^3+\right.}{b^6d^6\log} \\ \frac{e^2x^4}{4}+\frac{2efx^5}{5}+\frac{f^2x^6}{6} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*x**3*(f*x+e)**2,x)
```

```
[Out] Piecewise((F**(a + b*(c + d*x))*(b**5*d**5*e**2*x**3*log(F)**5 + 2*b**5*d**
5*e*f*x**4*log(F)**5 + b**5*d**5*f**2*x**5*log(F)**5 - 3*b**4*d**4*e**2*x**
2*log(F)**4 - 8*b**4*d**4*e*f*x**3*log(F)**4 - 5*b**4*d**4*f**2*x**4*log(F)
**4 + 6*b**3*d**3*e**2*x*log(F)**3 + 24*b**3*d**3*e*f*x**2*log(F)**3 + 20*b
**3*d**3*f**2*x**3*log(F)**3 - 6*b**2*d**2*e**2*log(F)**2 - 48*b**2*d**2*e*
f*x*log(F)**2 - 60*b**2*d**2*f**2*x**2*log(F)**2 + 48*b*d*e*f*log(F) + 120*
b*d*f**2*x*log(F) - 120*f**2)/(b**6*d**6*log(F)**6), Ne(b**6*d**6*log(F)**6
, 0)), (e**2*x**4/4 + 2*e*f*x**5/5 + f**2*x**6/6, True))
```

3.66 $\int F^{a+b(c+dx)}x^2(e+fx)^2\,dx$

Optimal. Leaf size=328

$$\frac{24f^2F^{a+bc+bdx}}{b^5d^5\log^5(F)}-\frac{12efF^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{24f^2xF^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{2e^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{12efxF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{12f^2x^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{2e^2xF^{a+bc+bdx}}{b^2d^2\log^2(F)}$$

```
[Out] 24*f^2*F^(b*d*x+b*c+a)/b^5/d^5/ln(F)^5-12*e*f*F^(b*d*x+b*c+a)/b^4/d^4/ln(F)
^4-24*f^2*F^(b*d*x+b*c+a)*x/b^4/d^4/ln(F)^4+2*e^2*F^(b*d*x+b*c+a)/b^3/d^3/l
n(F)^3+12*e*f*F^(b*d*x+b*c+a)*x/b^3/d^3/ln(F)^3+12*f^2*F^(b*d*x+b*c+a)*x^2/
b^3/d^3/ln(F)^3-2*e^2*F^(b*d*x+b*c+a)*x/b^2/d^2/ln(F)^2-6*e*f*F^(b*d*x+b*c+
a)*x^2/b^2/d^2/ln(F)^2-4*f^2*F^(b*d*x+b*c+a)*x^3/b^2/d^2/ln(F)^2+e^2*F^(b*d
*x+b*c+a)*x^2/b/d/ln(F)+2*e*f*F^(b*d*x+b*c+a)*x^3/b/d/ln(F)+f^2*F^(b*d*x+b*
c+a)*x^4/b/d/ln(F)
```

Rubi [A] time = 0.53, antiderivative size = 328, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.136, Rules used = {2196, 2176, 2194}

$$-\frac{2e^2xF^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{2e^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{6efx^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{12efxF^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{12efF^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{4f^2x^3F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{12f^2x^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(a + b*(c + d*x))*x^2*(e + f*x)^2,x]
```

```
[Out] (24*f^2*F^(a + b*c + b*d*x))/(b^5*d^5*Log[F]^5) - (12*e*f*F^(a + b*c + b*d*
x))/(b^4*d^4*Log[F]^4) - (24*f^2*F^(a + b*c + b*d*x)*x)/(b^4*d^4*Log[F]^4)
+ (2*e^2*F^(a + b*c + b*d*x))/(b^3*d^3*Log[F]^3) + (12*e*f*F^(a + b*c + b*d
*x)*x)/(b^3*d^3*Log[F]^3) + (12*f^2*F^(a + b*c + b*d*x)*x^2)/(b^3*d^3*Log[F
]^3) - (2*e^2*F^(a + b*c + b*d*x)*x)/(b^2*d^2*Log[F]^2) - (6*e*f*F^(a + b*c
 + b*d*x)*x^2)/(b^2*d^2*Log[F]^2) - (4*f^2*F^(a + b*c + b*d*x)*x^3)/(b^2*d^
2*Log[F]^2) + (e^2*F^(a + b*c + b*d*x)*x^2)/(b*d*Log[F]) + (2*e*f*F^(a + b*
c + b*d*x)*x^3)/(b*d*Log[F]) + (f^2*F^(a + b*c + b*d*x)*x^4)/(b*d*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}
\int F^{a+b(c+dx)}x^2(e+fx)^2\,dx &= \int \left(e^2F^{a+bc+bdx}x^2+2efF^{a+bc+bdx}x^3+f^2F^{a+bc+bdx}x^4\right)dx\\
&= e^2\int F^{a+bc+bdx}x^2\,dx+(2ef)\int F^{a+bc+bdx}x^3\,dx+f^2\int F^{a+bc+bdx}x^4\,dx\\
&= \frac{e^2F^{a+bc+bdx}x^2}{bd\log(F)}+\frac{2efF^{a+bc+bdx}x^3}{bd\log(F)}+\frac{f^2F^{a+bc+bdx}x^4}{bd\log(F)}-\frac{\left(2e^2\right)\int F^{a+bc+bdx}x\,dx}{bd\log(F)}-\frac{(6ef)}{}\\
&= -\frac{2e^2F^{a+bc+bdx}x}{b^2d^2\log^2(F)}-\frac{6efF^{a+bc+bdx}x^2}{b^2d^2\log^2(F)}-\frac{4f^2F^{a+bc+bdx}x^3}{b^2d^2\log^2(F)}+\frac{e^2F^{a+bc+bdx}x^2}{bd\log(F)}+\frac{2efF^{a+bc+}}{bd\log(}\\
&= \frac{2e^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{12efF^{a+bc+bdx}x}{b^3d^3\log^3(F)}+\frac{12f^2F^{a+bc+bdx}x^2}{b^3d^3\log^3(F)}-\frac{2e^2F^{a+bc+bdx}x}{b^2d^2\log^2(F)}-\frac{6efF^{a+bc+bd}}{b^2d^2\log^2(}\\
&= -\frac{12efF^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{24f^2F^{a+bc+bdx}x}{b^4d^4\log^4(F)}+\frac{2e^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{12efF^{a+bc+bdx}x}{b^3d^3\log^3(F)}+\frac{12f^2F^{a+bc-}}{b^3d^3\log}\\
&= \frac{24f^2F^{a+bc+bdx}}{b^5d^5\log^5(F)}-\frac{12efF^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{24f^2F^{a+bc+bdx}x}{b^4d^4\log^4(F)}+\frac{2e^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{12efF^{a+bc+bdx}}{b^3d^3\log^3(F}
\end{aligned}$$

Mathematica [A] time = 0.25, size = 121, normalized size = 0.37

$$\frac{F^{a+b(c+dx)}\left(b^4d^4x^2\log^4(F)(e+fx)^2-2b^3d^3x\log^3(F)\left(e^2+3efx+2f^2x^2\right)+2b^2d^2\log^2(F)\left(e^2+6efx+6f^2x^2\right)\right.}{b^5d^5\log^5(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*(c + d*x))*x^2*(e + f*x)^2,x]
```

```
[Out] (F^(a + b*(c + d*x))*(24*f^2 - 12*b*d*f*(e + 2*f*x)*Log[F] + 2*b^2*d^2*(e^2
 + 6*e*f*x + 6*f^2*x^2)*Log[F]^2 - 2*b^3*d^3*x*(e^2 + 3*e*f*x + 2*f^2*x^2)*
Log[F]^3 + b^4*d^4*x^2*(e + f*x)^2*Log[F]^4))/(b^5*d^5*Log[F]^5)
```

fricas [A] time = 0.42, size = 178, normalized size = 0.54

$$\frac{\left(\left(b^4d^4f^2x^4+2\,b^4d^4efx^3+b^4d^4e^2x^2\right)\log(F)^4-2\left(2\,b^3d^3f^2x^3+3\,b^3d^3efx^2+b^3d^3e^2x\right)\log(F)^3+2\left(6\,b^2d^2f^2x^2+\right.\right.}{b^5d^5\log(F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^4*d^4*f^2*x^4 + 2*b^4*d^4*e*f*x^3 + b^4*d^4*e^2*x^2)*log(F)^4 - 2*(2*b^
3*d^3*f^2*x^3 + 3*b^3*d^3*e*f*x^2 + b^3*d^3*e^2*x)*log(F)^3 + 2*(6*b^2*d^2*
f^2*x^2 + 6*b^2*d^2*e*f*x + b^2*d^2*e^2)*log(F)^2 + 24*f^2 - 12*(2*b*d*f^2*
x + b*d*e*f)*log(F))*F^(b*d*x + b*c + a)/(b^5*d^5*log(F)^5)
```

giac [C] time = 1.34, size = 7061, normalized size = 21.53

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (((3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F)) + 2*b^3*d
^3*log(abs(F))^3)*(pi^2*b^2*d^2*x^2*sgn(F) - pi^2*b^2*d^2*x^2 + 2*b^2*d^2*x
^2*log(abs(F))^2 - 4*b*d*x*log(abs(F)) + 4)/((pi^3*b^3*d^3*sgn(F) - 3*pi*b^
3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*log(abs(F))^2)^2 +
 (3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F)) + 2*b^3*d^
3*log(abs(F))^3)^2) - 2*(pi^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*s
gn(F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*log(abs(F))^2)*(pi*b^2*d^2*x^2*log(abs(
F))*sgn(F) - pi*b^2*d^2*x^2*log(abs(F)) - pi*b*d*x*sgn(F) + pi*b*d*x)/((pi^
3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*
b^3*d^3*log(abs(F))^2)^2 + (3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*
d^3*log(abs(F)) + 2*b^3*d^3*log(abs(F))^3)^2))*cos(-1/2*pi*b*d*x*sgn(F) + 1
/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a)
+ ((pi^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3
+ 3*pi*b^3*d^3*log(abs(F))^2)*(pi^2*b^2*d^2*x^2*sgn(F) - pi^2*b^2*d^2*x^2 +
 2*b^2*d^2*x^2*log(abs(F))^2 - 4*b*d*x*log(abs(F)) + 4)/((pi^3*b^3*d^3*sgn(
F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*log(ab
s(F))^2)^2 + (3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F)
) + 2*b^3*d^3*log(abs(F))^3)^2) + 2*(3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*
pi^2*b^3*d^3*log(abs(F)) + 2*b^3*d^3*log(abs(F))^3)*(pi*b^2*d^2*x^2*log(abs
(F))*sgn(F) - pi*b^2*d^2*x^2*log(abs(F)) - pi*b*d*x*sgn(F) + pi*b*d*x)/((pi
^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi
*b^3*d^3*log(abs(F))^2)^2 + (3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3
*d^3*log(abs(F)) + 2*b^3*d^3*log(abs(F))^3)^2))*sin(-1/2*pi*b*d*x*sgn(F) +
1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a)
```

)*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)) + 2) + 1/2*I*((4*I
*pi^2*b^2*d^2*x^2*sgn(F) - 8*pi*b^2*d^2*x^2*log(abs(F))*sgn(F) - 4*I*pi^2*b
^2*d^2*x^2 + 8*pi*b^2*d^2*x^2*log(abs(F)) + 8*I*b^2*d^2*x^2*log(abs(F))^2 +
 8*pi*b*d*x*sgn(F) - 8*pi*b*d*x - 16*I*b*d*x*log(abs(F)) + 16*I)*e^(1/2*I*p
i*b*d*x*sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*b*c*sgn(F) - 1/2*I*pi*b*c + 1/2*
I*pi*a*sgn(F) - 1/2*I*pi*a)/(-4*I*pi^3*b^3*d^3*sgn(F) + 12*pi^2*b^3*d^3*log
(abs(F))*sgn(F) + 12*I*pi*b^3*d^3*log(abs(F))^2*sgn(F) + 4*I*pi^3*b^3*d^3 -
 12*pi^2*b^3*d^3*log(abs(F)) - 12*I*pi*b^3*d^3*log(abs(F))^2 + 8*b^3*d^3*lo
g(abs(F))^3) - (4*I*pi^2*b^2*d^2*x^2*sgn(F) + 8*pi*b^2*d^2*x^2*log(abs(F))*
sgn(F) - 4*I*pi^2*b^2*d^2*x^2 - 8*pi*b^2*d^2*x^2*log(abs(F)) + 8*I*b^2*d^2*
x^2*log(abs(F))^2 - 8*pi*b*d*x*sgn(F) + 8*pi*b*d*x - 16*I*b*d*x*log(abs(F))
 + 16*I)*e^(-1/2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b*d*x - 1/2*I*pi*b*c*sgn(F) +
 1/2*I*pi*b*c - 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)/(4*I*pi^3*b^3*d^3*sgn(F) +
12*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 12*I*pi*b^3*d^3*log(abs(F))^2*sgn(F) -
 4*I*pi^3*b^3*d^3 - 12*pi^2*b^3*d^3*log(abs(F)) + 12*I*pi*b^3*d^3*log(abs(F
))^2 + 8*b^3*d^3*log(abs(F))^3))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a
log(abs(F)) + 2) - 2(((3*pi^2*b^3*d^3*f*x^3*log(abs(F))*sgn(F) - 3*pi^2*b
^3*d^3*f*x^3*log(abs(F)) + 2*b^3*d^3*f*x^3*log(abs(F))^3 - 3*pi^2*b^2*d^2*f
*x^2*sgn(F) + 3*pi^2*b^2*d^2*f*x^2 - 6*b^2*d^2*f*x^2*log(abs(F))^2 + 12*b*d
*f*x*log(abs(F)) - 12*f)*(pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*log(abs(F))^
2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^4*log(abs(
F))^4)/((pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - pi^4*b
^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^4*log(abs(F))^4)^2 + 16*(pi
^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^4*
d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)^2) - 4*(pi^3*b^3*d^3*f*x^3*sgn(
F) - 3*pi*b^3*d^3*f*x^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3*f*x^3 + 3*pi*b^
3*d^3*f*x^3*log(abs(F))^2 + 6*pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) - 6*pi*b^
2*d^2*f*x^2*log(abs(F)) - 6*pi*b*d*f*x*sgn(F) + 6*pi*b*d*f*x)*(pi^3*b^4*d^4
*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*log(ab
s(F)) + pi*b^4*d^4*log(abs(F))^3)/((pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*lo
g(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^
4*log(abs(F))^4)^2 + 16*(pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(a
bs(F))^3*sgn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)^2))*
cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c -
1/2*pi*a*sgn(F) + 1/2*pi*a) - ((pi^3*b^3*d^3*f*x^3*sgn(F) - 3*pi*b^3*d^3*f*
x^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3*f*x^3 + 3*pi*b^3*d^3*f*x^3*log(abs(
F))^2 + 6*pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) - 6*pi*b^2*d^2*f*x^2*log(abs(
F)) - 6*pi*b*d*f*x*sgn(F) + 6*pi*b*d*f*x)*(pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4
*d^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2
*b^4*d^4*log(abs(F))^4)/((pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*log(abs(F))^
2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^4*log(abs(
F))^4)^2 + 16*(pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F))^3*s
gn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)^2) + 4*(3*pi^2
*b^3*d^3*f*x^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*f*x^3*log(abs(F)) + 2*b^
3*d^3*f*x^3*log(abs(F))^3 - 3*pi^2*b^2*d^2*f*x^2*sgn(F) + 3*pi^2*b^2*d^2*f*

x^2 - 6*b^2*d^2*f*x^2*log(abs(F))^2 + 12*b*d*f*x*log(abs(F)) - 12*f)*(pi^3*
b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4
*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)/((pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4
*d^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2
*b^4*d^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^
4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^
3)^2))*sin(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi
*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F))
+ a*log(abs(F)) + 1) - 1/2*I*((16*pi^3*b^3*d^3*f*x^3*sgn(F) + 48*I*pi^2*b^3
*d^3*f*x^3*log(abs(F))*sgn(F) - 48*pi*b^3*d^3*f*x^3*log(abs(F))^2*sgn(F) -
16*pi^3*b^3*d^3*f*x^3 - 48*I*pi^2*b^3*d^3*f*x^3*log(abs(F)) + 48*pi*b^3*d^3
*f*x^3*log(abs(F))^2 + 32*I*b^3*d^3*f*x^3*log(abs(F))^3 - 48*I*pi^2*b^2*d^2
*f*x^2*sgn(F) + 96*pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) + 48*I*pi^2*b^2*d^2*
f*x^2 - 96*pi*b^2*d^2*f*x^2*log(abs(F)) - 96*I*b^2*d^2*f*x^2*log(abs(F))^2
- 96*pi*b*d*f*x*sgn(F) + 96*pi*b*d*f*x + 192*I*b*d*f*x*log(abs(F)) - 192*I*
f)*e^(1/2*I*pi*b*d*x*sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*b*c*sgn(F) - 1/2*I*
pi*b*c + 1/2*I*pi*a*sgn(F) - 1/2*I*pi*a)/(8*pi^4*b^4*d^4*sgn(F) + 32*I*pi^3
*b^4*d^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - 32*I*p
i*b^4*d^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*d^4 - 32*I*pi^3*b^4*d^4*log(abs
(F)) + 48*pi^2*b^4*d^4*log(abs(F))^2 + 32*I*pi*b^4*d^4*log(abs(F))^3 - 16*b
^4*d^4*log(abs(F))^4) + (16*pi^3*b^3*d^3*f*x^3*sgn(F) - 48*I*pi^2*b^3*d^3*f
*x^3*log(abs(F))*sgn(F) - 48*pi*b^3*d^3*f*x^3*log(abs(F))^2*sgn(F) - 16*pi^
3*b^3*d^3*f*x^3 + 48*I*pi^2*b^3*d^3*f*x^3*log(abs(F)) + 48*pi*b^3*d^3*f*x^3
*log(abs(F))^2 - 32*I*b^3*d^3*f*x^3*log(abs(F))^3 + 48*I*pi^2*b^2*d^2*f*x^2
*sgn(F) + 96*pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) - 48*I*pi^2*b^2*d^2*f*x^2
- 96*pi*b^2*d^2*f*x^2*log(abs(F)) + 96*I*b^2*d^2*f*x^2*log(abs(F))^2 - 96*p
i*b*d*f*x*sgn(F) + 96*pi*b*d*f*x - 192*I*b*d*f*x*log(abs(F)) + 192*I*f)*e^(
-1/2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b*d*x - 1/2*I*pi*b*c*sgn(F) + 1/2*I*pi*b*
c - 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)/(8*pi^4*b^4*d^4*sgn(F) - 32*I*pi^3*b^4*
d^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) + 32*I*pi*b^4
*d^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*d^4 + 32*I*pi^3*b^4*d^4*log(abs(F))
+ 48*pi^2*b^4*d^4*log(abs(F))^2 - 32*I*pi*b^4*d^4*log(abs(F))^3 - 16*b^4*d^
4*log(abs(F))^4))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)) +
1) - ((4*(pi^3*b^4*d^4*f^2*x^4*log(abs(F))*sgn(F) - pi*b^4*d^4*f^2*x^4*log(
abs(F))^3*sgn(F) - pi^3*b^4*d^4*f^2*x^4*log(abs(F)) + pi*b^4*d^4*f^2*x^4*lo
g(abs(F))^3 - pi^3*b^3*d^3*f^2*x^3*sgn(F) + 3*pi*b^3*d^3*f^2*x^3*log(abs(F)
)^2*sgn(F) + pi^3*b^3*d^3*f^2*x^3 - 3*pi*b^3*d^3*f^2*x^3*log(abs(F))^2 - 6*
pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) + 6*pi*b^2*d^2*f^2*x^2*log(abs(F)) +
6*pi*b*d*f^2*x*sgn(F) - 6*pi*b*d*f^2*x)*(pi^5*b^5*d^5*sgn(F) - 10*pi^3*b^5*
d^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F))^4*sgn(F) - pi^5*b^5*d^5
+ 10*pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*log(abs(F))^4)/((pi^5*b^5*d
^5*sgn(F) - 10*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F))
^4*sgn(F) - pi^5*b^5*d^5 + 10*pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*log
(abs(F))^4)^2 + (5*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*log(ab
s(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(F))^3

- 2*b^5*d^5*log(abs(F))^5)^2) - (pi^4*b^4*d^4*f^2*x^4*sgn(F) - 6*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4*f^2*x^4 + 6*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2 - 2*b^4*d^4*f^2*x^4*log(abs(F))^4 + 12*pi^2*b^3*d^3*f^2*x^3*log(abs(F))*sgn(F) - 12*pi^2*b^3*d^3*f^2*x^3*log(abs(F)) + 8*b^3*d^3*f^2*x^3*log(abs(F))^3 - 12*pi^2*b^2*d^2*f^2*x^2*sgn(F) + 12*pi^2*b^2*d^2*f^2*x^2 - 24*b^2*d^2*f^2*x^2*log(abs(F))^2 + 48*b*d*f^2*x*log(abs(F)) - 48*f^2)*(5*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(F))^3 - 2*b^5*d^5*log(abs(F))^5)/((pi^5*b^5*d^5*sgn(F) - 10*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F))^4*sgn(F) - pi^5*b^5*d^5 + 10*pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*log(abs(F))^4)^2 + (5*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(F))^3 - 2*b^5*d^5*log(abs(F))^5)^2))*cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a) - ((pi^4*b^4*d^4*f^2*x^4*sgn(F) - 6*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4*f^2*x^4 + 6*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2 - 2*b^4*d^4*f^2*x^4*log(abs(F))^4 + 12*pi^2*b^3*d^3*f^2*x^3*log(abs(F))*sgn(F) - 12*pi^2*b^3*d^3*f^2*x^3*log(abs(F)) + 8*b^3*d^3*f^2*x^3*log(abs(F))^3 - 12*pi^2*b^2*d^2*f^2*x^2*sgn(F) + 12*pi^2*b^2*d^2*f^2*x^2 - 24*b^2*d^2*f^2*x^2*log(abs(F))^2 + 48*b*d*f^2*x*log(abs(F)) - 48*f^2)*(pi^5*b^5*d^5*sgn(F) - 10*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F))^4*sgn(F) - pi^5*b^5*d^5 + 10*pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*log(abs(F))^4)/((pi^5*b^5*d^5*sgn(F) - 10*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F))^4*sgn(F) - pi^5*b^5*d^5 + 10*pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*log(abs(F))^4)^2 + (5*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(F))^3 - 2*b^5*d^5*log(abs(F))^5)^2) + 4*(pi^3*b^4*d^4*f^2*x^4*log(abs(F))*sgn(F) - pi*b^4*d^4*f^2*x^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*f^2*x^4*log(abs(F)) + pi*b^4*d^4*f^2*x^4*log(abs(F))^3 - pi^3*b^3*d^3*f^2*x^3*sgn(F) + 3*pi*b^3*d^3*f^2*x^3*log(abs(F))^2*sgn(F) + pi^3*b^3*d^3*f^2*x^3 - 3*pi*b^3*d^3*f^2*x^3*log(abs(F))^2 - 6*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) + 6*pi*b^2*d^2*f^2*x^2*log(abs(F)) + 6*pi*b*d*f^2*x*sgn(F) - 6*pi*b*d*f^2*x)*(5*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(F))^3 - 2*b^5*d^5*log(abs(F))^5)/((pi^5*b^5*d^5*sgn(F) - 10*pi^3*b^5*d^5*log(abs(F))^2*sgn(F) + 5*pi*b^5*d^5*log(abs(F))^4*sgn(F) - pi^5*b^5*d^5 + 10*pi^3*b^5*d^5*log(abs(F))^2 - 5*pi*b^5*d^5*log(abs(F))^4)^2 + (5*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 10*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 5*pi^4*b^5*d^5*log(abs(F)) + 10*pi^2*b^5*d^5*log(abs(F))^3 - 2*b^5*d^5*log(abs(F))^5)^2))*sin(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F))) + 1/2*I*((-16*I*pi^4*b^4*d^4*f^2*x^4*sgn(F) + 64*pi^3*b^4*d^4*f^2*x^4*log(abs(F))*sgn(F) + 96*I*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2*sgn(F) - 64*pi*b^4*d^4*f^2*x^4*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4*d^4*f^2*x^4 - 64*pi^3*b^4*d^4*f^2*x^4*log(abs(F)) - 96*I*pi^2*b^4*d^4*f^2*x^4*log(abs(F))^2 + 64*pi*b

```
^4*d^4*f^2*x^4*log(abs(F))^3 + 32*I*b^4*d^4*f^2*x^4*log(abs(F))^4 - 64*pi^3
*b^3*d^3*f^2*x^3*sgn(F) - 192*I*pi^2*b^3*d^3*f^2*x^3*log(abs(F))*sgn(F) + 1
92*pi*b^3*d^3*f^2*x^3*log(abs(F))^2*sgn(F) + 64*pi^3*b^3*d^3*f^2*x^3 + 192*
I*pi^2*b^3*d^3*f^2*x^3*log(abs(F)) - 192*pi*b^3*d^3*f^2*x^3*log(abs(F))^2 -
 128*I*b^3*d^3*f^2*x^3*log(abs(F))^3 + 192*I*pi^2*b^2*d^2*f^2*x^2*sgn(F) -
384*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) - 192*I*pi^2*b^2*d^2*f^2*x^2 + 38
4*pi*b^2*d^2*f^2*x^2*log(abs(F)) + 384*I*b^2*d^2*f^2*x^2*log(abs(F))^2 + 38
4*pi*b*d*f^2*x*sgn(F) - 384*pi*b*d*f^2*x - 768*I*b*d*f^2*x*log(abs(F)) + 76
8*I*f^2)*e^(1/2*I*pi*b*d*x*sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*b*c*sgn(F) -
1/2*I*pi*b*c + 1/2*I*pi*a*sgn(F) - 1/2*I*pi*a)/(16*I*pi^5*b^5*d^5*sgn(F) -
80*pi^4*b^5*d^5*log(abs(F))*sgn(F) - 160*I*pi^3*b^5*d^5*log(abs(F))^2*sgn(F
) + 160*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) + 80*I*pi*b^5*d^5*log(abs(F))^4*s
gn(F) - 16*I*pi^5*b^5*d^5 + 80*pi^4*b^5*d^5*log(abs(F)) + 160*I*pi^3*b^5*d^
5*log(abs(F))^2 - 160*pi^2*b^5*d^5*log(abs(F))^3 - 80*I*pi*b^5*d^5*log(abs(
F))^4 + 32*b^5*d^5*log(abs(F))^5) - (-16*I*pi^4*b^4*d^4*f^2*x^4*sgn(F) - 64
*pi^3*b^4*d^4*f^2*x^4*log(abs(F))*sgn(F) + 96*I*pi^2*b^4*d^4*f^2*x^4*log(ab
s(F))^2*sgn(F) + 64*pi*b^4*d^4*f^2*x^4*log(abs(F))^3*sgn(F) + 16*I*pi^4*b^4
*d^4*f^2*x^4 + 64*pi^3*b^4*d^4*f^2*x^4*log(abs(F)) - 96*I*pi^2*b^4*d^4*f^2*
x^4*log(abs(F))^2 - 64*pi*b^4*d^4*f^2*x^4*log(abs(F))^3 + 32*I*b^4*d^4*f^2*
x^4*log(abs(F))^4 + 64*pi^3*b^3*d^3*f^2*x^3*sgn(F) - 192*I*pi^2*b^3*d^3*f^2
*x^3*log(abs(F))*sgn(F) - 192*pi*b^3*d^3*f^2*x^3*log(abs(F))^2*sgn(F) - 64*
pi^3*b^3*d^3*f^2*x^3 + 192*I*pi^2*b^3*d^3*f^2*x^3*log(abs(F)) + 192*pi*b^3*
d^3*f^2*x^3*log(abs(F))^2 - 128*I*b^3*d^3*f^2*x^3*log(abs(F))^3 + 192*I*pi^
2*b^2*d^2*f^2*x^2*sgn(F) + 384*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) - 192*
I*pi^2*b^2*d^2*f^2*x^2 - 384*pi*b^2*d^2*f^2*x^2*log(abs(F)) + 384*I*b^2*d^2
*f^2*x^2*log(abs(F))^2 - 384*pi*b*d*f^2*x*sgn(F) + 384*pi*b*d*f^2*x - 768*I
*b*d*f^2*x*log(abs(F)) + 768*I*f^2)*e^(-1/2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b*
d*x - 1/2*I*pi*b*c*sgn(F) + 1/2*I*pi*b*c - 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)/
(-16*I*pi^5*b^5*d^5*sgn(F) - 80*pi^4*b^5*d^5*log(abs(F))*sgn(F) + 160*I*pi^
3*b^5*d^5*log(abs(F))^2*sgn(F) + 160*pi^2*b^5*d^5*log(abs(F))^3*sgn(F) - 80
*I*pi*b^5*d^5*log(abs(F))^4*sgn(F) + 16*I*pi^5*b^5*d^5 + 80*pi^4*b^5*d^5*lo
g(abs(F)) - 160*I*pi^3*b^5*d^5*log(abs(F))^2 - 160*pi^2*b^5*d^5*log(abs(F))
^3 + 80*I*pi*b^5*d^5*log(abs(F))^4 + 32*b^5*d^5*log(abs(F))^5))*e^(b*d*x*lo
g(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)))
```

maple [A] time = 0.01, size = 197, normalized size = 0.60

$$\frac{\left(b^4d^4f^2x^4\ln(F)^4 + 2b^4d^4ef\,x^3\ln(F)^4 + b^4d^4e^2x^2\ln(F)^4 - 4b^3d^3f^2x^3\ln(F)^3 - 6b^3d^3ef\,x^2\ln(F)^3 - 2b^3d^3e^2x\ln(F)^3}{b^5d^5\ln}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*x^2*(f*x+e)^2,x)
```

```
[Out] (b^4*d^4*f^2*x^4*ln(F)^4+2*b^4*d^4*e*f*x^3*ln(F)^4+b^4*d^4*e^2*x^2*ln(F)^4-
4*b^3*d^3*f^2*x^3*ln(F)^3-6*b^3*d^3*e*f*x^2*ln(F)^3-2*b^3*d^3*e^2*x*ln(F)^3
```

```
+12*b^2*d^2*f^2*x^2*ln(F)^2+12*b^2*d^2*e*f*x*ln(F)^2+2*b^2*d^2*e^2*ln(F)^2-
24*b*d*f^2*x*ln(F)-12*b*d*e*f*ln(F)+24*f^2)*F^(b*d*x+b*c+a)/ln(F)^5/b^5/d^5
```

maxima [A] time = 0.72, size = 262, normalized size = 0.80

$$\frac{\left(F^{bc+a}b^2d^2x^2\log(F)^2 - 2F^{bc+a}bdx\log(F) + 2F^{bc+a}\right)F^{bdx}e^2}{b^3d^3\log(F)^3} + \frac{2\left(F^{bc+a}b^3d^3x^3\log(F)^3 - 3F^{bc+a}b^2d^2x^2\log(F)^2 + 6\right.}{b^4d^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^(b*c + a)*b^2*d^2*x^2*log(F)^2 - 2*F^(b*c + a)*b*d*x*log(F) + 2*F^(b*c +
 a))*F^(b*d*x)*e^2/(b^3*d^3*log(F)^3) + 2*(F^(b*c + a)*b^3*d^3*x^3*log(F)^3
 - 3*F^(b*c + a)*b^2*d^2*x^2*log(F)^2 + 6*F^(b*c + a)*b*d*x*log(F) - 6*F^(b
*c + a))*F^(b*d*x)*e*f/(b^4*d^4*log(F)^4) + (F^(b*c + a)*b^4*d^4*x^4*log(F)
^4 - 4*F^(b*c + a)*b^3*d^3*x^3*log(F)^3 + 12*F^(b*c + a)*b^2*d^2*x^2*log(F)
^2 - 24*F^(b*c + a)*b*d*x*log(F) + 24*F^(b*c + a))*F^(b*d*x)*f^2/(b^5*d^5*l
og(F)^5)
```

mupad [B] time = 3.56, size = 196, normalized size = 0.60

$$\frac{F^{a+b\,c+b\,d\,x}\,\left(b^4\,d^4\,e^2\,x^2\,\ln(F)^4 + 2\,b^4\,d^4\,e\,f\,x^3\,\ln(F)^4 + b^4\,d^4\,f^2\,x^4\,\ln(F)^4 - 2\,b^3\,d^3\,e^2\,x\,\ln(F)^3 - 6\,b^3\,d^3\,e\,f\,x^2\,\ln(F)^3\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a + b*(c + d*x))*x^2*(e + f*x)^2,x)
```

```
[Out] (F^(a + b*c + b*d*x)*(24*f^2 + 2*b^2*d^2*e^2*log(F)^2 - 24*b*d*f^2*x*log(F)
 - 2*b^3*d^3*e^2*x*log(F)^3 + b^4*d^4*e^2*x^2*log(F)^4 + 12*b^2*d^2*f^2*x^2
*log(F)^2 - 4*b^3*d^3*f^2*x^3*log(F)^3 + b^4*d^4*f^2*x^4*log(F)^4 - 12*b*d*
e*f*log(F) + 12*b^2*d^2*e*f*x*log(F)^2 - 6*b^3*d^3*e*f*x^2*log(F)^3 + 2*b^4
*d^4*e*f*x^3*log(F)^4))/(b^5*d^5*log(F)^5)
```

sympy [A] time = 0.28, size = 260, normalized size = 0.79

$$\begin{cases} \frac{F^{a+b(c+dx)}\left(b^4d^4e^2x^2\log(F)^4 + 2b^4d^4efx^3\log(F)^4 + b^4d^4f^2x^4\log(F)^4 - 2b^3d^3e^2x\log(F)^3 - 6b^3d^3efx^2\log(F)^3 - 4b^3d^3f^2x^3\log(F)^3 + 2b^2d^2e^2\log(F)^2 + \right.}{b^5d^5\log(F)^5} \\ \frac{e^2x^3}{3} + \frac{efx^4}{2} + \frac{f^2x^5}{5} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*x**2*(f*x+e)**2,x)
```

```
[Out] Piecewise((F**(a + b*(c + d*x))*(b**4*d**4*e**2*x**2*log(F)**4 + 2*b**4*d**
4*e*f*x**3*log(F)**4 + b**4*d**4*f**2*x**4*log(F)**4 - 2*b**3*d**3*e**2*x*l
og(F)**3 - 6*b**3*d**3*e*f*x**2*log(F)**3 - 4*b**3*d**3*f**2*x**3*log(F)**3
 + 2*b**2*d**2*e**2*log(F)**2 + 12*b**2*d**2*e*f*x*log(F)**2 + 12*b**2*d**2
*f**2*x**2*log(F)**2 - 12*b*d*e*f*log(F) - 24*b*d*f**2*x*log(F) + 24*f**2)/
(b**5*d**5*log(F)**5), Ne(b**5*d**5*log(F)**5, 0)), (e**2*x**3/3 + e*f*x**4
/2 + f**2*x**5/5, True))
```

3.67 $\int F^{a+b(c+dx)}x(e+fx)^2\,dx$

Optimal. Leaf size=242

$$-\frac{6f^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{4efF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{6f^2xF^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{e^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{4efxF^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{3f^2x^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{e^2xF^{a+bc+bdx}}{bd\log(F)}+\frac{2e}{}$$

```
[Out] -6*f^2*F^(b*d*x+b*c+a)/b^4/d^4/ln(F)^4+4*e*f*F^(b*d*x+b*c+a)/b^3/d^3/ln(F)^
3+6*f^2*F^(b*d*x+b*c+a)*x/b^3/d^3/ln(F)^3-e^2*F^(b*d*x+b*c+a)/b^2/d^2/ln(F)
^2-4*e*f*F^(b*d*x+b*c+a)*x/b^2/d^2/ln(F)^2-3*f^2*F^(b*d*x+b*c+a)*x^2/b^2/d^
2/ln(F)^2+e^2*F^(b*d*x+b*c+a)*x/b/d/ln(F)+2*e*f*F^(b*d*x+b*c+a)*x^2/b/d/ln(
F)+f^2*F^(b*d*x+b*c+a)*x^3/b/d/ln(F)
```

Rubi [A] time = 0.36, antiderivative size = 242, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 3, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.150, Rules used = {2196, 2176, 2194}

$$-\frac{e^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{4efxF^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{4efF^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{3f^2x^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{6f^2xF^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{6f^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{e^2xF^{a+bc+bdx}}{bd\log(F)}+\frac{2e}{}$$

Antiderivative was successfully verified.

```
[In] Int[F^(a + b*(c + d*x))*x*(e + f*x)^2,x]
```

```
[Out] (-6*f^2*F^(a + b*c + b*d*x))/(b^4*d^4*Log[F]^4) + (4*e*f*F^(a + b*c + b*d*x
))/(b^3*d^3*Log[F]^3) + (6*f^2*F^(a + b*c + b*d*x)*x)/(b^3*d^3*Log[F]^3) -
(e^2*F^(a + b*c + b*d*x))/(b^2*d^2*Log[F]^2) - (4*e*f*F^(a + b*c + b*d*x)*x
)/(b^2*d^2*Log[F]^2) - (3*f^2*F^(a + b*c + b*d*x)*x^2)/(b^2*d^2*Log[F]^2) +
 (e^2*F^(a + b*c + b*d*x)*x)/(b*d*Log[F]) + (2*e*f*F^(a + b*c + b*d*x)*x^2)
/(b*d*Log[F]) + (f^2*F^(a + b*c + b*d*x)*x^3)/(b*d*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}
\int F^{a+b(c+dx)}x(e+fx)^2\,dx &= \int \left(e^2F^{a+bc+bdx}x+2efF^{a+bc+bdx}x^2+f^2F^{a+bc+bdx}x^3\right)dx\\
&= e^2\int F^{a+bc+bdx}x\,dx+(2ef)\int F^{a+bc+bdx}x^2\,dx+f^2\int F^{a+bc+bdx}x^3\,dx\\
&= \frac{e^2F^{a+bc+bdx}x}{bd\log(F)}+\frac{2efF^{a+bc+bdx}x^2}{bd\log(F)}+\frac{f^2F^{a+bc+bdx}x^3}{bd\log(F)}-\frac{e^2\int F^{a+bc+bdx}\,dx}{bd\log(F)}-\frac{(4ef)\int F^{a+bc+}}{bd\log(}\\
&= -\frac{e^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{4efF^{a+bc+bdx}x}{b^2d^2\log^2(F)}-\frac{3f^2F^{a+bc+bdx}x^2}{b^2d^2\log^2(F)}+\frac{e^2F^{a+bc+bdx}x}{bd\log(F)}+\frac{2efF^{a+bc+bdx}x^2}{bd\log(F)}\\
&= \frac{4efF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{6f^2F^{a+bc+bdx}x}{b^3d^3\log^3(F)}-\frac{e^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{4efF^{a+bc+bdx}x}{b^2d^2\log^2(F)}-\frac{3f^2F^{a+bc+bdx}x^2}{b^2d^2\log^2(F)}+\\
&= -\frac{6f^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{4efF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{6f^2F^{a+bc+bdx}x}{b^3d^3\log^3(F)}-\frac{e^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{4efF^{a+bc+bdx}x}{b^2d^2\log^2(F)}-
\end{aligned}$$

Mathematica [A] time = 0.15, size = 91, normalized size = 0.38

$$\frac{F^{a+b(c+dx)}\left(b^3d^3x\log^3(F)(e+fx)^2-b^2d^2\log^2(F)\left(e^2+4efx+3f^2x^2\right)+2bdf\log(F)(2e+3fx)-6f^2\right)}{b^4d^4\log^4(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*(c + d*x))*x*(e + f*x)^2,x]
```

```
[Out] (F^(a + b*(c + d*x))*(-6*f^2 + 2*b*d*f*(2*e + 3*f*x)*Log[F] - b^2*d^2*(e^2
+ 4*e*f*x + 3*f^2*x^2)*Log[F]^2 + b^3*d^3*x*(e + f*x)^2*Log[F]^3))/(b^4*d^4
*Log[F]^4)
```

fricas [A] time = 0.42, size = 132, normalized size = 0.55

$$\frac{\left(\left(b^3d^3f^2x^3+2\,b^3d^3efx^2+b^3d^3e^2x\right)\log(F)^3-\left(3\,b^2d^2f^2x^2+4\,b^2d^2efx+b^2d^2e^2\right)\log(F)^2-6\,f^2+2\left(3\,bdf^2x+2\right.}{b^4d^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^3*d^3*f^2*x^3 + 2*b^3*d^3*e*f*x^2 + b^3*d^3*e^2*x)*log(F)^3 - (3*b^2*d^
2*f^2*x^2 + 4*b^2*d^2*e*f*x + b^2*d^2*e^2)*log(F)^2 - 6*f^2 + 2*(3*b*d*f^2*
x + 2*b*d*e*f)*log(F))*F^(b*d*x + b*c + a)/(b^4*d^4*log(F)^4)
```

giac [C] time = 1.06, size = 4696, normalized size = 19.40

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (2*((pi*b^2*d^2*log(abs(F))*sgn(F) - pi*b^2*d^2*log(abs(F)))*(pi*b*d*x*sgn(
F) - pi*b*d*x)/((pi^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2 + 2*b^2*d^2*log(abs(F))
^2)^2 + 4*(pi*b^2*d^2*log(abs(F))*sgn(F) - pi*b^2*d^2*log(abs(F)))^2) + (pi
^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2 + 2*b^2*d^2*log(abs(F))^2)*(b*d*x*log(abs(
F)) - 1)/((pi^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2 + 2*b^2*d^2*log(abs(F))^2)^2
+ 4*(pi*b^2*d^2*log(abs(F))*sgn(F) - pi*b^2*d^2*log(abs(F)))^2))*cos(-1/2*p
i*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*s
gn(F) + 1/2*pi*a) + ((pi^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2 + 2*b^2*d^2*log(ab
s(F))^2)*(pi*b*d*x*sgn(F) - pi*b*d*x)/((pi^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2
+ 2*b^2*d^2*log(abs(F))^2)^2 + 4*(pi*b^2*d^2*log(abs(F))*sgn(F) - pi*b^2*d^
2*log(abs(F)))^2) - 4*(pi*b^2*d^2*log(abs(F))*sgn(F) - pi*b^2*d^2*log(abs(F
)))*(b*d*x*log(abs(F)) - 1)/((pi^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2 + 2*b^2*d^
2*log(abs(F))^2)^2 + 4*(pi*b^2*d^2*log(abs(F))*sgn(F) - pi*b^2*d^2*log(abs(
F)))^2))*sin(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*
pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)
) + a*log(abs(F)) + 2) - 1/2*I*((2*pi*b*d*x*sgn(F) - 2*pi*b*d*x - 4*I*b*d*x
*log(abs(F)) + 4*I)*e^(1/2*I*pi*b*d*x*sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*b*
c*sgn(F) - 1/2*I*pi*b*c + 1/2*I*pi*a*sgn(F) - 1/2*I*pi*a)/(2*pi^2*b^2*d^2*s
gn(F) + 4*I*pi*b^2*d^2*log(abs(F))*sgn(F) - 2*pi^2*b^2*d^2 - 4*I*pi*b^2*d^2
*log(abs(F)) + 4*b^2*d^2*log(abs(F))^2) + (2*pi*b*d*x*sgn(F) - 2*pi*b*d*x +
 4*I*b*d*x*log(abs(F)) - 4*I)*e^(-1/2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b*d*x -
1/2*I*pi*b*c*sgn(F) + 1/2*I*pi*b*c - 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)/(2*pi^
2*b^2*d^2*sgn(F) - 4*I*pi*b^2*d^2*log(abs(F))*sgn(F) - 2*pi^2*b^2*d^2 + 4*I
*pi*b^2*d^2*log(abs(F)) + 4*b^2*d^2*log(abs(F))^2))*e^(b*d*x*log(abs(F)) +
b*c*log(abs(F)) + a*log(abs(F)) + 2) + 2*(((pi^2*b^2*d^2*f*x^2*sgn(F) - pi^
2*b^2*d^2*f*x^2 + 2*b^2*d^2*f*x^2*log(abs(F))^2 - 4*b*d*f*x*log(abs(F)) + 4
*f)*(3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F)) + 2*b^3
*d^3*log(abs(F))^3)/((pi^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(
F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*log(abs(F))^2)^2 + (3*pi^2*b^3*d^3*log(abs
(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F)) + 2*b^3*d^3*log(abs(F))^3)^2) - 2*
(pi^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3
*pi*b^3*d^3*log(abs(F))^2)*(pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) - pi*b^2*d^
2*f*x^2*log(abs(F)) - pi*b*d*f*x*sgn(F) + pi*b*d*f*x)/((pi^3*b^3*d^3*sgn(F)
 - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*log(abs(
```

F))^2)^2 + (3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F))
+ 2*b^3*d^3*log(abs(F))^3)^2))*cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/
2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a) + ((pi^3*b^3*d^3
*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*l
og(abs(F))^2)*(pi^2*b^2*d^2*f*x^2*sgn(F) - pi^2*b^2*d^2*f*x^2 + 2*b^2*d^2*f
*x^2*log(abs(F))^2 - 4*b*d*f*x*log(abs(F)) + 4*f)/((pi^3*b^3*d^3*sgn(F) - 3
*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*log(abs(F))^
2)^2 + (3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F)) + 2*
b^3*d^3*log(abs(F))^3)^2) + 2*(3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b
^3*d^3*log(abs(F)) + 2*b^3*d^3*log(abs(F))^3)*(pi*b^2*d^2*f*x^2*log(abs(F))
*sgn(F) - pi*b^2*d^2*f*x^2*log(abs(F)) - pi*b*d*f*x*sgn(F) + pi*b*d*f*x)/((
pi^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*
pi*b^3*d^3*log(abs(F))^2)^2 + (3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b
^3*d^3*log(abs(F)) + 2*b^3*d^3*log(abs(F))^3)^2))*sin(-1/2*pi*b*d*x*sgn(F)
+ 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*
a))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)) + 1) + 1/2*I*((8
*I*pi^2*b^2*d^2*f*x^2*sgn(F) - 16*pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) - 8*I
*pi^2*b^2*d^2*f*x^2 + 16*pi*b^2*d^2*f*x^2*log(abs(F)) + 16*I*b^2*d^2*f*x^2*
log(abs(F))^2 + 16*pi*b*d*f*x*sgn(F) - 16*pi*b*d*f*x - 32*I*b*d*f*x*log(abs
(F)) + 32*I*f)*e^(1/2*I*pi*b*d*x*sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*b*c*sgn
(F) - 1/2*I*pi*b*c + 1/2*I*pi*a*sgn(F) - 1/2*I*pi*a)/(-4*I*pi^3*b^3*d^3*sgn
(F) + 12*pi^2*b^3*d^3*log(abs(F))*sgn(F) + 12*I*pi*b^3*d^3*log(abs(F))^2*sg
n(F) + 4*I*pi^3*b^3*d^3 - 12*pi^2*b^3*d^3*log(abs(F)) - 12*I*pi*b^3*d^3*log
(abs(F))^2 + 8*b^3*d^3*log(abs(F))^3) - (8*I*pi^2*b^2*d^2*f*x^2*sgn(F) + 16
*pi*b^2*d^2*f*x^2*log(abs(F))*sgn(F) - 8*I*pi^2*b^2*d^2*f*x^2 - 16*pi*b^2*d
^2*f*x^2*log(abs(F)) + 16*I*b^2*d^2*f*x^2*log(abs(F))^2 - 16*pi*b*d*f*x*sgn
(F) + 16*pi*b*d*f*x - 32*I*b*d*f*x*log(abs(F)) + 32*I*f)*e^(-1/2*I*pi*b*d*x
*sgn(F) + 1/2*I*pi*b*d*x - 1/2*I*pi*b*c*sgn(F) + 1/2*I*pi*b*c - 1/2*I*pi*a*
sgn(F) + 1/2*I*pi*a)/(4*I*pi^3*b^3*d^3*sgn(F) + 12*pi^2*b^3*d^3*log(abs(F))
*sgn(F) - 12*I*pi*b^3*d^3*log(abs(F))^2*sgn(F) - 4*I*pi^3*b^3*d^3 - 12*pi^2
*b^3*d^3*log(abs(F)) + 12*I*pi*b^3*d^3*log(abs(F))^2 + 8*b^3*d^3*log(abs(F)
)^3))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)) + 1) - (((3*pi
^2*b^3*d^3*f^2*x^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*f^2*x^3*log(abs(F))
+ 2*b^3*d^3*f^2*x^3*log(abs(F))^3 - 3*pi^2*b^2*d^2*f^2*x^2*sgn(F) + 3*pi^2*
b^2*d^2*f^2*x^2 - 6*b^2*d^2*f^2*x^2*log(abs(F))^2 + 12*b*d*f^2*x*log(abs(F)
) - 12*f^2)*(pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - pi
^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^4*log(abs(F))^4)/((pi^4
*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi
^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*d^4*lo
g(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*log(abs(F
)) + pi*b^4*d^4*log(abs(F))^3)^2) - 4*(pi^3*b^3*d^3*f^2*x^3*sgn(F) - 3*pi*b
^3*d^3*f^2*x^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3*f^2*x^3 + 3*pi*b^3*d^3*f
^2*x^3*log(abs(F))^2 + 6*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) - 6*pi*b^2*d
^2*f^2*x^2*log(abs(F)) - 6*pi*b*d*f^2*x*sgn(F) + 6*pi*b*d*f^2*x)*(pi^3*b^4*
d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*log

(abs(F)) + pi*b^4*d^4*log(abs(F))^3)/((pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4
*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4
*d^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*lo
g(abs(F))^3*sgn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)^2
))*cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c
 - 1/2*pi*a*sgn(F) + 1/2*pi*a) - ((pi^3*b^3*d^3*f^2*x^3*sgn(F) - 3*pi*b^3*d
^3*f^2*x^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3*f^2*x^3 + 3*pi*b^3*d^3*f^2*x
^3*log(abs(F))^2 + 6*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) - 6*pi*b^2*d^2*f
^2*x^2*log(abs(F)) - 6*pi*b*d*f^2*x*sgn(F) + 6*pi*b*d*f^2*x)*(pi^4*b^4*d^4*
sgn(F) - 6*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^
4*log(abs(F))^2 - 2*b^4*d^4*log(abs(F))^4)/((pi^4*b^4*d^4*sgn(F) - 6*pi^2*b
^4*d^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4 + 6*pi^2*b^4*d^4*log(abs(F))^2 -
 2*b^4*d^4*log(abs(F))^4)^2 + 16*(pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*
d^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F)
)^3)^2) + 4*(3*pi^2*b^3*d^3*f^2*x^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*f^2
*x^3*log(abs(F)) + 2*b^3*d^3*f^2*x^3*log(abs(F))^3 - 3*pi^2*b^2*d^2*f^2*x^2
*sgn(F) + 3*pi^2*b^2*d^2*f^2*x^2 - 6*b^2*d^2*f^2*x^2*log(abs(F))^2 + 12*b*d
*f^2*x*log(abs(F)) - 12*f^2)*(pi^3*b^4*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*
log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*log(abs(F)) + pi*b^4*d^4*log(abs(F))^3)
/((pi^4*b^4*d^4*sgn(F) - 6*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - pi^4*b^4*d^4
 + 6*pi^2*b^4*d^4*log(abs(F))^2 - 2*b^4*d^4*log(abs(F))^4)^2 + 16*(pi^3*b^4
*d^4*log(abs(F))*sgn(F) - pi*b^4*d^4*log(abs(F))^3*sgn(F) - pi^3*b^4*d^4*lo
g(abs(F)) + pi*b^4*d^4*log(abs(F))^3)^2))*sin(-1/2*pi*b*d*x*sgn(F) + 1/2*pi
*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a))*e^(b
*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F))) - 1/2*I*((8*pi^3*b^3*d^
3*f^2*x^3*sgn(F) + 24*I*pi^2*b^3*d^3*f^2*x^3*log(abs(F))*sgn(F) - 24*pi*b^3
*d^3*f^2*x^3*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*d^3*f^2*x^3 - 24*I*pi^2*b^3*
d^3*f^2*x^3*log(abs(F)) + 24*pi*b^3*d^3*f^2*x^3*log(abs(F))^2 + 16*I*b^3*d^
3*f^2*x^3*log(abs(F))^3 - 24*I*pi^2*b^2*d^2*f^2*x^2*sgn(F) + 48*pi*b^2*d^2*
f^2*x^2*log(abs(F))*sgn(F) + 24*I*pi^2*b^2*d^2*f^2*x^2 - 48*pi*b^2*d^2*f^2*
x^2*log(abs(F)) - 48*I*b^2*d^2*f^2*x^2*log(abs(F))^2 - 48*pi*b*d*f^2*x*sgn(
F) + 48*pi*b*d*f^2*x + 96*I*b*d*f^2*x*log(abs(F)) - 96*I*f^2)*e^(1/2*I*pi*b
*d*x*sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*b*c*sgn(F) - 1/2*I*pi*b*c + 1/2*I*p
i*a*sgn(F) - 1/2*I*pi*a)/(8*pi^4*b^4*d^4*sgn(F) + 32*I*pi^3*b^4*d^4*log(abs
(F))*sgn(F) - 48*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) - 32*I*pi*b^4*d^4*log(ab
s(F))^3*sgn(F) - 8*pi^4*b^4*d^4 - 32*I*pi^3*b^4*d^4*log(abs(F)) + 48*pi^2*b
^4*d^4*log(abs(F))^2 + 32*I*pi*b^4*d^4*log(abs(F))^3 - 16*b^4*d^4*log(abs(F
))^4) + (8*pi^3*b^3*d^3*f^2*x^3*sgn(F) - 24*I*pi^2*b^3*d^3*f^2*x^3*log(abs(
F))*sgn(F) - 24*pi*b^3*d^3*f^2*x^3*log(abs(F))^2*sgn(F) - 8*pi^3*b^3*d^3*f^
2*x^3 + 24*I*pi^2*b^3*d^3*f^2*x^3*log(abs(F)) + 24*pi*b^3*d^3*f^2*x^3*log(a
bs(F))^2 - 16*I*b^3*d^3*f^2*x^3*log(abs(F))^3 + 24*I*pi^2*b^2*d^2*f^2*x^2*s
gn(F) + 48*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) - 24*I*pi^2*b^2*d^2*f^2*x^
2 - 48*pi*b^2*d^2*f^2*x^2*log(abs(F)) + 48*I*b^2*d^2*f^2*x^2*log(abs(F))^2
- 48*pi*b*d*f^2*x*sgn(F) + 48*pi*b*d*f^2*x - 96*I*b*d*f^2*x*log(abs(F)) + 9
6*I*f^2)*e^(-1/2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b*d*x - 1/2*I*pi*b*c*sgn(F) +

```
 1/2*I*pi*b*c - 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)/(8*pi^4*b^4*d^4*sgn(F) - 32
*I*pi^3*b^4*d^4*log(abs(F))*sgn(F) - 48*pi^2*b^4*d^4*log(abs(F))^2*sgn(F) +
 32*I*pi*b^4*d^4*log(abs(F))^3*sgn(F) - 8*pi^4*b^4*d^4 + 32*I*pi^3*b^4*d^4*
log(abs(F)) + 48*pi^2*b^4*d^4*log(abs(F))^2 - 32*I*pi*b^4*d^4*log(abs(F))^3
 - 16*b^4*d^4*log(abs(F))^4))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*lo
g(abs(F)))
```

maple [A] time = 0.01, size = 144, normalized size = 0.60

$$\frac{\left(b^3d^3f^2x^3\ln(F)^3+2b^3d^3ef\,x^2\ln(F)^3+b^3d^3e^2x\ln(F)^3-3b^2d^2f^2x^2\ln(F)^2-4b^2d^2ef\,x\ln(F)^2-b^2d^2e^2\ln(F)^2+6b}{b^4d^4\ln(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*x*(f*x+e)^2,x)
```

```
[Out] (b^3*d^3*f^2*x^3*ln(F)^3+2*b^3*d^3*e*f*x^2*ln(F)^3+b^3*d^3*e^2*x*ln(F)^3-3*
b^2*d^2*f^2*x^2*ln(F)^2-4*b^2*d^2*e*f*x*ln(F)^2-b^2*d^2*e^2*ln(F)^2+6*b*d*f
^2*x*ln(F)+4*b*d*e*f*ln(F)-6*f^2)*F^(b*d*x+b*c+a)/ln(F)^4/b^4/d^4
```

maxima [A] time = 0.59, size = 196, normalized size = 0.81

$$\frac{\left(F^{bc+a}bdx\log(F)-F^{bc+a}\right)F^{bdx}e^2}{b^2d^2\log(F)^2}+\frac{2\left(F^{bc+a}b^2d^2x^2\log(F)^2-2\,F^{bc+a}bdx\log(F)+2\,F^{bc+a}\right)F^{bdx}ef}{b^3d^3\log(F)^3}+\frac{\left(F^{bc+a}b^3d^3x^3\log\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^(b*c + a)*b*d*x*log(F) - F^(b*c + a))*F^(b*d*x)*e^2/(b^2*d^2*log(F)^2) +
 2*(F^(b*c + a)*b^2*d^2*x^2*log(F)^2 - 2*F^(b*c + a)*b*d*x*log(F) + 2*F^(b*
c + a))*F^(b*d*x)*e*f/(b^3*d^3*log(F)^3) + (F^(b*c + a)*b^3*d^3*x^3*log(F)^
3 - 3*F^(b*c + a)*b^2*d^2*x^2*log(F)^2 + 6*F^(b*c + a)*b*d*x*log(F) - 6*F^(
b*c + a))*F^(b*d*x)*f^2/(b^4*d^4*log(F)^4)
```

mupad [B] time = 3.52, size = 143, normalized size = 0.59

$$\frac{F^{a+b\,c+b\,d\,x}\,\left(b^3\,d^3\,e^2\,x\,{\ln(F)}^3+2\,b^3\,d^3\,e\,f\,x^2\,{\ln(F)}^3+b^3\,d^3\,f^2\,x^3\,{\ln(F)}^3-b^2\,d^2\,e^2\,{\ln(F)}^2-4\,b^2\,d^2\,e\,f\,x\,{\ln(F)}^2-3\,b^2}{b^4\,d^4\,{\ln(F)}^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a + b*(c + d*x))*x*(e + f*x)^2,x)
```

```
[Out] (F^(a + b*c + b*d*x)*(6*b*d*f^2*x*log(F) - b^2*d^2*e^2*log(F)^2 - 6*f^2 + b
^3*d^3*e^2*x*log(F)^3 - 3*b^2*d^2*f^2*x^2*log(F)^2 + b^3*d^3*f^2*x^3*log(F)
```

```
^3 + 4*b*d*e*f*log(F) - 4*b^2*d^2*e*f*x*log(F)^2 + 2*b^3*d^3*e*f*x^2*log(F)
^3))/(b^4*d^4*log(F)^4)
```

sympy [A] time = 0.23, size = 199, normalized size = 0.82

$$\begin{cases} \frac{F^{a+b(c+dx)}\left(b^3d^3e^2x\log{(F)}^3+2b^3d^3efx^2\log{(F)}^3+b^3d^3f^2x^3\log{(F)}^3-b^2d^2e^2\log{(F)}^2-4b^2d^2efx\log{(F)}^2-3b^2d^2f^2x^2\log{(F)}^2+4bdef\log{(F)}+6bdf^2x\right.}{b^4d^4\log{(F)}^4} \\ \frac{e^2x^2}{2}+\frac{2efx^3}{3}+\frac{f^2x^4}{4} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*x*(f*x+e)**2,x)
```

```
[Out] Piecewise((F**(a + b*(c + d*x))*(b**3*d**3*e**2*x*log(F)**3 + 2*b**3*d**3*e
*f*x**2*log(F)**3 + b**3*d**3*f**2*x**3*log(F)**3 - b**2*d**2*e**2*log(F)**
2 - 4*b**2*d**2*e*f*x*log(F)**2 - 3*b**2*d**2*f**2*x**2*log(F)**2 + 4*b*d*e
*f*log(F) + 6*b*d*f**2*x*log(F) - 6*f**2)/(b**4*d**4*log(F)**4), Ne(b**4*d*
*4*log(F)**4, 0)), (e**2*x**2/2 + 2*e*f*x**3/3 + f**2*x**4/4, True))
```

3.68 $\int F^{a+b(c+dx)}(e+fx)^2\,dx$

Optimal. Leaf size=85

$$\frac{2f^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{2f(e+fx)F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{(e+fx)^2F^{a+bc+bdx}}{bd\log(F)}$$

```
[Out] 2*f^2*F^(b*d*x+b*c+a)/b^3/d^3/ln(F)^3-2*f*F^(b*d*x+b*c+a)*(f*x+e)/b^2/d^2/l
n(F)^2+F^(b*d*x+b*c+a)*(f*x+e)^2/b/d/ln(F)
```

Rubi [A] time = 0.12, antiderivative size = 85, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {2187, 2176, 2194}

$$-\frac{2f(e+fx)F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{2f^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{(e+fx)^2F^{a+bc+bdx}}{bd\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(a + b*(c + d*x))*(e + f*x)^2,x]
```

```
[Out] (2*f^2*F^(a + b*c + b*d*x))/(b^3*d^3*Log[F]^3) - (2*f*F^(a + b*c + b*d*x)*(
e + f*x))/(b^2*d^2*Log[F]^2) + (F^(a + b*c + b*d*x)*(e + f*x)^2)/(b*d*Log[F
])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] && !$UseGamma === True
```

Rule 2187

```
Int[((a_.) + (b_.)*((F_)^((g_.)*(v_)))^(n_.))^(p_.)*(u_)^(m_.), x_Symbol] :
> Int[NormalizePowerOfLinear[u, x]^m*(a + b*(F^(g*ExpandToSum[v, x]))^n)^p,
 x] /; FreeQ[{F, a, b, g, n, p}, x] && LinearQ[v, x] && PowerOfLinearQ[u, x
] && !(LinearMatchQ[v, x] && PowerOfLinearMatchQ[u, x]) && IntegerQ[m]
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int F^{a+b(c+dx)}(e+fx)^2\,dx = \int F^{a+bc+bdx}(e+fx)^2\,dx$$
$$= \frac{F^{a+bc+bdx}(e+fx)^2}{bd\log(F)} - \frac{(2f)\int F^{a+bc+bdx}(e+fx)\,dx}{bd\log(F)}$$
$$= -\frac{2fF^{a+bc+bdx}(e+fx)}{b^2d^2\log^2(F)} + \frac{F^{a+bc+bdx}(e+fx)^2}{bd\log(F)} + \frac{\left(2f^2\right)\int F^{a+bc+bdx}\,dx}{b^2d^2\log^2(F)}$$
$$= \frac{2f^2F^{a+bc+bdx}}{b^3d^3\log^3(F)} - \frac{2fF^{a+bc+bdx}(e+fx)}{b^2d^2\log^2(F)} + \frac{F^{a+bc+bdx}(e+fx)^2}{bd\log(F)}$$

Mathematica [A] time = 0.07, size = 58, normalized size = 0.68

$$\frac{F^{a+b(c+dx)}\left(b^2d^2\log^2(F)(e+fx)^2 - 2bdf\log(F)(e+fx) + 2f^2\right)}{b^3d^3\log^3(F)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(a + b*(c + d*x))*(e + f*x)^2,x]
```

```
[Out] (F^(a + b*(c + d*x))*(2*f^2 - 2*b*d*f*(e + f*x)*Log[F] + b^2*d^2*(e + f*x)^
2*Log[F]^2))/(b^3*d^3*Log[F]^3)
```

fricas [A] time = 0.41, size = 85, normalized size = 1.00

$$\frac{\left(\left(b^2d^2f^2x^2 + 2\,b^2d^2efx + b^2d^2e^2\right)\log(F)^2 + 2\,f^2 - 2\left(bdf^2x + bdef\right)\log(F)\right)F^{bdx+bc+a}}{b^3d^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^2*d^2*f^2*x^2 + 2*b^2*d^2*e*f*x + b^2*d^2*e^2)*log(F)^2 + 2*f^2 - 2*(b*
d*f^2*x + b*d*e*f)*log(F))*F^(b*d*x + b*c + a)/(b^3*d^3*log(F)^3)
```

giac [C] time = 0.93, size = 2747, normalized size = 32.32

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 2*(2*b*d*cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*
pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a)*log(abs(F))/(4*b^2*d^2*log(abs(F))^2 +
 (pi*b*d*sgn(F) - pi*b*d)^2) - (pi*b*d*sgn(F) - pi*b*d)*sin(-1/2*pi*b*d*x*s
gn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1
/2*pi*a)/(4*b^2*d^2*log(abs(F))^2 + (pi*b*d*sgn(F) - pi*b*d)^2))*e^(b*d*x*l
og(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)) + 2) - 1/2*I*(-2*I*e^(1/2*I*pi
*b*d*x*sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*b*c*sgn(F) - 1/2*I*pi*b*c + 1/2*I
*pi*a*sgn(F) - 1/2*I*pi*a)/(I*pi*b*d*sgn(F) - I*pi*b*d + 2*b*d*log(abs(F)))
 + 2*I*e^(-1/2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b*d*x - 1/2*I*pi*b*c*sgn(F) + 1
/2*I*pi*b*c - 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)/(-I*pi*b*d*sgn(F) + I*pi*b*d
+ 2*b*d*log(abs(F))))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)
) + 2) + 2*(2*((pi*b^2*d^2*log(abs(F))*sgn(F) - pi*b^2*d^2*log(abs(F)))*(pi
*b*d*f*x*sgn(F) - pi*b*d*f*x)/((pi^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2 + 2*b^2*
d^2*log(abs(F))^2)^2 + 4*(pi*b^2*d^2*log(abs(F))*sgn(F) - pi*b^2*d^2*log(ab
s(F)))^2) + (pi^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2 + 2*b^2*d^2*log(abs(F))^2)*
(b*d*f*x*log(abs(F)) - f)/((pi^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2 + 2*b^2*d^2*
log(abs(F))^2)^2 + 4*(pi*b^2*d^2*log(abs(F))*sgn(F) - pi*b^2*d^2*log(abs(F)
))^2))*cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi
*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a) + ((pi^2*b^2*d^2*sgn(F) - pi^2*b^2*d^2 +
 2*b^2*d^2*log(abs(F))^2)*(pi*b*d*f*x*sgn(F) - pi*b*d*f*x)/((pi^2*b^2*d^2*s
gn(F) - pi^2*b^2*d^2 + 2*b^2*d^2*log(abs(F))^2)^2 + 4*(pi*b^2*d^2*log(abs(F
))*sgn(F) - pi*b^2*d^2*log(abs(F)))^2) - 4*(pi*b^2*d^2*log(abs(F))*sgn(F) -
 pi*b^2*d^2*log(abs(F)))*(b*d*f*x*log(abs(F)) - f)/((pi^2*b^2*d^2*sgn(F) -
pi^2*b^2*d^2 + 2*b^2*d^2*log(abs(F))^2)^2 + 4*(pi*b^2*d^2*log(abs(F))*sgn(F
) - pi*b^2*d^2*log(abs(F)))^2))*sin(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1
/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a))*e^(b*d*x*log(a
bs(F)) + b*c*log(abs(F)) + a*log(abs(F)) + 1) - 1/2*I*((4*pi*b*d*f*x*sgn(F)
 - 4*pi*b*d*f*x - 8*I*b*d*f*x*log(abs(F)) + 8*I*f)*e^(1/2*I*pi*b*d*x*sgn(F)
 - 1/2*I*pi*b*d*x + 1/2*I*pi*b*c*sgn(F) - 1/2*I*pi*b*c + 1/2*I*pi*a*sgn(F)
- 1/2*I*pi*a)/(2*pi^2*b^2*d^2*sgn(F) + 4*I*pi*b^2*d^2*log(abs(F))*sgn(F) -
2*pi^2*b^2*d^2 - 4*I*pi*b^2*d^2*log(abs(F)) + 4*b^2*d^2*log(abs(F))^2) + (4
*pi*b*d*f*x*sgn(F) - 4*pi*b*d*f*x + 8*I*b*d*f*x*log(abs(F)) - 8*I*f)*e^(-1/
2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b*d*x - 1/2*I*pi*b*c*sgn(F) + 1/2*I*pi*b*c -
 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)/(2*pi^2*b^2*d^2*sgn(F) - 4*I*pi*b^2*d^2*lo
g(abs(F))*sgn(F) - 2*pi^2*b^2*d^2 + 4*I*pi*b^2*d^2*log(abs(F)) + 4*b^2*d^2*
log(abs(F))^2))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F)) + 1)
 - ((2*(pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) - pi*b^2*d^2*f^2*x^2*log(abs(
F)) - pi*b*d*f^2*x*sgn(F) + pi*b*d*f^2*x)*(pi^3*b^3*d^3*sgn(F) - 3*pi*b^3*d
^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*log(abs(F))^2)/((pi^3
*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*b
^3*d^3*log(abs(F))^2)^2 + (3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d
^3*log(abs(F)) + 2*b^3*d^3*log(abs(F))^3)^2) - (pi^2*b^2*d^2*f^2*x^2*sgn(F)
 - pi^2*b^2*d^2*f^2*x^2 + 2*b^2*d^2*f^2*x^2*log(abs(F))^2 - 4*b*d*f^2*x*log
(abs(F)) + 4*f^2)*(3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(a
bs(F)) + 2*b^3*d^3*log(abs(F))^3)/((pi^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(
```

```
abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*log(abs(F))^2)^2 + (3*pi^2*b
^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F)) + 2*b^3*d^3*log(abs(
F))^3)^2))*cos(-1/2*pi*b*d*x*sgn(F) + 1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/
2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a) - ((pi^2*b^2*d^2*f^2*x^2*sgn(F) - pi
^2*b^2*d^2*f^2*x^2 + 2*b^2*d^2*f^2*x^2*log(abs(F))^2 - 4*b*d*f^2*x*log(abs(
F)) + 4*f^2)*(pi^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^
3*b^3*d^3 + 3*pi*b^3*d^3*log(abs(F))^2)/((pi^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^
3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi*b^3*d^3*log(abs(F))^2)^2 + (3*
pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F)) + 2*b^3*d^3*lo
g(abs(F))^3)^2) + 2*(pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) - pi*b^2*d^2*f^2
*x^2*log(abs(F)) - pi*b*d*f^2*x*sgn(F) + pi*b*d*f^2*x)*(3*pi^2*b^3*d^3*log(
abs(F))*sgn(F) - 3*pi^2*b^3*d^3*log(abs(F)) + 2*b^3*d^3*log(abs(F))^3)/((pi
^3*b^3*d^3*sgn(F) - 3*pi*b^3*d^3*log(abs(F))^2*sgn(F) - pi^3*b^3*d^3 + 3*pi
*b^3*d^3*log(abs(F))^2)^2 + (3*pi^2*b^3*d^3*log(abs(F))*sgn(F) - 3*pi^2*b^3
*d^3*log(abs(F)) + 2*b^3*d^3*log(abs(F))^3)^2))*sin(-1/2*pi*b*d*x*sgn(F) +
1/2*pi*b*d*x - 1/2*pi*b*c*sgn(F) + 1/2*pi*b*c - 1/2*pi*a*sgn(F) + 1/2*pi*a)
)*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(abs(F))) + 1/2*I*((4*I*pi^
2*b^2*d^2*f^2*x^2*sgn(F) - 8*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) - 4*I*pi
^2*b^2*d^2*f^2*x^2 + 8*pi*b^2*d^2*f^2*x^2*log(abs(F)) + 8*I*b^2*d^2*f^2*x^2
*log(abs(F))^2 + 8*pi*b*d*f^2*x*sgn(F) - 8*pi*b*d*f^2*x - 16*I*b*d*f^2*x*lo
g(abs(F)) + 16*I*f^2)*e^(1/2*I*pi*b*d*x*sgn(F) - 1/2*I*pi*b*d*x + 1/2*I*pi*
b*c*sgn(F) - 1/2*I*pi*b*c + 1/2*I*pi*a*sgn(F) - 1/2*I*pi*a)/(-4*I*pi^3*b^3*
d^3*sgn(F) + 12*pi^2*b^3*d^3*log(abs(F))*sgn(F) + 12*I*pi*b^3*d^3*log(abs(F
))^2*sgn(F) + 4*I*pi^3*b^3*d^3 - 12*pi^2*b^3*d^3*log(abs(F)) - 12*I*pi*b^3*
d^3*log(abs(F))^2 + 8*b^3*d^3*log(abs(F))^3) - (4*I*pi^2*b^2*d^2*f^2*x^2*sg
n(F) + 8*pi*b^2*d^2*f^2*x^2*log(abs(F))*sgn(F) - 4*I*pi^2*b^2*d^2*f^2*x^2 -
 8*pi*b^2*d^2*f^2*x^2*log(abs(F)) + 8*I*b^2*d^2*f^2*x^2*log(abs(F))^2 - 8*p
i*b*d*f^2*x*sgn(F) + 8*pi*b*d*f^2*x - 16*I*b*d*f^2*x*log(abs(F)) + 16*I*f^2
)*e^(-1/2*I*pi*b*d*x*sgn(F) + 1/2*I*pi*b*d*x - 1/2*I*pi*b*c*sgn(F) + 1/2*I*
pi*b*c - 1/2*I*pi*a*sgn(F) + 1/2*I*pi*a)/(4*I*pi^3*b^3*d^3*sgn(F) + 12*pi^2
*b^3*d^3*log(abs(F))*sgn(F) - 12*I*pi*b^3*d^3*log(abs(F))^2*sgn(F) - 4*I*pi
^3*b^3*d^3 - 12*pi^2*b^3*d^3*log(abs(F)) + 12*I*pi*b^3*d^3*log(abs(F))^2 +
8*b^3*d^3*log(abs(F))^3))*e^(b*d*x*log(abs(F)) + b*c*log(abs(F)) + a*log(ab
s(F)))
```

maple [A] time = 0.01, size = 93, normalized size = 1.09

$$\frac{\left(b^2 d^2 f^2 x^2 \ln(F)^2 + 2 b^2 d^2 e f x \ln(F)^2 + b^2 d^2 e^2 \ln(F)^2 - 2 b d f^2 x \ln(F) - 2 b d e f \ln(F) + 2 f^2\right) F^{b d x + b c + a}}{b^3 d^3 \ln(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*(f*x+e)^2,x)
```

```
[Out] (b^2*d^2*f^2*x^2*ln(F)^2+2*b^2*d^2*e*f*x*ln(F)^2+b^2*d^2*e^2*ln(F)^2-2*b*d*
f^2*x*ln(F)-2*b*d*e*f*ln(F)+2*f^2)*F^(b*d*x+b*c+a)/b^3/d^3/ln(F)^3
```

maxima [A] time = 0.61, size = 134, normalized size = 1.58

$$\frac{F^{bdx+bc+a}e^2}{bd\log(F)}+\frac{2\left(F^{bc+a}bdx\log(F)-F^{bc+a}\right)F^{bdx}ef}{b^2d^2\log(F)^2}+\frac{\left(F^{bc+a}b^2d^2x^2\log(F)^2-2F^{bc+a}bdx\log(F)+2F^{bc+a}\right)F^{bdx}f^2}{b^3d^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*d*x + b*c + a)*e^2/(b*d*log(F)) + 2*(F^(b*c + a)*b*d*x*log(F) - F^(b*c
 + a))*F^(b*d*x)*e*f/(b^2*d^2*log(F)^2) + (F^(b*c + a)*b^2*d^2*x^2*log(F)^2
 - 2*F^(b*c + a)*b*d*x*log(F) + 2*F^(b*c + a))*F^(b*d*x)*f^2/(b^3*d^3*log(F
)^3)
```

mupad [B] time = 3.44, size = 92, normalized size = 1.08

$$\frac{F^{a+b\,c+b\,d\,x}\,\left(b^2\,d^2\,e^2\ln(F)^2+2\,b^2\,d^2\,e\,f\,x\ln(F)^2+b^2\,d^2\,f^2\,x^2\ln(F)^2-2\,b\,d\,e\,f\,\ln(F)-2\,b\,d\,f^2\,x\,\ln(F)+2\,f^2\right)}{b^3\,d^3\ln(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a + b*(c + d*x))*(e + f*x)^2,x)
```

```
[Out] (F^(a + b*c + b*d*x)*(2*f^2 + b^2*d^2*e^2*log(F)^2 - 2*b*d*f^2*x*log(F) + b
^2*d^2*f^2*x^2*log(F)^2 - 2*b*d*e*f*log(F) + 2*b^2*d^2*e*f*x*log(F)^2))/(b^
3*d^3*log(F)^3)
```

sympy [A] time = 0.18, size = 134, normalized size = 1.58

$$\begin{cases}\frac{F^{a+b(c+dx)}\left(b^2d^2e^2\log\left(F\right)^2+2b^2d^2efx\log\left(F\right)^2+b^2d^2f^2x^2\log\left(F\right)^2-2bdef\log\left(F\right)-2bdf^2x\log\left(F\right)+2f^2\right)}{b^3d^3\log\left(F\right)^3} & \text{for}\ b^3d^3\log\left(F\right)^3\neq 0\\ e^2x+efx^2+\frac{f^2x^3}{3} & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*(f*x+e)**2,x)
```

```
[Out] Piecewise((F**(a + b*(c + d*x))*(b**2*d**2*e**2*log(F)**2 + 2*b**2*d**2*e*f
*x*log(F)**2 + b**2*d**2*f**2*x**2*log(F)**2 - 2*b*d*e*f*log(F) - 2*b*d*f**
2*x*log(F) + 2*f**2)/(b**3*d**3*log(F)**3), Ne(b**3*d**3*log(F)**3, 0)), (e
**2*x + e*f*x**2 + f**2*x**3/3, True))
```

3.69 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x}\,dx$

Optimal. Leaf size=96

$$-\frac{f^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+e^2F^{a+bc}\text{Ei}(bdx\log(F))+\frac{2efF^{a+bc+bdx}}{bd\log(F)}+\frac{f^2xF^{a+bc+bdx}}{bd\log(F)}$$

```
[Out] e^2*F^(b*c+a)*Ei(b*d*x*ln(F))-f^2*F^(b*d*x+b*c+a)/b^2/d^2/ln(F)^2+2*e*f*F^(
b*d*x+b*c+a)/b/d/ln(F)+f^2*F^(b*d*x+b*c+a)*x/b/d/ln(F)
```

Rubi [A] time = 0.26, antiderivative size = 96, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2199, 2194, 2178, 2176}

$$-\frac{f^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+e^2F^{a+bc}\text{Ei}(bdx\log(F))+\frac{2efF^{a+bc+bdx}}{bd\log(F)}+\frac{f^2xF^{a+bc+bdx}}{bd\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[(F^(a + b*(c + d*x))*(e + f*x)^2)/x,x]
```

```
[Out] e^2*F^(a + b*c)*ExpIntegralEi[b*d*x*Log[F]] - (f^2*F^(a + b*c + b*d*x))/(b^
2*d^2*Log[F]^2) + (2*e*f*F^(a + b*c + b*d*x))/(b*d*Log[F]) + (f^2*F^(a + b*
c + b*d*x)*x)/(b*d*Log[F])
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}
\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x}\,dx &= \int \left(2efF^{a+bc+bdx}+\frac{e^2F^{a+bc+bdx}}{x}+f^2F^{a+bc+bdx}x\right)dx\\
&= e^2\int \frac{F^{a+bc+bdx}}{x}\,dx+(2ef)\int F^{a+bc+bdx}\,dx+f^2\int F^{a+bc+bdx}x\,dx\\
&= e^2F^{a+bc}\mathrm{Ei}(bdx\log(F))+\frac{2efF^{a+bc+bdx}}{bd\log(F)}+\frac{f^2F^{a+bc+bdx}x}{bd\log(F)}-\frac{f^2\int F^{a+bc+bdx}\,dx}{bd\log(F)}\\
&= e^2F^{a+bc}\mathrm{Ei}(bdx\log(F))-\frac{f^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{2efF^{a+bc+bdx}}{bd\log(F)}+\frac{f^2F^{a+bc+bdx}x}{bd\log(F)}
\end{aligned}$$

Mathematica [A] time = 0.13, size = 54, normalized size = 0.56

$$F^{a+bc}\left(\frac{fF^{bdx}(bd\log(F)(2e+fx)-f)}{b^2d^2\log^2(F)}+e^2\mathrm{Ei}(bdx\log(F))\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(F^(a + b*(c + d*x))*(e + f*x)^2)/x,x]
```

```
[Out] F^(a + b*c)*(e^2*ExpIntegralEi[b*d*x*Log[F]] + (f*F^(b*d*x)*(-f + b*d*(2*e
+ f*x)*Log[F]))/(b^2*d^2*Log[F]^2))
```

fricas [A] time = 0.42, size = 75, normalized size = 0.78

$$\frac{F^{bc+a}b^2d^2e^2\mathrm{Ei}\left(bdx\log(F)\right)\log(F)^2-\left(f^2-\left(bdf^2x+2\,bdef\right)\log(F)\right)F^{bdx+bc+a}}{b^2d^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (F^(b*c + a)*b^2*d^2*e^2*Ei(b*d*x*log(F))*log(F)^2 - (f^2 - (b*d*f^2*x + 2*
b*d*e*f)*log(F))*F^(b*d*x + b*c + a))/(b^2*d^2*log(F)^2)
```

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

$$\int \frac{\left(fx+e\right)^2 F^{(dx+c)b+a}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate((f*x + e)^2*F^((d*x + c)*b + a)/x, x)
```

maple [A] time = 0.06, size = 126, normalized size = 1.31

$$-e^2F^aF^{bc}\,\mathrm{Ei}\left(1,-bdx\ln(F)+bc\ln(F)+a\ln(F)-(bc+a)\ln(F)\right)+\frac{f^2x\,F^{bdx}F^{bc+a}}{bd\ln(F)}+\frac{2ef\,F^{bdx}F^{bc+a}}{bd\ln(F)}-\frac{f^2F^{bdx}F^{bc+a}}{b^2d^2\ln(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*(f*x+e)^2/x,x)
```

```
[Out] -e^2*F^(b*c)*F^a*Ei(1,b*c*ln(F)+ln(F)*a-b*d*x*ln(F)-(b*c+a)*ln(F))+1/d/b/ln
(F)*f^2*F^(b*c+a)*F^(b*d*x)*x-1/d^2/b^2/ln(F)^2*f^2*F^(b*d*x)*F^(b*c+a)+2*e
/d/b/ln(F)*f*F^(b*d*x)*F^(b*c+a)
```

maxima [A] time = 1.05, size = 87, normalized size = 0.91

$$F^{bc+a}e^2\mathrm{Ei}\left(bdx\log(F)\right)+\frac{2\,F^{bdx+bc+a}ef}{bd\log(F)}+\frac{\left(F^{bc+a}bdx\log(F)-F^{bc+a}\right)F^{bdx}f^2}{b^2d^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*c + a)*e^2*Ei(b*d*x*log(F)) + 2*F^(b*d*x + b*c + a)*e*f/(b*d*log(F)) +
 (F^(b*c + a)*b*d*x*log(F) - F^(b*c + a))*F^(b*d*x)*f^2/(b^2*d^2*log(F)^2)
```

mupad [B] time = 3.58, size = 80, normalized size = 0.83

$$\frac{F^{a+b\,c}\,\left(b^2\,d^2\,e^2\,\mathrm{ei}\left(b\,d\,x\,\ln(F)\right)\,\ln(F)^2-F^{b\,d\,x}\,f^2+F^{b\,d\,x}\,b\,d\,f^2\,x\,\ln(F)+2\,F^{b\,d\,x}\,b\,d\,e\,f\,\ln(F)\right)}{b^2\,d^2\,\ln(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^(a + b*(c + d*x))*(e + f*x)^2)/x,x)
```

```
[Out] (F^(a + b*c)*(b^2*d^2*e^2*ei(b*d*x*log(F))*log(F)^2 - F^(b*d*x)*f^2 + F^(b*
d*x)*b*d*f^2*x*log(F) + 2*F^(b*d*x)*b*d*e*f*log(F)))/(b^2*d^2*log(F)^2)
```

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

$$\int \frac{F^{a+b(c+dx)} \left(e+fx\right)^2}{x} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*(f*x+e)**2/x,x)
```

```
[Out] Integral(F**(a + b*(c + d*x))*(e + f*x)**2/x, x)
```

3.70 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^2}\,dx$

Optimal. Leaf size=85

$$bde^2\log(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{x}+2efF^{a+bc}\text{Ei}(bdx\log(F))+\frac{f^2F^{a+bc+bdx}}{bd\log(F)}$$

```
[Out] -e^2*F^(b*d*x+b*c+a)/x+2*e*f*F^(b*c+a)*Ei(b*d*x*ln(F))+f^2*F^(b*d*x+b*c+a)/
b/d/ln(F)+b*d*e^2*F^(b*c+a)*Ei(b*d*x*ln(F))*ln(F)
```

Rubi [A] time = 0.28, antiderivative size = 85, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2199, 2194, 2177, 2178}

$$bde^2\log(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{x}+2efF^{a+bc}\text{Ei}(bdx\log(F))+\frac{f^2F^{a+bc+bdx}}{bd\log(F)}$$

Antiderivative was successfully verified.

```
[In] Int[(F^(a + b*(c + d*x))*(e + f*x)^2)/x^2,x]
```

```
[Out] -((e^2*F^(a + b*c + b*d*x))/x) + 2*e*f*F^(a + b*c)*ExpIntegralEi[b*d*x*Log[
F]] + (f^2*F^(a + b*c + b*d*x))/(b*d*Log[F]) + b*d*e^2*F^(a + b*c)*ExpInteg
ralEi[b*d*x*Log[F]]*Log[F]
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] && !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] && !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^2}\,dx &= \int \left(f^2F^{a+bc+bdx}+\frac{e^2F^{a+bc+bdx}}{x^2}+\frac{2efF^{a+bc+bdx}}{x}\right)dx\\ &= e^2\int \frac{F^{a+bc+bdx}}{x^2}\,dx+(2ef)\int \frac{F^{a+bc+bdx}}{x}\,dx+f^2\int F^{a+bc+bdx}\,dx\\ &= -\frac{e^2F^{a+bc+bdx}}{x}+2efF^{a+bc}\text{Ei}(bdx\log(F))+\frac{f^2F^{a+bc+bdx}}{bd\log(F)}+\left(bde^2\log(F)\right)\int \frac{F^{a+bc+bdx}}{x}\,d\\ &= -\frac{e^2F^{a+bc+bdx}}{x}+2efF^{a+bc}\text{Ei}(bdx\log(F))+\frac{f^2F^{a+bc+bdx}}{bd\log(F)}+bde^2F^{a+bc}\text{Ei}(bdx\log(F))\log\end{aligned}$$

Mathematica [A] time = 0.15, size = 58, normalized size = 0.68

$$F^{a+bc}\left(F^{bdx}\left(\frac{f^2}{bd\log(F)}-\frac{e^2}{x}\right)+e(bde\log(F)+2f)\text{Ei}(bdx\log(F))\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(F^(a + b*(c + d*x))*(e + f*x)^2)/x^2,x]
```

```
[Out] F^(a + b*c)*(F^(b*d*x)*(-(e^2/x) + f^2/(b*d*Log[F])) + e*ExpIntegralEi[b*d*
x*Log[F]]*(2*f + b*d*e*Log[F]))
```

fricas [A] time = 0.41, size = 83, normalized size = 0.98

$$\frac{\left(b^2d^2e^2x\log(F)^2+2\,bdefx\log(F)\right)F^{bc+a}\text{Ei}\left(bdx\log(F)\right)-\left(bde^2\log(F)-f^2x\right)F^{bdx+bc+a}}{bdx\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((b^2*d^2*e^2*x*log(F)^2 + 2*b*d*e*f*x*log(F))*F^(b*c + a)*Ei(b*d*x*log(F))
 - (b*d*e^2*log(F) - f^2*x)*F^(b*d*x + b*c + a))/(b*d*x*log(F))
```

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

$$\int \frac{\left(fx+e\right)^2F^{(dx+c)b+a}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] integrate((f*x + e)^2*F^((d*x + c)*b + a)/x^2, x)
```

maple [A] time = 0.07, size = 135, normalized size = 1.59

$$-bd\,e^2F^aF^{bc}\,\mathrm{Ei}\,(1,-bdx\ln(F)+bc\ln(F)+a\ln(F)-(bc+a)\ln(F))\ln(F)-2ef\,F^aF^{bc}\,\mathrm{Ei}\,(1,-bdx\ln(F)+bc\ln(F)+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*(f*x+e)^2/x^2,x)
```

```
[Out] -ln(F)*b*d*e^2*F^(b*c)*F^a*Ei(1,-b*d*x*ln(F)+b*c*ln(F)+a*ln(F)-(b*c+a)*ln(F
))-2*e*f*F^(b*c)*F^a*Ei(1,-b*d*x*ln(F)+b*c*ln(F)+a*ln(F)-(b*c+a)*ln(F))+1/l
n(F)/b/d*f^2*F^(b*d*x)*F^(b*c+a)-e^2*F^(b*d*x)*F^(b*c+a)/x
```

maxima [A] time = 0.92, size = 68, normalized size = 0.80

$$F^{bc+a}bde^2\Gamma\left(-1,-bdx\log(F)\right)\log(F)+2\,F^{bc+a}ef\mathrm{Ei}\left(bdx\log(F)\right)+\frac{F^{bdx+bc+a}f^2}{bd\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F^(b*c + a)*b*d*e^2*gamma(-1, -b*d*x*log(F))*log(F) + 2*F^(b*c + a)*e*f*Ei(
b*d*x*log(F)) + F^(b*d*x + b*c + a)*f^2/(b*d*log(F))
```

mupad [B] time = 3.59, size = 89, normalized size = 1.05

$$2\,F^{a+b\,c}\,e\,f\,\mathrm{ei}\,(b\,d\,x\,\ln(F))-\frac{F^{b\,d\,x}\,F^{a+b\,c}\,e^2}{x}+\frac{F^{a+b\,c+b\,d\,x}\,f^2}{b\,d\,\ln(F)}-F^{a+b\,c}\,b\,d\,e^2\,\ln(F)\,\mathrm{expint}\,(-b\,d\,x\,\ln(F))$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^(a + b*(c + d*x))*(e + f*x)^2)/x^2,x)
```

```
[Out] 2*F^(a + b*c)*e*f*ei(b*d*x*log(F)) - (F^(b*d*x)*F^(a + b*c)*e^2)/x + (F^(a
+ b*c + b*d*x)*f^2)/(b*d*log(F)) - F^(a + b*c)*b*d*e^2*log(F)*expint(-b*d*x
*log(F))
```

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

$$\int\frac{F^{a+b(c+dx)}\left(e+fx\right)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*(f*x+e)**2/x**2,x)
```

```
[Out] Integral(F**(a + b*(c + d*x))*(e + f*x)**2/x**2, x)
```

3.71 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^3}\,dx$

Optimal. Leaf size=136

$$\frac{1}{2}b^2d^2e^2\log^2(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{2x^2}-\frac{bde^2\log(F)F^{a+bc+bdx}}{2x}+2bdef\log(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{2ef}{}$$

```
[Out] -1/2*e^2*F^(b*d*x+b*c+a)/x^2-2*e*f*F^(b*d*x+b*c+a)/x+f^2*F^(b*c+a)*Ei(b*d*x
*ln(F))-1/2*b*d*e^2*F^(b*d*x+b*c+a)*ln(F)/x+2*b*d*e*f*F^(b*c+a)*Ei(b*d*x*ln
(F))*ln(F)+1/2*b^2*d^2*e^2*F^(b*c+a)*Ei(b*d*x*ln(F))*ln(F)^2
```

Rubi [A] time = 0.36, antiderivative size = 136, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.136, Rules used = {2199, 2177, 2178}

$$\frac{1}{2}b^2d^2e^2\log^2(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{2x^2}-\frac{bde^2\log(F)F^{a+bc+bdx}}{2x}+2bdef\log(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{2ef}{}$$

Antiderivative was successfully verified.

```
[In] Int[(F^(a + b*(c + d*x))*(e + f*x)^2)/x^3,x]
```

```
[Out] -(e^2*F^(a + b*c + b*d*x))/(2*x^2) - (2*e*f*F^(a + b*c + b*d*x))/x + f^2*F^
(a + b*c)*ExpIntegralEi[b*d*x*Log[F]] - (b*d*e^2*F^(a + b*c + b*d*x)*Log[F]
)/(2*x) + 2*b*d*e*f*F^(a + b*c)*ExpIntegralEi[b*d*x*Log[F]]*Log[F] + (b^2*d
^2*e^2*F^(a + b*c)*ExpIntegralEi[b*d*x*Log[F]]*Log[F]^2)/2
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
```

```
c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}
\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^3}\,dx &= \int \left(\frac{e^2F^{a+bc+bdx}}{x^3}+\frac{2efF^{a+bc+bdx}}{x^2}+\frac{f^2F^{a+bc+bdx}}{x}\right)dx\\
&= e^2\int \frac{F^{a+bc+bdx}}{x^3}\,dx+(2ef)\int \frac{F^{a+bc+bdx}}{x^2}\,dx+f^2\int \frac{F^{a+bc+bdx}}{x}\,dx\\
&= -\frac{e^2F^{a+bc+bdx}}{2x^2}-\frac{2efF^{a+bc+bdx}}{x}+f^2F^{a+bc}\mathrm{Ei}(bdx\log(F))+\frac{1}{2}\left(bde^2\log(F)\right)\int \frac{F^{a+bc+bdx}}{x^2}\\
&= -\frac{e^2F^{a+bc+bdx}}{2x^2}-\frac{2efF^{a+bc+bdx}}{x}+f^2F^{a+bc}\mathrm{Ei}(bdx\log(F))-\frac{bde^2F^{a+bc+bdx}\log(F)}{2x}+2bde\\
&= -\frac{e^2F^{a+bc+bdx}}{2x^2}-\frac{2efF^{a+bc+bdx}}{x}+f^2F^{a+bc}\mathrm{Ei}(bdx\log(F))-\frac{bde^2F^{a+bc+bdx}\log(F)}{2x}+2bde
\end{aligned}$$

Mathematica [A] time = 0.15, size = 76, normalized size = 0.56

$$\frac{F^{a+bc}\left(x^2\left(b^2d^2e^2\log^2(F)+4bdef\log(F)+2f^2\right)\mathrm{Ei}(bdx\log(F))-eF^{bdx}(bdex\log(F)+e+4fx)\right)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(F^(a + b*(c + d*x))*(e + f*x)^2)/x^3,x]
```

```
[Out] (F^(a + b*c)*(-(e*F^(b*d*x)*(e + 4*f*x + b*d*e*x*Log[F])) + x^2*ExpIntegral
Ei[b*d*x*Log[F]]*(2*f^2 + 4*b*d*e*f*Log[F] + b^2*d^2*e^2*Log[F]^2)))/(2*x^2
)
```

fricas [A] time = 0.40, size = 89, normalized size = 0.65

$$\frac{\left(b^2d^2e^2x^2\log(F)^2+4\,bdefx^2\log(F)+2\,f^2x^2\right)F^{bc+a}\mathrm{Ei}\left(bdx\log(F)\right)-\left(bde^2x\log(F)+4\,efx+e^2\right)F^{bdx+bc+a}}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*(f*x+e)^2/x^3,x, algorithm="fricas")
```

```
[Out] 1/2*((b^2*d^2*e^2*x^2*log(F)^2 + 4*b*d*e*f*x^2*log(F) + 2*f^2*x^2)*F^(b*c +
 a)*Ei(b*d*x*log(F)) - (b*d*e^2*x*log(F) + 4*e*f*x + e^2)*F^(b*d*x + b*c +
a))/x^2
```

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

$$\int \frac{\left(fx+e\right)^2 F^{(dx+c)b+a}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*(f*x+e)^2/x^3,x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*F^((d*x + c)*b + a)/x^3, x)
```

maple [A] time = 0.08, size = 204, normalized size = 1.50

$$-\frac{b^2d^2e^2F^aF^{bc}\,\mathrm{Ei}\left(1,-bdx\ln(F)+bc\ln(F)+a\ln(F)-(bc+a)\ln(F)\right)\ln(F)^2}{2}-2bdef\,F^aF^{bc}\,\mathrm{Ei}\left(1,-bdx\ln(F)+bc\,\mathrm{l}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*(f*x+e)^2/x^3,x)
```

```
[Out] -2*e*f*F^(b*d*x)*F^(b*c+a)/x-2*b*d*ln(F)*e*f*F^(b*c)*F^a*Ei(1,-b*d*x*ln(F)+
b*c*ln(F)+a*ln(F)-(b*c+a)*ln(F))-1/2*b^2*d^2*ln(F)^2*e^2*F^(b*c)*F^a*Ei(1,-
b*d*x*ln(F)+b*c*ln(F)+a*ln(F)-(b*c+a)*ln(F))-f^2*F^(b*c)*F^a*Ei(1,-b*d*x*ln
(F)+b*c*ln(F)+a*ln(F)-(b*c+a)*ln(F))-1/2*e^2*F^(b*d*x)*F^(b*c+a)/x^2-1/2*b*
d*ln(F)*e^2*F^(b*d*x)*F^(b*c+a)/x
```

maxima [A] time = 1.23, size = 74, normalized size = 0.54

$$-F^{bc+a}b^2d^2e^2\Gamma\left(-2,-bdx\log(F)\right)\log(F)^2+2\,F^{bc+a}bdef\,\Gamma\left(-1,-bdx\log(F)\right)\log(F)+F^{bc+a}f^2\mathrm{Ei}\left(bdx\log(F)\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*(f*x+e)^2/x^3,x, algorithm="maxima")
```

```
[Out] -F^(b*c + a)*b^2*d^2*e^2*gamma(-2, -b*d*x*log(F))*log(F)^2 + 2*F^(b*c + a)*
b*d*e*f*gamma(-1, -b*d*x*log(F))*log(F) + F^(b*c + a)*f^2*Ei(b*d*x*log(F))
```

mupad [B] time = 3.60, size = 133, normalized size = 0.98

$$F^{a+b\,c}\,f^2\,\mathrm{ei}\left(b\,d\,x\,\ln(F)\right)-\frac{2\,F^{b\,d\,x}\,F^{a+b\,c}\,e\,f}{x}-F^{a+b\,c}\,b^2\,d^2\,e^2\ln(F)^2\left(\frac{\mathrm{expint}\left(-b\,d\,x\,\ln(F)\right)}{2}+F^{b\,d\,x}\left(\frac{1}{2\,b\,d\,x\,\ln(F)}+\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^(a + b*(c + d*x))*(e + f*x)^2)/x^3,x)
```

```
[Out] F^(a + b*c)*f^2*ei(b*d*x*log(F)) - (2*F^(b*d*x)*F^(a + b*c)*e*f)/x - F^(a +
 b*c)*b^2*d^2*e^2*log(F)^2*(expint(-b*d*x*log(F))/2 + F^(b*d*x)*(1/(2*b*d*x
*log(F)) + 1/(2*b^2*d^2*x^2*log(F)^2))) - 2*F^(a + b*c)*b*d*e*f*log(F)*expi
nt(-b*d*x*log(F))
```

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

$$\int \frac{F^{a+b(c+dx)}\left(e+fx\right)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*(f*x+e)**2/x**3,x)
```

```
[Out] Integral(F**(a + b*(c + d*x))*(e + f*x)**2/x**3, x)
```

3.72 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^4} dx$

Optimal. Leaf size=217

$$\frac{1}{6}b^3d^3e^2\log^3(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{b^2d^2e^2\log^2(F)F^{a+bc+bdx}}{6x}+b^2d^2ef\log^2(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{3x^3}-$$

```
[Out] -1/3*e^2*F^(b*d*x+b*c+a)/x^3-e*f*F^(b*d*x+b*c+a)/x^2-f^2*F^(b*d*x+b*c+a)/x-
1/6*b*d*e^2*F^(b*d*x+b*c+a)*ln(F)/x^2-b*d*e*f*F^(b*d*x+b*c+a)*ln(F)/x+b*d*f
^2*F^(b*c+a)*Ei(b*d*x*ln(F))*ln(F)-1/6*b^2*d^2*e^2*F^(b*d*x+b*c+a)*ln(F)^2/
x+b^2*d^2*e*f*F^(b*c+a)*Ei(b*d*x*ln(F))*ln(F)^2+1/6*b^3*d^3*e^2*F^(b*c+a)*E
i(b*d*x*ln(F))*ln(F)^3
```

Rubi [A] time = 0.46, antiderivative size = 217, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.136, Rules used = {2199, 2177, 2178}

$$\frac{1}{6}b^3d^3e^2\log^3(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{b^2d^2e^2\log^2(F)F^{a+bc+bdx}}{6x}+b^2d^2ef\log^2(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{3x^3}-$$

Antiderivative was successfully verified.

```
[In] Int[(F^(a + b*(c + d*x))*(e + f*x)^2)/x^4,x]
```

```
[Out] -(e^2*F^(a + b*c + b*d*x))/(3*x^3) - (e*f*F^(a + b*c + b*d*x))/x^2 - (f^2*F
^(a + b*c + b*d*x))/x - (b*d*e^2*F^(a + b*c + b*d*x)*Log[F])/(6*x^2) - (b*d
*e*f*F^(a + b*c + b*d*x)*Log[F])/x + b*d*f^2*F^(a + b*c)*ExpIntegralEi[b*d*
x*Log[F]]*Log[F] - (b^2*d^2*e^2*F^(a + b*c + b*d*x)*Log[F]^2)/(6*x) + b^2*d
^2*e*f*F^(a + b*c)*ExpIntegralEi[b*d*x*Log[F]]*Log[F]^2 + (b^3*d^3*e^2*F^(a
 + b*c)*ExpIntegralEi[b*d*x*Log[F]]*Log[F]^3)/6
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\begin{aligned}
\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^4}\,dx &= \int \left(\frac{e^2F^{a+bc+bdx}}{x^4}+\frac{2efF^{a+bc+bdx}}{x^3}+\frac{f^2F^{a+bc+bdx}}{x^2}\right)dx \\
&= e^2\int \frac{F^{a+bc+bdx}}{x^4}\,dx+(2ef)\int \frac{F^{a+bc+bdx}}{x^3}\,dx+f^2\int \frac{F^{a+bc+bdx}}{x^2}\,dx \\
&= -\frac{e^2F^{a+bc+bdx}}{3x^3}-\frac{efF^{a+bc+bdx}}{x^2}-\frac{f^2F^{a+bc+bdx}}{x}+\frac{1}{3}\left(bde^2\log(F)\right)\int \frac{F^{a+bc+bdx}}{x^3}\,dx+(bdef \\
&= -\frac{e^2F^{a+bc+bdx}}{3x^3}-\frac{efF^{a+bc+bdx}}{x^2}-\frac{f^2F^{a+bc+bdx}}{x}-\frac{bde^2F^{a+bc+bdx}\log(F)}{6x^2}-\frac{bdefF^{a+bc+bdx}\log}{x} \\
&= -\frac{e^2F^{a+bc+bdx}}{3x^3}-\frac{efF^{a+bc+bdx}}{x^2}-\frac{f^2F^{a+bc+bdx}}{x}-\frac{bde^2F^{a+bc+bdx}\log(F)}{6x^2}-\frac{bdefF^{a+bc+bdx}\log}{x} \\
&= -\frac{e^2F^{a+bc+bdx}}{3x^3}-\frac{efF^{a+bc+bdx}}{x^2}-\frac{f^2F^{a+bc+bdx}}{x}-\frac{bde^2F^{a+bc+bdx}\log(F)}{6x^2}-\frac{bdefF^{a+bc+bdx}\log}{x}
\end{aligned}$$

Mathematica [A] time = 0.23, size = 116, normalized size = 0.53

$$\frac{F^{a+bc}\left(bdx^3\log(F)\left(b^2d^2e^2\log^2(F)+6bdef\log(F)+6f^2\right)\text{Ei}(bdx\log(F))-F^{bdx}\left(b^2d^2e^2x^2\log^2(F)+bdex\log(F)(\right.\right.}{6x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(F^(a + b*(c + d*x))*(e + f*x)^2)/x^4,x]
```

```
[Out] (F^(a + b*c)*(b*d*x^3*ExpIntegralEi[b*d*x*Log[F]]*Log[F]*(6*f^2 + 6*b*d*e*f
*Log[F] + b^2*d^2*e^2*Log[F]^2) - F^(b*d*x)*(2*(e^2 + 3*e*f*x + 3*f^2*x^2)
+ b*d*e*x*(e + 6*f*x)*Log[F] + b^2*d^2*e^2*x^2*Log[F]^2)))/(6*x^3)
```

fricas [A] time = 0.42, size = 137, normalized size = 0.63

$$\frac{\left(b^3d^3e^2x^3\log(F)^3+6\,b^2d^2efx^3\log(F)^2+6\,bdf^2x^3\log(F)\right)F^{bc+a}\text{Ei}\left(bdx\log(F)\right)-\left(b^2d^2e^2x^2\log(F)^2+6\,f^2x^2+6\right.}{6\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*(f*x+e)^2/x^4,x, algorithm="fricas")
```

```
[Out] 1/6*((b^3*d^3*e^2*x^3*log(F)^3 + 6*b^2*d^2*e*f*x^3*log(F)^2 + 6*b*d*f^2*x^3
*log(F))*F^(b*c + a)*Ei(b*d*x*log(F)) - (b^2*d^2*e^2*x^2*log(F)^2 + 6*f^2*x
^2 + 6*e*f*x + 2*e^2 + (6*b*d*e*f*x^2 + b*d*e^2*x)*log(F))*F^(b*d*x + b*c +
 a))/x^3
```

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

$$\int \frac{\left(fx+e\right)^{2} F^{(dx+c)b+a}}{x^{4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*(f*x+e)^2/x^4,x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*F^((d*x + c)*b + a)/x^4, x)
```

maple [A] time = 0.08, size = 290, normalized size = 1.34

$$-\frac{b^{3}d^{3}e^{2}F^{a}F^{bc}\operatorname{Ei}\left(1,-bdx\ln(F)+bc\ln(F)+a\ln(F)-(bc+a)\ln(F)\right)\ln(F)^{3}}{6}-b^{2}d^{2}ef\,F^{a}F^{bc}\operatorname{Ei}\left(1,-bdx\ln(F)+bc\ln\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*(f*x+e)^2/x^4,x)
```

```
[Out] -e*f*F^(b*d*x)*F^(b*c+a)/x^2-ln(F)*b*d*e*f*F^(b*d*x)*F^(b*c+a)/x-ln(F)^2*b^
2*d^2*e*f*F^(b*c)*F^a*Ei(1,-b*d*x*ln(F)+b*c*ln(F)+a*ln(F)-(b*c+a)*ln(F))-1/
6*ln(F)^3*b^3*d^3*e^2*F^(b*c)*F^a*Ei(1,-b*d*x*ln(F)+b*c*ln(F)+a*ln(F)-(b*c+
a)*ln(F))-1/3*e^2*F^(b*d*x)*F^(b*c+a)/x^3-1/6*ln(F)*b*d*e^2*F^(b*d*x)*F^(b*
c+a)/x^2-1/6*ln(F)^2*b^2*d^2*e^2*F^(b*d*x)*F^(b*c+a)/x-f^2*F^(b*d*x)*F^(b*c
+a)/x-ln(F)*b*d*f^2*F^(b*c)*F^a*Ei(1,-b*d*x*ln(F)+b*c*ln(F)+a*ln(F)-(b*c+a)
*ln(F))
```

maxima [A] time = 1.05, size = 85, normalized size = 0.39

$$F^{bc+a}b^{3}d^{3}e^{2}\Gamma\left(-3,-bdx\log(F)\right)\log(F)^{3}-2\,F^{bc+a}b^{2}d^{2}ef\,\Gamma\left(-2,-bdx\log(F)\right)\log(F)^{2}+F^{bc+a}bdf^{2}\Gamma\left(-1,-bdx\log(F\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*(f*x+e)^2/x^4,x, algorithm="maxima")
```

```
[Out] F^(b*c + a)*b^3*d^3*e^2*gamma(-3, -b*d*x*log(F))*log(F)^3 - 2*F^(b*c + a)*b
^2*d^2*e*f*gamma(-2, -b*d*x*log(F))*log(F)^2 + F^(b*c + a)*b*d*f^2*gamma(-1
, -b*d*x*log(F))*log(F)
```

mupad [B] time = 3.66, size = 202, normalized size = 0.93

$$-\frac{F^{b\,d\,x}\,F^{a+b\,c}\,f^2}{x}-F^{a+b\,c}\,b^3\,d^3\,e^2\ln(F)^3\,\left(F^{b\,d\,x}\,\left(\frac{1}{6\,b\,d\,x\,\ln(F)}+\frac{1}{6\,b^2\,d^2\,x^2\ln(F)^2}+\frac{1}{3\,b^3\,d^3\,x^3\ln(F)^3}\right)+\frac{\mathrm{expint}\,(-b\,d}{6}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^(a + b*(c + d*x))*(e + f*x)^2)/x^4,x)
```

```
[Out] - (F^(b*d*x)*F^(a + b*c)*f^2)/x - F^(a + b*c)*b^3*d^3*e^2*log(F)^3*(F^(b*d*
x)*(1/(6*b*d*x*log(F)) + 1/(6*b^2*d^2*x^2*log(F)^2) + 1/(3*b^3*d^3*x^3*log(
F)^3)) + expint(-b*d*x*log(F))/6) - F^(a + b*c)*b*d*f^2*log(F)*expint(-b*d*
x*log(F)) - 2*F^(a + b*c)*b^2*d^2*e*f*log(F)^2*(expint(-b*d*x*log(F))/2 + F
^(b*d*x)*(1/(2*b*d*x*log(F)) + 1/(2*b^2*d^2*x^2*log(F)^2)))
```

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

$$\int\frac{F^{a+b(c+dx)}\left(e+fx\right)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*(f*x+e)**2/x**4,x)
```

```
[Out] Integral(F**(a + b*(c + d*x))*(e + f*x)**2/x**4, x)
```

3.73 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^5}\,dx$

Optimal. Leaf size=321

$$\frac{1}{24}b^4d^4e^2\log^4(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{b^3d^3e^2\log^3(F)F^{a+bc+bdx}}{24x}+\frac{1}{3}b^3d^3ef\log^3(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{b^2d^2e^2\log}{}$$

```
[Out] -1/4*e^2*F^(b*d*x+b*c+a)/x^4-2/3*e*f*F^(b*d*x+b*c+a)/x^3-1/2*f^2*F^(b*d*x+b
*c+a)/x^2-1/12*b*d*e^2*F^(b*d*x+b*c+a)*ln(F)/x^3-1/3*b*d*e*f*F^(b*d*x+b*c+a
)*ln(F)/x^2-1/2*b*d*f^2*F^(b*d*x+b*c+a)*ln(F)/x-1/24*b^2*d^2*e^2*F^(b*d*x+b
*c+a)*ln(F)^2/x^2-1/3*b^2*d^2*e*f*F^(b*d*x+b*c+a)*ln(F)^2/x+1/2*b^2*d^2*f^2
*F^(b*c+a)*Ei(b*d*x*ln(F))*ln(F)^2-1/24*b^3*d^3*e^2*F^(b*d*x+b*c+a)*ln(F)^3
/x+1/3*b^3*d^3*e*f*F^(b*c+a)*Ei(b*d*x*ln(F))*ln(F)^3+1/24*b^4*d^4*e^2*F^(b*
c+a)*Ei(b*d*x*ln(F))*ln(F)^4
```

Rubi [A] time = 0.58, antiderivative size = 321, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.136, Rules used = {2199, 2177, 2178}

$$\frac{1}{24}b^4d^4e^2\log^4(F)F^{a+bc}\text{Ei}(bdx\log(F))-\frac{b^2d^2e^2\log^2(F)F^{a+bc+bdx}}{24x^2}-\frac{b^3d^3e^2\log^3(F)F^{a+bc+bdx}}{24x}+\frac{1}{3}b^3d^3ef\log^3(F)F^{a+bc}$$

Antiderivative was successfully verified.

```
[In] Int[(F^(a + b*(c + d*x))*(e + f*x)^2)/x^5,x]
```

```
[Out] -(e^2*F^(a + b*c + b*d*x))/(4*x^4) - (2*e*f*F^(a + b*c + b*d*x))/(3*x^3) -
(f^2*F^(a + b*c + b*d*x))/(2*x^2) - (b*d*e^2*F^(a + b*c + b*d*x)*Log[F])/(1
2*x^3) - (b*d*e*f*F^(a + b*c + b*d*x)*Log[F])/(3*x^2) - (b*d*f^2*F^(a + b*c
 + b*d*x)*Log[F])/(2*x) - (b^2*d^2*e^2*F^(a + b*c + b*d*x)*Log[F]^2)/(24*x^
2) - (b^2*d^2*e*f*F^(a + b*c + b*d*x)*Log[F]^2)/(3*x) + (b^2*d^2*f^2*F^(a +
 b*c)*ExpIntegralEi[b*d*x*Log[F]]*Log[F]^2)/2 - (b^3*d^3*e^2*F^(a + b*c + b
*d*x)*Log[F]^3)/(24*x) + (b^3*d^3*e*f*F^(a + b*c)*ExpIntegralEi[b*d*x*Log[F
]]*Log[F]^3)/3 + (b^4*d^4*e^2*F^(a + b*c)*ExpIntegralEi[b*d*x*Log[F]]*Log[F
]^4)/24
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^5}\,dx = \int \left(\frac{e^2F^{a+bc+bdx}}{x^5}+\frac{2efF^{a+bc+bdx}}{x^4}+\frac{f^2F^{a+bc+bdx}}{x^3}\right)dx$$

$$= e^2\int \frac{F^{a+bc+bdx}}{x^5}\,dx+(2ef)\int \frac{F^{a+bc+bdx}}{x^4}\,dx+f^2\int \frac{F^{a+bc+bdx}}{x^3}\,dx$$

$$= -\frac{e^2F^{a+bc+bdx}}{4x^4}-\frac{2efF^{a+bc+bdx}}{3x^3}-\frac{f^2F^{a+bc+bdx}}{2x^2}+\frac{1}{4}\left(bde^2\log(F)\right)\int \frac{F^{a+bc+bdx}}{x^4}\,dx+\frac{1}{3}(2b$$

$$= -\frac{e^2F^{a+bc+bdx}}{4x^4}-\frac{2efF^{a+bc+bdx}}{3x^3}-\frac{f^2F^{a+bc+bdx}}{2x^2}-\frac{bde^2F^{a+bc+bdx}\log(F)}{12x^3}-\frac{bdefF^{a+bc+bdx}\,1}{3x^2}$$

$$= -\frac{e^2F^{a+bc+bdx}}{4x^4}-\frac{2efF^{a+bc+bdx}}{3x^3}-\frac{f^2F^{a+bc+bdx}}{2x^2}-\frac{bde^2F^{a+bc+bdx}\log(F)}{12x^3}-\frac{bdefF^{a+bc+bdx}\,1}{3x^2}$$

$$= -\frac{e^2F^{a+bc+bdx}}{4x^4}-\frac{2efF^{a+bc+bdx}}{3x^3}-\frac{f^2F^{a+bc+bdx}}{2x^2}-\frac{bde^2F^{a+bc+bdx}\log(F)}{12x^3}-\frac{bdefF^{a+bc+bdx}\,1}{3x^2}$$

$$= -\frac{e^2F^{a+bc+bdx}}{4x^4}-\frac{2efF^{a+bc+bdx}}{3x^3}-\frac{f^2F^{a+bc+bdx}}{2x^2}-\frac{bde^2F^{a+bc+bdx}\log(F)}{12x^3}-\frac{bdefF^{a+bc+bdx}\,1}{3x^2}$$

Mathematica [A] time = 0.30, size = 156, normalized size = 0.49

$$\frac{F^{a+bc}\left(b^2d^2x^4\log^2(F)\left(b^2d^2e^2\log^2(F)+8bdef\log(F)+12f^2\right)\mathrm{Ei}(bdx\log(F))-F^{bdx}\left(b^3d^3e^2x^3\log^3(F)+b^2d^2ex^2\,1\right.\right.}{24x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[(F^(a + b*(c + d*x))*(e + f*x)^2)/x^5,x]
```

```
[Out] (F^(a + b*c)*(b^2*d^2*x^4*ExpIntegralEi[b*d*x*Log[F]]*Log[F]^2*(12*f^2 + 8*
b*d*e*f*Log[F] + b^2*d^2*e^2*Log[F]^2) - F^(b*d*x)*(2*(3*e^2 + 8*e*f*x + 6*
f^2*x^2) + 2*b*d*x*(e^2 + 4*e*f*x + 6*f^2*x^2)*Log[F] + b^2*d^2*e*x^2*(e +
8*f*x)*Log[F]^2 + b^3*d^3*e^2*x^3*Log[F]^3)))/(24*x^4)
```

fricas [A] time = 0.43, size = 186, normalized size = 0.58

$$\frac{\left(b^4d^4e^2x^4\log(F)^4 + 8\,b^3d^3efx^4\log(F)^3 + 12\,b^2d^2f^2x^4\log(F)^2\right)F^{bc+a}\mathrm{Ei}\left(bdx\log(F)\right) - \left(b^3d^3e^2x^3\log(F)^3 + 12\,f^2\right.}{24\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*(f*x+e)^2/x^5,x, algorithm="fricas")
```

```
[Out] 1/24*((b^4*d^4*e^2*x^4*log(F)^4 + 8*b^3*d^3*e*f*x^4*log(F)^3 + 12*b^2*d^2*f
^2*x^4*log(F)^2)*F^(b*c + a)*Ei(b*d*x*log(F)) - (b^3*d^3*e^2*x^3*log(F)^3 +
 12*f^2*x^2 + 16*e*f*x + (8*b^2*d^2*e*f*x^3 + b^2*d^2*e^2*x^2)*log(F)^2 + 6
*e^2 + 2*(6*b*d*f^2*x^3 + 4*b*d*e*f*x^2 + b*d*e^2*x)*log(F))*F^(b*d*x + b*c
 + a))/x^4
```

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

$$\int \frac{\left(fx+e\right)^2 F^{(dx+c)b+a}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*(f*x+e)^2/x^5,x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*F^((d*x + c)*b + a)/x^5, x)
```

maple [A] time = 0.09, size = 382, normalized size = 1.19

$$-\frac{b^4d^4e^2F^aF^{bc}\,\mathrm{Ei}\left(1,-bdx\ln(F)+bc\ln(F)+a\ln(F)-(bc+a)\ln(F)\right)\ln(F)^4}{24}-\frac{b^3d^3ef\,F^aF^{bc}\,\mathrm{Ei}\left(1,-bdx\ln(F)+bc\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(a+b*(d*x+c))*(f*x+e)^2/x^5,x)
```

```
[Out] -2/3*e*f*F^(b*d*x)*F^(b*c+a)/x^3-1/3*ln(F)*b*d*e*f*F^(b*d*x)*F^(b*c+a)/x^2-
1/3*ln(F)^2*b^2*d^2*e*f*F^(b*d*x)*F^(b*c+a)/x-1/3*ln(F)^3*b^3*d^3*e*f*F^(b*
c)*F^a*Ei(1,-b*d*x*ln(F)+b*c*ln(F)+a*ln(F)-(b*c+a)*ln(F))-1/24*ln(F)^4*b^4*
d^4*e^2*F^(b*c)*F^a*Ei(1,-b*d*x*ln(F)+b*c*ln(F)+a*ln(F)-(b*c+a)*ln(F))-1/2*
ln(F)*b*d*f^2*F^(b*d*x)*F^(b*c+a)/x-1/2*ln(F)^2*b^2*d^2*f^2*F^(b*c)*F^a*Ei(
1,-b*d*x*ln(F)+b*c*ln(F)+a*ln(F)-(b*c+a)*ln(F))-1/2*f^2*F^(b*d*x)*F^(b*c+a)
/x^2-1/4*e^2*F^(b*d*x)*F^(b*c+a)/x^4-1/12*ln(F)*b*d*e^2*F^(b*d*x)*F^(b*c+a)
/x^3-1/24*ln(F)^2*b^2*d^2*e^2*F^(b*d*x)*F^(b*c+a)/x^2-1/24*ln(F)^3*b^3*d^3*
e^2*F^(b*d*x)*F^(b*c+a)/x
```

maxima [A] time = 1.01, size = 93, normalized size = 0.29

$$-F^{bc+a}b^4d^4e^2\Gamma\left(-4,-bdx\log(F)\right)\log(F)^4+2\,F^{bc+a}b^3d^3ef\Gamma\left(-3,-bdx\log(F)\right)\log(F)^3-F^{bc+a}b^2d^2f^2\Gamma\left(-2,-bdx\,\mathrm{lo}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(a+b*(d*x+c))*(f*x+e)^2/x^5,x, algorithm="maxima")
```

```
[Out] -F^(b*c + a)*b^4*d^4*e^2*gamma(-4, -b*d*x*log(F))*log(F)^4 + 2*F^(b*c + a)*
b^3*d^3*e*f*gamma(-3, -b*d*x*log(F))*log(F)^3 - F^(b*c + a)*b^2*d^2*f^2*gam
ma(-2, -b*d*x*log(F))*log(F)^2
```

mupad [B] time = 3.68, size = 258, normalized size = 0.80

$$-F^{a+b\,c}\,b^2\,d^2\,f^2\,\ln(F)^2\,\left(\frac{\mathrm{expint}\left(-b\,d\,x\,\ln(F)\right)}{2}+F^{b\,d\,x}\,\left(\frac{1}{2\,b\,d\,x\,\ln(F)}+\frac{1}{2\,b^2\,d^2\,x^2\,\ln(F)^2}\right)\right)-F^{a+b\,c}\,b^4\,d^4\,e^2\,\ln(F)^4\,\left(F\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^(a + b*(c + d*x))*(e + f*x)^2)/x^5,x)
```

```
[Out] - F^(a + b*c)*b^2*d^2*f^2*log(F)^2*(expint(-b*d*x*log(F))/2 + F^(b*d*x)*(1/
(2*b*d*x*log(F)) + 1/(2*b^2*d^2*x^2*log(F)^2))) - F^(a + b*c)*b^4*d^4*e^2*l
og(F)^4*(F^(b*d*x)*(1/(24*b*d*x*log(F)) + 1/(24*b^2*d^2*x^2*log(F)^2) + 1/(
12*b^3*d^3*x^3*log(F)^3) + 1/(4*b^4*d^4*x^4*log(F)^4)) + expint(-b*d*x*log(
F))/24) - 2*F^(a + b*c)*b^3*d^3*e*f*log(F)^3*(F^(b*d*x)*(1/(6*b*d*x*log(F))
 + 1/(6*b^2*d^2*x^2*log(F)^2) + 1/(3*b^3*d^3*x^3*log(F)^3)) + expint(-b*d*x
*log(F))/6)
```

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

$$\int \frac{F^{a+b(c+dx)}\left(e+fx\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(a+b*(d*x+c))*(f*x+e)**2/x**5,x)
```

```
[Out] Integral(F**(a + b*(c + d*x))*(e + f*x)**2/x**5, x)
```

3.74 $\int e^{-a-bx}(a+bx)^4(c+dx)^3\,dx$

Optimal. Leaf size=754

$$-\frac{3d^2e^{-a-bx}(a+bx)^6(bc-ad)}{b^4}-\frac{18d^2e^{-a-bx}(a+bx)^5(bc-ad)}{b^4}-\frac{90d^2e^{-a-bx}(a+bx)^4(bc-ad)}{b^4}-\frac{360d^2e^{-a-bx}(a+bx}{b^4}$$

```
[Out] -5040*d^3*exp(-b*x-a)/b^4-24*(-a*d+b*c)^3*exp(-b*x-a)/b^4-2160*d^2*(-a*d+b*
c)*exp(-b*x-a)*(b*x+a)/b^4-360*d*(-a*d+b*c)^2*exp(-b*x-a)*(b*x+a)/b^4-1080*
d^2*(-a*d+b*c)*exp(-b*x-a)*(b*x+a)^2/b^4-180*d*(-a*d+b*c)^2*exp(-b*x-a)*(b*
x+a)^2/b^4-360*d^2*(-a*d+b*c)*exp(-b*x-a)*(b*x+a)^3/b^4-60*d*(-a*d+b*c)^2*e
xp(-b*x-a)*(b*x+a)^3/b^4-90*d^2*(-a*d+b*c)*exp(-b*x-a)*(b*x+a)^4/b^4-15*d*(
-a*d+b*c)^2*exp(-b*x-a)*(b*x+a)^4/b^4-18*d^2*(-a*d+b*c)*exp(-b*x-a)*(b*x+a)
^5/b^4-3*d*(-a*d+b*c)^2*exp(-b*x-a)*(b*x+a)^5/b^4-3*d^2*(-a*d+b*c)*exp(-b*x
-a)*(b*x+a)^6/b^4-2160*d^2*(-a*d+b*c)*exp(-b*x-a)/b^4-360*d*(-a*d+b*c)^2*ex
p(-b*x-a)/b^4-5040*d^3*exp(-b*x-a)*(b*x+a)/b^4-24*(-a*d+b*c)^3*exp(-b*x-a)*
(b*x+a)/b^4-2520*d^3*exp(-b*x-a)*(b*x+a)^2/b^4-12*(-a*d+b*c)^3*exp(-b*x-a)*
(b*x+a)^2/b^4-840*d^3*exp(-b*x-a)*(b*x+a)^3/b^4-4*(-a*d+b*c)^3*exp(-b*x-a)*
(b*x+a)^3/b^4-210*d^3*exp(-b*x-a)*(b*x+a)^4/b^4-42*d^3*exp(-b*x-a)*(b*x+a)^
5/b^4-7*d^3*exp(-b*x-a)*(b*x+a)^6/b^4-(-a*d+b*c)^3*exp(-b*x-a)*(b*x+a)^4/b^
4-d^3*exp(-b*x-a)*(b*x+a)^7/b^4
```

Rubi [A] time = 0.92, antiderivative size = 754, normalized size of antiderivative = 1.00, number of steps used = 28, number of rules used = 3, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.120, Rules used = {2196, 2176, 2194}

$$-\frac{3d^2e^{-a-bx}(a+bx)^6(bc-ad)}{b^4}-\frac{18d^2e^{-a-bx}(a+bx)^5(bc-ad)}{b^4}-\frac{90d^2e^{-a-bx}(a+bx)^4(bc-ad)}{b^4}-\frac{360d^2e^{-a-bx}(a+bx}{b^4}$$

Antiderivative was successfully verified.

```
[In] Int[E^(-a - b*x)*(a + b*x)^4*(c + d*x)^3,x]
```

```
[Out] (-5040*d^3*E^(-a - b*x))/b^4 - (2160*d^2*(b*c - a*d)*E^(-a - b*x))/b^4 - (3
60*d*(b*c - a*d)^2*E^(-a - b*x))/b^4 - (24*(b*c - a*d)^3*E^(-a - b*x))/b^4
- (5040*d^3*E^(-a - b*x)*(a + b*x))/b^4 - (2160*d^2*(b*c - a*d)*E^(-a - b*x
)*(a + b*x))/b^4 - (360*d*(b*c - a*d)^2*E^(-a - b*x)*(a + b*x))/b^4 - (24*(
b*c - a*d)^3*E^(-a - b*x)*(a + b*x))/b^4 - (2520*d^3*E^(-a - b*x)*(a + b*x)
^2)/b^4 - (1080*d^2*(b*c - a*d)*E^(-a - b*x)*(a + b*x)^2)/b^4 - (180*d*(b*c
 - a*d)^2*E^(-a - b*x)*(a + b*x)^2)/b^4 - (12*(b*c - a*d)^3*E^(-a - b*x)*(a
 + b*x)^2)/b^4 - (840*d^3*E^(-a - b*x)*(a + b*x)^3)/b^4 - (360*d^2*(b*c - a
*d)*E^(-a - b*x)*(a + b*x)^3)/b^4 - (60*d*(b*c - a*d)^2*E^(-a - b*x)*(a + b
*x)^3)/b^4 - (4*(b*c - a*d)^3*E^(-a - b*x)*(a + b*x)^3)/b^4 - (210*d^3*E^(-
a - b*x)*(a + b*x)^4)/b^4 - (90*d^2*(b*c - a*d)*E^(-a - b*x)*(a + b*x)^4)/b
^4 - (15*d*(b*c - a*d)^2*E^(-a - b*x)*(a + b*x)^4)/b^4 - ((b*c - a*d)^3*E^(
```

```
-a - b*x)*(a + b*x)^4)/b^4 - (42*d^3*E^(-a - b*x)*(a + b*x)^5)/b^4 - (18*d^
2*(b*c - a*d)*E^(-a - b*x)*(a + b*x)^5)/b^4 - (3*d*(b*c - a*d)^2*E^(-a - b*
x)*(a + b*x)^5)/b^4 - (7*d^3*E^(-a - b*x)*(a + b*x)^6)/b^4 - (3*d^2*(b*c -
a*d)*E^(-a - b*x)*(a + b*x)^6)/b^4 - (d^3*E^(-a - b*x)*(a + b*x)^7)/b^4
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\int e^{-a-bx}(a+bx)^4(c+dx)^3\,dx = \int\left(\frac{(bc-ad)^3e^{-a-bx}(a+bx)^4}{b^3} + \frac{3d(bc-ad)^2e^{-a-bx}(a+bx)^5}{b^3} + \frac{3d^2(bc-ad)e^{-a\cdot}}{b^3}\right.$$
$$= \frac{d^3\int e^{-a-bx}(a+bx)^7\,dx}{b^3} + \frac{\left(3d^2(bc-ad)\right)\int e^{-a-bx}(a+bx)^6\,dx}{b^3} + \frac{\left(3d(bc-ad)^2\right)}{}$$
$$= -\frac{(bc-ad)^3e^{-a-bx}(a+bx)^4}{b^4} - \frac{3d(bc-ad)^2e^{-a-bx}(a+bx)^5}{b^4} - \frac{3d^2(bc-ad)e^{-a-bx}}{b^4}$$
$$= -\frac{4(bc-ad)^3e^{-a-bx}(a+bx)^3}{b^4} - \frac{15d(bc-ad)^2e^{-a-bx}(a+bx)^4}{b^4} - \frac{(bc-ad)^3e^{-a-bx}}{b^4}$$
$$= -\frac{12(bc-ad)^3e^{-a-bx}(a+bx)^2}{b^4} - \frac{60d(bc-ad)^2e^{-a-bx}(a+bx)^3}{b^4} - \frac{4(bc-ad)^3e^{-a\cdot}}{b^4}$$
$$= -\frac{24(bc-ad)^3e^{-a-bx}(a+bx)}{b^4} - \frac{180d(bc-ad)^2e^{-a-bx}(a+bx)^2}{b^4} - \frac{12(bc-ad)^3e^{-}}{b^4}$$
$$= -\frac{24(bc-ad)^3e^{-a-bx}}{b^4} - \frac{360d(bc-ad)^2e^{-a-bx}(a+bx)}{b^4} - \frac{24(bc-ad)^3e^{-a-bx}(a+}{b^4}$$
$$= -\frac{360d(bc-ad)^2e^{-a-bx}}{b^4} - \frac{24(bc-ad)^3e^{-a-bx}}{b^4} - \frac{2160d^2(bc-ad)e^{-a-bx}(a+bx)}{b^4} -$$
$$= -\frac{2160d^2(bc-ad)e^{-a-bx}}{b^4} - \frac{360d(bc-ad)^2e^{-a-bx}}{b^4} - \frac{24(bc-ad)^3e^{-a-bx}}{b^4} - \frac{5040d}{}$$
$$= -\frac{5040d^3e^{-a-bx}}{b^4} - \frac{2160d^2(bc-ad)e^{-a-bx}}{b^4} - \frac{360d(bc-ad)^2e^{-a-bx}}{b^4} - \frac{24(bc-ad)}{b^4}$$

Mathematica [A] time = 0.72, size = 458, normalized size = 0.61

$$\frac{e^{-a-bx}\left(-6b^5x^2(c+dx)\left(\left(a^2+2a+2\right)c^2+2\left(a^2+3a+4\right)cdx+\left(a^2+4a+7\right)d^2x^2\right)-2b^4x\left(2\left(a^3+3a^2+6a+\right.\right.\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(-a - b*x)*(a + b*x)^4*(c + d*x)^3,x]
```

```
[Out] (E^(-a - b*x)*(-6*(840 + 480*a + 120*a^2 + 16*a^3 + a^4)*d^3 - b^7*x^4*(c +
 d*x)^3 - b^6*x^3*(c + d*x)^2*(4*(1 + a)*c + (7 + 4*a)*d*x) - 6*b*d^2*((360
 + 240*a + 72*a^2 + 12*a^3 + a^4)*c + (840 + 480*a + 120*a^2 + 16*a^3 + a^4
)*d*x) - 6*b^5*x^2*(c + d*x)*((2 + 2*a + a^2)*c^2 + 2*(4 + 3*a + a^2)*c*d*x
 + (7 + 4*a + a^2)*d^2*x^2) - 3*b^2*d*((120 + 96*a + 36*a^2 + 8*a^3 + a^4)*
c^2 + 2*(360 + 240*a + 72*a^2 + 12*a^3 + a^4)*c*d*x + (840 + 480*a + 120*a^
2 + 16*a^3 + a^4)*d^2*x^2) - 2*b^4*x*(2*(6 + 6*a + 3*a^2 + a^3)*c^3 + 3*(30
 + 24*a + 9*a^2 + 2*a^3)*c^2*d*x + 6*(30 + 20*a + 6*a^2 + a^3)*c*d^2*x^2 +
```

```
(105 + 60*a + 15*a^2 + 2*a^3)*d^3*x^3) - b^3*((24 + 24*a + 12*a^2 + 4*a^3 +
 a^4)*c^3 + 3*(120 + 96*a + 36*a^2 + 8*a^3 + a^4)*c^2*d*x + 3*(360 + 240*a
+ 72*a^2 + 12*a^3 + a^4)*c*d^2*x^2 + (840 + 480*a + 120*a^2 + 16*a^3 + a^4)
*d^3*x^3)))/b^4
```

fricas [A] time = 0.41, size = 544, normalized size = 0.72

$$-\frac{\left(b^7 d^3 x^7 + \left(a^4 + 4\,a^3 + 12\,a^2 + 24\,a + 24\right)b^3 c^3 + \left(3\,b^7 c d^2 + (4\,a + 7)b^6 d^3\right)x^6 + 3\,\left(a^4 + 8\,a^3 + 36\,a^2 + 96\,a + 120\right)\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4*(d*x+c)^3,x, algorithm="fricas")
```

```
[Out] -(b^7*d^3*x^7 + (a^4 + 4*a^3 + 12*a^2 + 24*a + 24)*b^3*c^3 + (3*b^7*c*d^2 +
 (4*a + 7)*b^6*d^3)*x^6 + 3*(a^4 + 8*a^3 + 36*a^2 + 96*a + 120)*b^2*c^2*d +
 3*(b^7*c^2*d + 2*(2*a + 3)*b^6*c*d^2 + 2*(a^2 + 4*a + 7)*b^5*d^3)*x^5 + 6*
(a^4 + 12*a^3 + 72*a^2 + 240*a + 360)*b*c*d^2 + (b^7*c^3 + 3*(4*a + 5)*b^6*
c^2*d + 6*(3*a^2 + 10*a + 15)*b^5*c*d^2 + 2*(2*a^3 + 15*a^2 + 60*a + 105)*b
^4*d^3)*x^4 + 6*(a^4 + 16*a^3 + 120*a^2 + 480*a + 840)*d^3 + (4*(a + 1)*b^6
*c^3 + 6*(3*a^2 + 8*a + 10)*b^5*c^2*d + 12*(a^3 + 6*a^2 + 20*a + 30)*b^4*c*
d^2 + (a^4 + 16*a^3 + 120*a^2 + 480*a + 840)*b^3*d^3)*x^3 + 3*(2*(a^2 + 2*a
 + 2)*b^5*c^3 + 2*(2*a^3 + 9*a^2 + 24*a + 30)*b^4*c^2*d + (a^4 + 12*a^3 + 7
2*a^2 + 240*a + 360)*b^3*c*d^2 + (a^4 + 16*a^3 + 120*a^2 + 480*a + 840)*b^2
*d^3)*x^2 + (4*(a^3 + 3*a^2 + 6*a + 6)*b^4*c^3 + 3*(a^4 + 8*a^3 + 36*a^2 +
96*a + 120)*b^3*c^2*d + 6*(a^4 + 12*a^3 + 72*a^2 + 240*a + 360)*b^2*c*d^2 +
 6*(a^4 + 16*a^3 + 120*a^2 + 480*a + 840)*b*d^3)*x)*e^(-b*x - a)/b^4
```

giac [A] time = 0.44, size = 1096, normalized size = 1.45

$$-\frac{\left(b^{11} d^3 x^7 + 3\,b^{11} c d^2 x^6 + 4\,a b^{10} d^3 x^6 + 3\,b^{11} c^2 d x^5 + 12\,a b^{10} c d^2 x^5 + 6\,a^2 b^9 d^3 x^5 + 7\,b^{10} d^3 x^6 + b^{11} c^3 x^4 + 12\,a b^{10} c^2\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4*(d*x+c)^3,x, algorithm="giac")
```

```
[Out] -(b^11*d^3*x^7 + 3*b^11*c*d^2*x^6 + 4*a*b^10*d^3*x^6 + 3*b^11*c^2*d*x^5 + 1
2*a*b^10*c*d^2*x^5 + 6*a^2*b^9*d^3*x^5 + 7*b^10*d^3*x^6 + b^11*c^3*x^4 + 12
*a*b^10*c^2*d*x^4 + 18*a^2*b^9*c*d^2*x^4 + 4*a^3*b^8*d^3*x^4 + 18*b^10*c*d^
2*x^5 + 24*a*b^9*d^3*x^5 + 4*a*b^10*c^3*x^3 + 18*a^2*b^9*c^2*d*x^3 + 12*a^3
*b^8*c*d^2*x^3 + a^4*b^7*d^3*x^3 + 15*b^10*c^2*d*x^4 + 60*a*b^9*c*d^2*x^4 +
 30*a^2*b^8*d^3*x^4 + 42*b^9*d^3*x^5 + 6*a^2*b^9*c^3*x^2 + 12*a^3*b^8*c^2*d
*x^2 + 3*a^4*b^7*c*d^2*x^2 + 4*b^10*c^3*x^3 + 48*a*b^9*c^2*d*x^3 + 72*a^2*b
^8*c*d^2*x^3 + 16*a^3*b^7*d^3*x^3 + 90*b^9*c*d^2*x^4 + 120*a*b^8*d^3*x^4 +
4*a^3*b^8*c^3*x + 3*a^4*b^7*c^2*d*x + 12*a*b^9*c^3*x^2 + 54*a^2*b^8*c^2*d*x
```

```
^2 + 36*a^3*b^7*c*d^2*x^2 + 3*a^4*b^6*d^3*x^2 + 60*b^9*c^2*d*x^3 + 240*a*b^
8*c*d^2*x^3 + 120*a^2*b^7*d^3*x^3 + 210*b^8*d^3*x^4 + a^4*b^7*c^3 + 12*a^2*
b^8*c^3*x + 24*a^3*b^7*c^2*d*x + 6*a^4*b^6*c*d^2*x + 12*b^9*c^3*x^2 + 144*a
*b^8*c^2*d*x^2 + 216*a^2*b^7*c*d^2*x^2 + 48*a^3*b^6*d^3*x^2 + 360*b^8*c*d^2
*x^3 + 480*a*b^7*d^3*x^3 + 4*a^3*b^7*c^3 + 3*a^4*b^6*c^2*d + 24*a*b^8*c^3*x
 + 108*a^2*b^7*c^2*d*x + 72*a^3*b^6*c*d^2*x + 6*a^4*b^5*d^3*x + 180*b^8*c^2
*d*x^2 + 720*a*b^7*c*d^2*x^2 + 360*a^2*b^6*d^3*x^2 + 840*b^7*d^3*x^3 + 12*a
^2*b^7*c^3 + 24*a^3*b^6*c^2*d + 6*a^4*b^5*c*d^2 + 24*b^8*c^3*x + 288*a*b^7*
c^2*d*x + 432*a^2*b^6*c*d^2*x + 96*a^3*b^5*d^3*x + 1080*b^7*c*d^2*x^2 + 144
0*a*b^6*d^3*x^2 + 24*a*b^7*c^3 + 108*a^2*b^6*c^2*d + 72*a^3*b^5*c*d^2 + 6*a
^4*b^4*d^3 + 360*b^7*c^2*d*x + 1440*a*b^6*c*d^2*x + 720*a^2*b^5*d^3*x + 252
0*b^6*d^3*x^2 + 24*b^7*c^3 + 288*a*b^6*c^2*d + 432*a^2*b^5*c*d^2 + 96*a^3*b
^4*d^3 + 2160*b^6*c*d^2*x + 2880*a*b^5*d^3*x + 360*b^6*c^2*d + 1440*a*b^5*c
*d^2 + 720*a^2*b^4*d^3 + 5040*b^5*d^3*x + 2160*b^5*c*d^2 + 2880*a*b^4*d^3 +
 5040*b^4*d^3)*e^(-b*x - a)/b^8
```

maple [A] time = 0.01, size = 1062, normalized size = 1.41

$$-\frac{\left(b^7 d^3 x^7 + 4a\, b^6 d^3 x^6 + 3b^7 c\, d^2 x^6 + 6a^2 b^5 d^3 x^5 + 12a\, b^6 c\, d^2 x^5 + 3b^7 c^2 d\, x^5 + 7b^6 d^3 x^6 + 4a^3 b^4 d^3 x^4 + 18a^2 b^5 c\, d^2 x\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*(b*x+a)^4*(d*x+c)^3,x)
```

```
[Out] -(b^7*d^3*x^7+4*a*b^6*d^3*x^6+3*b^7*c*d^2*x^6+6*a^2*b^5*d^3*x^5+12*a*b^6*c*
d^2*x^5+3*b^7*c^2*d*x^5+7*b^6*d^3*x^6+4*a^3*b^4*d^3*x^4+18*a^2*b^5*c*d^2*x^
4+12*a*b^6*c^2*d*x^4+24*a*b^5*d^3*x^5+b^7*c^3*x^4+18*b^6*c*d^2*x^5+a^4*b^3*
d^3*x^3+12*a^3*b^4*c*d^2*x^3+18*a^2*b^5*c^2*d*x^3+30*a^2*b^4*d^3*x^4+4*a*b^
6*c^3*x^3+60*a*b^5*c*d^2*x^4+15*b^6*c^2*d*x^4+42*b^5*d^3*x^5+3*a^4*b^3*c*d^
2*x^2+12*a^3*b^4*c^2*d*x^2+16*a^3*b^3*d^3*x^3+6*a^2*b^5*c^3*x^2+72*a^2*b^4*
c*d^2*x^3+48*a*b^5*c^2*d*x^3+120*a*b^4*d^3*x^4+4*b^6*c^3*x^3+90*b^5*c*d^2*x
^4+3*a^4*b^3*c^2*d*x+3*a^4*b^2*d^3*x^2+4*a^3*b^4*c^3*x+36*a^3*b^3*c*d^2*x^2
+54*a^2*b^4*c^2*d*x^2+120*a^2*b^3*d^3*x^3+12*a*b^5*c^3*x^2+240*a*b^4*c*d^2*
x^3+60*b^5*c^2*d*x^3+210*b^4*d^3*x^4+a^4*b^3*c^3+6*a^4*b^2*c*d^2*x+24*a^3*b
^3*c^2*d*x+48*a^3*b^2*d^3*x^2+12*a^2*b^4*c^3*x+216*a^2*b^3*c*d^2*x^2+144*a*
b^4*c^2*d*x^2+480*a*b^3*d^3*x^3+12*b^5*c^3*x^2+360*b^4*c*d^2*x^3+3*a^4*b^2*
c^2*d+6*a^4*b*d^3*x+4*a^3*b^3*c^3+72*a^3*b^2*c*d^2*x+108*a^2*b^3*c^2*d*x+36
0*a^2*b^2*d^3*x^2+24*a*b^4*c^3*x+720*a*b^3*c*d^2*x^2+180*b^4*c^2*d*x^2+840*
b^3*d^3*x^3+6*a^4*b*c*d^2+24*a^3*b^2*c^2*d+96*a^3*b*d^3*x+12*a^2*b^3*c^3+43
2*a^2*b^2*c*d^2*x+288*a*b^3*c^2*d*x+1440*a*b^2*d^3*x^2+24*b^4*c^3*x+1080*b^
3*c*d^2*x^2+6*a^4*d^3+72*a^3*b*c*d^2+108*a^2*b^2*c^2*d+720*a^2*b*d^3*x+24*a
*b^3*c^3+1440*a*b^2*c*d^2*x+360*b^3*c^2*d*x+2520*b^2*d^3*x^2+96*a^3*d^3+432
*a^2*b*c*d^2+288*a*b^2*c^2*d+2880*a*b*d^3*x+24*b^3*c^3+2160*b^2*c*d^2*x+720
*a^2*d^3+1440*a*b*c*d^2+360*b^2*c^2*d+5040*b*d^3*x+2880*a*d^3+2160*b*c*d^2+
5040*d^3)*exp(-b*x-a)/b^4
```

maxima [A] time = 1.10, size = 894, normalized size = 1.19

$$-\frac{4\,(bx+1)a^3c^3e^{(-bx-a)}}{b}-\frac{a^4c^3e^{(-bx-a)}}{b}-\frac{3\,(bx+1)a^4c^2de^{(-bx-a)}}{b^2}-\frac{6\left(b^2x^2+2\,bx+2\right)a^2c^3e^{(-bx-a)}}{b}-\frac{12\left(b^2x^2+2\,bx+2\right.}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4*(d*x+c)^3,x, algorithm="maxima")
```

```
[Out] -4*(b*x + 1)*a^3*c^3*e^(-b*x - a)/b - a^4*c^3*e^(-b*x - a)/b - 3*(b*x + 1)*
a^4*c^2*d*e^(-b*x - a)/b^2 - 6*(b^2*x^2 + 2*b*x + 2)*a^2*c^3*e^(-b*x - a)/b
 - 12*(b^2*x^2 + 2*b*x + 2)*a^3*c^2*d*e^(-b*x - a)/b^2 - 3*(b^2*x^2 + 2*b*x
 + 2)*a^4*c*d^2*e^(-b*x - a)/b^3 - 4*(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a*c^
3*e^(-b*x - a)/b - 18*(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a^2*c^2*d*e^(-b*x -
 a)/b^2 - 12*(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a^3*c*d^2*e^(-b*x - a)/b^3 -
 (b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a^4*d^3*e^(-b*x - a)/b^4 - (b^4*x^4 + 4*
b^3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*c^3*e^(-b*x - a)/b - 12*(b^4*x^4 + 4*b^
3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*a*c^2*d*e^(-b*x - a)/b^2 - 18*(b^4*x^4 +
4*b^3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*a^2*c*d^2*e^(-b*x - a)/b^3 - 4*(b^4*x
^4 + 4*b^3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*a^3*d^3*e^(-b*x - a)/b^4 - 3*(b^
5*x^5 + 5*b^4*x^4 + 20*b^3*x^3 + 60*b^2*x^2 + 120*b*x + 120)*c^2*d*e^(-b*x
- a)/b^2 - 12*(b^5*x^5 + 5*b^4*x^4 + 20*b^3*x^3 + 60*b^2*x^2 + 120*b*x + 12
0)*a*c*d^2*e^(-b*x - a)/b^3 - 6*(b^5*x^5 + 5*b^4*x^4 + 20*b^3*x^3 + 60*b^2*
x^2 + 120*b*x + 120)*a^2*d^3*e^(-b*x - a)/b^4 - 3*(b^6*x^6 + 6*b^5*x^5 + 30
*b^4*x^4 + 120*b^3*x^3 + 360*b^2*x^2 + 720*b*x + 720)*c*d^2*e^(-b*x - a)/b^
3 - 4*(b^6*x^6 + 6*b^5*x^5 + 30*b^4*x^4 + 120*b^3*x^3 + 360*b^2*x^2 + 720*b
*x + 720)*a*d^3*e^(-b*x - a)/b^4 - (b^7*x^7 + 7*b^6*x^6 + 42*b^5*x^5 + 210*
b^4*x^4 + 840*b^3*x^3 + 2520*b^2*x^2 + 5040*b*x + 5040)*d^3*e^(-b*x - a)/b^
4
```

mupad [B] time = 3.82, size = 803, normalized size = 1.06

$$-x^3\,e^{-a-b\,x}\,\left(b^2\,\left(4\,a\,c^3+4\,c^3\right)+360\,c\,d^2+\frac{a^4\,d^3+16\,a^3\,d^3+120\,a^2\,d^3+480\,a\,d^3+840\,d^3}{b}+b\,\left(18\,d\,a^2\,c^2+48\,d\,a\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(- a - b*x)*(a + b*x)^4*(c + d*x)^3,x)
```

```
[Out] - x^3*exp(- a - b*x)*(b^2*(4*a*c^3 + 4*c^3) + 360*c*d^2 + (480*a*d^3 + 840*
d^3 + 120*a^2*d^3 + 16*a^3*d^3 + a^4*d^3)/b + b*(60*c^2*d + 18*a^2*c^2*d +
48*a*c^2*d) + 72*a^2*c*d^2 + 12*a^3*c*d^2 + 240*a*c*d^2) - x^4*exp(- a - b*
x)*(120*a*d^3 + 210*d^3 + 30*a^2*d^3 + 4*a^3*d^3 + b^3*c^3 + 15*b^2*c^2*d +
 90*b*c*d^2 + 60*a*b*c*d^2 + 12*a*b^2*c^2*d + 18*a^2*b*c*d^2) - (exp(- a -
b*x)*(2880*a*d^3 + 5040*d^3 + 720*a^2*d^3 + 96*a^3*d^3 + 24*b^3*c^3 + 6*a^4
```

```
*d^3 + 24*a*b^3*c^3 + 360*b^2*c^2*d + 12*a^2*b^3*c^3 + 4*a^3*b^3*c^3 + a^4*
b^3*c^3 + 2160*b*c*d^2 + 108*a^2*b^2*c^2*d + 24*a^3*b^2*c^2*d + 3*a^4*b^2*c
^2*d + 1440*a*b*c*d^2 + 288*a*b^2*c^2*d + 432*a^2*b*c*d^2 + 72*a^3*b*c*d^2
+ 6*a^4*b*c*d^2))/b^4 - x*exp(- a - b*x)*(4*c^3*(6*a + 3*a^2 + a^3 + 6) + (
6*d^3*(480*a + 120*a^2 + 16*a^3 + a^4 + 840))/b^3 + (3*c^2*d*(96*a + 36*a^2
 + 8*a^3 + a^4 + 120))/b + (6*c*d^2*(240*a + 72*a^2 + 12*a^3 + a^4 + 360))/
b^2) - (3*x^2*exp(- a - b*x)*(480*a*d^3 + 840*d^3 + 120*a^2*d^3 + 16*a^3*d^
3 + 4*b^3*c^3 + a^4*d^3 + 4*a*b^3*c^3 + 60*b^2*c^2*d + 2*a^2*b^3*c^3 + 360*
b*c*d^2 + 18*a^2*b^2*c^2*d + 4*a^3*b^2*c^2*d + 240*a*b*c*d^2 + 48*a*b^2*c^2
*d + 72*a^2*b*c*d^2 + 12*a^3*b*c*d^2 + a^4*b*c*d^2))/b^2 - b^3*d^3*x^7*exp(
- a - b*x) - b^2*d^2*x^6*exp(- a - b*x)*(7*d + 4*a*d + 3*b*c) - 3*b*d*x^5*e
xp(- a - b*x)*(8*a*d^2 + 14*d^2 + 2*a^2*d^2 + b^2*c^2 + 6*b*c*d + 4*a*b*c*d
)
```

sympy [A] time = 0.72, size = 1445, normalized size = 1.92

$$\begin{cases} \frac{(-a^4b^3c^3-3a^4b^3c^2dx-3a^4b^3cd^2x^2-a^4b^3d^3x^3-3a^4b^2c^2d-6a^4b^2cd^2x-3a^4b^2d^3x^2-6a^4bcd^2-6a^4bd^3x-6a^4d^3-4a^3b^4c^3x-12a^3b^4c^2dx^2-12a^3b^4cd^2x^3-4a}{} \\ a^4c^3x + \frac{b^4d^3x^8}{8} + x^7\left(\frac{4ab^3d^3}{7} + \frac{3b^4cd^2}{7}\right) + x^6\left(a^2b^2d^3 + 2ab^3cd^2 + \frac{b^4c^2d}{2}\right) + x^5\left(\frac{4a^3bd^3}{5} + \frac{18a^2b^2cd^2}{5} + \frac{12ab^3c^2d}{5} + \frac{b^4c^3}{5}\right) - \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**4*(d*x+c)**3,x)
```

```
[Out] Piecewise(((-a**4*b**3*c**3 - 3*a**4*b**3*c**2*d*x - 3*a**4*b**3*c*d**2*x**
2 - a**4*b**3*d**3*x**3 - 3*a**4*b**2*c**2*d - 6*a**4*b**2*c*d**2*x - 3*a**
4*b**2*d**3*x**2 - 6*a**4*b*c*d**2 - 6*a**4*b*d**3*x - 6*a**4*d**3 - 4*a**3
*b**4*c**3*x - 12*a**3*b**4*c**2*d*x**2 - 12*a**3*b**4*c*d**2*x**3 - 4*a**3
*b**4*d**3*x**4 - 4*a**3*b**3*c**3 - 24*a**3*b**3*c**2*d*x - 36*a**3*b**3*c
*d**2*x**2 - 16*a**3*b**3*d**3*x**3 - 24*a**3*b**2*c**2*d - 72*a**3*b**2*c*
d**2*x - 48*a**3*b**2*d**3*x**2 - 72*a**3*b*c*d**2 - 96*a**3*b*d**3*x - 96*
a**3*d**3 - 6*a**2*b**5*c**3*x**2 - 18*a**2*b**5*c**2*d*x**3 - 18*a**2*b**5
*c*d**2*x**4 - 6*a**2*b**5*d**3*x**5 - 12*a**2*b**4*c**3*x - 54*a**2*b**4*c
**2*d*x**2 - 72*a**2*b**4*c*d**2*x**3 - 30*a**2*b**4*d**3*x**4 - 12*a**2*b*
*3*c**3 - 108*a**2*b**3*c**2*d*x - 216*a**2*b**3*c*d**2*x**2 - 120*a**2*b**
3*d**3*x**3 - 108*a**2*b**2*c**2*d - 432*a**2*b**2*c*d**2*x - 360*a**2*b**2
*d**3*x**2 - 432*a**2*b*c*d**2 - 720*a**2*b*d**3*x - 720*a**2*d**3 - 4*a*b*
*6*c**3*x**3 - 12*a*b**6*c**2*d*x**4 - 12*a*b**6*c*d**2*x**5 - 4*a*b**6*d**
3*x**6 - 12*a*b**5*c**3*x**2 - 48*a*b**5*c**2*d*x**3 - 60*a*b**5*c*d**2*x**
4 - 24*a*b**5*d**3*x**5 - 24*a*b**4*c**3*x - 144*a*b**4*c**2*d*x**2 - 240*a
*b**4*c*d**2*x**3 - 120*a*b**4*d**3*x**4 - 24*a*b**3*c**3 - 288*a*b**3*c**2
*d*x - 720*a*b**3*c*d**2*x**2 - 480*a*b**3*d**3*x**3 - 288*a*b**2*c**2*d -
1440*a*b**2*c*d**2*x - 1440*a*b**2*d**3*x**2 - 1440*a*b*c*d**2 - 2880*a*b*d
**3*x - 2880*a*d**3 - b**7*c**3*x**4 - 3*b**7*c**2*d*x**5 - 3*b**7*c*d**2*x
```

```
**6 - b**7*d**3*x**7 - 4*b**6*c**3*x**3 - 15*b**6*c**2*d*x**4 - 18*b**6*c*d
**2*x**5 - 7*b**6*d**3*x**6 - 12*b**5*c**3*x**2 - 60*b**5*c**2*d*x**3 - 90*
b**5*c*d**2*x**4 - 42*b**5*d**3*x**5 - 24*b**4*c**3*x - 180*b**4*c**2*d*x**
2 - 360*b**4*c*d**2*x**3 - 210*b**4*d**3*x**4 - 24*b**3*c**3 - 360*b**3*c**
2*d*x - 1080*b**3*c*d**2*x**2 - 840*b**3*d**3*x**3 - 360*b**2*c**2*d - 2160
*b**2*c*d**2*x - 2520*b**2*d**3*x**2 - 2160*b*c*d**2 - 5040*b*d**3*x - 5040
*d**3)*exp(-a - b*x)/b**4, Ne(b**4, 0)), (a**4*c**3*x + b**4*d**3*x**8/8 +
x**7*(4*a*b**3*d**3/7 + 3*b**4*c*d**2/7) + x**6*(a**2*b**2*d**3 + 2*a*b**3*
c*d**2 + b**4*c**2*d/2) + x**5*(4*a**3*b*d**3/5 + 18*a**2*b**2*c*d**2/5 + 1
2*a*b**3*c**2*d/5 + b**4*c**3/5) + x**4*(a**4*d**3/4 + 3*a**3*b*c*d**2 + 9*
a**2*b**2*c**2*d/2 + a*b**3*c**3) + x**3*(a**4*c*d**2 + 4*a**3*b*c**2*d + 2
*a**2*b**2*c**3) + x**2*(3*a**4*c**2*d/2 + 2*a**3*b*c**3), True))
```

3.75 $\int e^{-a-bx}(a+bx)^4(c+dx)^2\,dx$

Optimal. Leaf size=495

$$-\frac{2de^{-a-bx}(a+bx)^5(bc-ad)}{b^3}-\frac{e^{-a-bx}(a+bx)^4(bc-ad)^2}{b^3}-\frac{10de^{-a-bx}(a+bx)^4(bc-ad)}{b^3}-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)}{b^3}$$

```
[Out] -720*d^2*exp(-b*x-a)/b^3-240*d*(-a*d+b*c)*exp(-b*x-a)/b^3-24*(-a*d+b*c)^2*e
xp(-b*x-a)/b^3-720*d^2*exp(-b*x-a)*(b*x+a)/b^3-240*d*(-a*d+b*c)*exp(-b*x-a)
*(b*x+a)/b^3-24*(-a*d+b*c)^2*exp(-b*x-a)*(b*x+a)/b^3-360*d^2*exp(-b*x-a)*(b
*x+a)^2/b^3-120*d*(-a*d+b*c)*exp(-b*x-a)*(b*x+a)^2/b^3-12*(-a*d+b*c)^2*exp(
-b*x-a)*(b*x+a)^2/b^3-120*d^2*exp(-b*x-a)*(b*x+a)^3/b^3-40*d*(-a*d+b*c)*exp
(-b*x-a)*(b*x+a)^3/b^3-4*(-a*d+b*c)^2*exp(-b*x-a)*(b*x+a)^3/b^3-30*d^2*exp(
-b*x-a)*(b*x+a)^4/b^3-10*d*(-a*d+b*c)*exp(-b*x-a)*(b*x+a)^4/b^3-(-a*d+b*c)^
2*exp(-b*x-a)*(b*x+a)^4/b^3-6*d^2*exp(-b*x-a)*(b*x+a)^5/b^3-2*d*(-a*d+b*c)*
exp(-b*x-a)*(b*x+a)^5/b^3-d^2*exp(-b*x-a)*(b*x+a)^6/b^3
```

Rubi [A] time = 0.64, antiderivative size = 495, normalized size of antiderivative = 1.00, number of steps used = 20, number of rules used = 3, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}} = 0.120$, Rules used = {2196, 2176, 2194}

$$-\frac{2de^{-a-bx}(a+bx)^5(bc-ad)}{b^3}-\frac{e^{-a-bx}(a+bx)^4(bc-ad)^2}{b^3}-\frac{10de^{-a-bx}(a+bx)^4(bc-ad)}{b^3}-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)}{b^3}$$

Antiderivative was successfully verified.

```
[In] Int[E^(-a - b*x)*(a + b*x)^4*(c + d*x)^2,x]
```

```
[Out] (-720*d^2*E^(-a - b*x))/b^3 - (240*d*(b*c - a*d)*E^(-a - b*x))/b^3 - (24*(b
*c - a*d)^2*E^(-a - b*x))/b^3 - (720*d^2*E^(-a - b*x)*(a + b*x))/b^3 - (240
*d*(b*c - a*d)*E^(-a - b*x)*(a + b*x))/b^3 - (24*(b*c - a*d)^2*E^(-a - b*x)
*(a + b*x))/b^3 - (360*d^2*E^(-a - b*x)*(a + b*x)^2)/b^3 - (120*d*(b*c - a*
d)*E^(-a - b*x)*(a + b*x)^2)/b^3 - (12*(b*c - a*d)^2*E^(-a - b*x)*(a + b*x)
^2)/b^3 - (120*d^2*E^(-a - b*x)*(a + b*x)^3)/b^3 - (40*d*(b*c - a*d)*E^(-a
- b*x)*(a + b*x)^3)/b^3 - (4*(b*c - a*d)^2*E^(-a - b*x)*(a + b*x)^3)/b^3 -
(30*d^2*E^(-a - b*x)*(a + b*x)^4)/b^3 - (10*d*(b*c - a*d)*E^(-a - b*x)*(a +
 b*x)^4)/b^3 - ((b*c - a*d)^2*E^(-a - b*x)*(a + b*x)^4)/b^3 - (6*d^2*E^(-a
- b*x)*(a + b*x)^5)/b^3 - (2*d*(b*c - a*d)*E^(-a - b*x)*(a + b*x)^5)/b^3 -
(d^2*E^(-a - b*x)*(a + b*x)^6)/b^3
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
```

```
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] &&  !$UseGamma === True
```

Rubi steps

$$\int e^{-a-bx}(a+bx)^4(c+dx)^2\,dx = \int\left(\frac{(bc-ad)^2e^{-a-bx}(a+bx)^4}{b^2}+\frac{2d(bc-ad)e^{-a-bx}(a+bx)^5}{b^2}+\frac{d^2e^{-a-bx}(a+bx)^6}{b^2}\right.$$

$$=\frac{d^2\int e^{-a-bx}(a+bx)^6\,dx}{b^2}+\frac{(2d(bc-ad))\int e^{-a-bx}(a+bx)^5\,dx}{b^2}+\frac{(bc-ad)^2\int e^{-a-b}}{b^2}$$

$$=-\frac{(bc-ad)^2e^{-a-bx}(a+bx)^4}{b^3}-\frac{2d(bc-ad)e^{-a-bx}(a+bx)^5}{b^3}-\frac{d^2e^{-a-bx}(a+bx)^6}{b^3}+$$

$$=-\frac{4(bc-ad)^2e^{-a-bx}(a+bx)^3}{b^3}-\frac{10d(bc-ad)e^{-a-bx}(a+bx)^4}{b^3}-\frac{(bc-ad)^2e^{-a-bx}(a}{b^3}$$

$$=-\frac{12(bc-ad)^2e^{-a-bx}(a+bx)^2}{b^3}-\frac{40d(bc-ad)e^{-a-bx}(a+bx)^3}{b^3}-\frac{4(bc-ad)^2e^{-a-bx}}{b^3}$$

$$=-\frac{24(bc-ad)^2e^{-a-bx}(a+bx)}{b^3}-\frac{120d(bc-ad)e^{-a-bx}(a+bx)^2}{b^3}-\frac{12(bc-ad)^2e^{-a-b}}{b^3}$$

$$=-\frac{24(bc-ad)^2e^{-a-bx}}{b^3}-\frac{240d(bc-ad)e^{-a-bx}(a+bx)}{b^3}-\frac{24(bc-ad)^2e^{-a-bx}(a+bx)}{b^3}$$

$$=-\frac{240d(bc-ad)e^{-a-bx}}{b^3}-\frac{24(bc-ad)^2e^{-a-bx}}{b^3}-\frac{720d^2e^{-a-bx}(a+bx)}{b^3}-\frac{240d(bc-}{}$$

$$=-\frac{720d^2e^{-a-bx}}{b^3}-\frac{240d(bc-ad)e^{-a-bx}}{b^3}-\frac{24(bc-ad)^2e^{-a-bx}}{b^3}-\frac{720d^2e^{-a-bx}(a+bx}{b^3}$$

Mathematica [A] time = 0.47, size = 320, normalized size = 0.65

$$e^{-a-bx}\left(-2b^4x^2\left(3\left(a^2+2a+2\right)c^2+2\left(3a^2+8a+10\right)cdx+\left(3a^2+10a+15\right)d^2x^2\right)-4b^3x\left(\left(a^3+3a^2+6a+6\right)c\right.\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(-a - b*x)*(a + b*x)^4*(c + d*x)^2,x]
```

```
[Out] (E^(-a - b*x)*(-2*(360 + 240*a + 72*a^2 + 12*a^3 + a^4)*d^2 - b^6*x^4*(c +
d*x)^2 - 2*b^5*x^3*(c + d*x)*(2*(1 + a)*c + (3 + 2*a)*d*x) - 2*b*d*((120 +
96*a + 36*a^2 + 8*a^3 + a^4)*c + (360 + 240*a + 72*a^2 + 12*a^3 + a^4)*d*x)
 - 2*b^4*x^2*(3*(2 + 2*a + a^2)*c^2 + 2*(10 + 8*a + 3*a^2)*c*d*x + (15 + 10
*a + 3*a^2)*d^2*x^2) - 4*b^3*x*((6 + 6*a + 3*a^2 + a^3)*c^2 + (30 + 24*a +
9*a^2 + 2*a^3)*c*d*x + (30 + 20*a + 6*a^2 + a^3)*d^2*x^2) - b^2*((24 + 24*a
 + 12*a^2 + 4*a^3 + a^4)*c^2 + 2*(120 + 96*a + 36*a^2 + 8*a^3 + a^4)*c*d*x
+ (360 + 240*a + 72*a^2 + 12*a^3 + a^4)*d^2*x^2)))/b^3
```

fricas [A] time = 0.41, size = 354, normalized size = 0.72

$$-\frac{\left(b^6d^2x^6 + 2\left(b^6cd + (2a+3)b^5d^2\right)x^5 + \left(a^4 + 4a^3 + 12a^2 + 24a + 24\right)b^2c^2 + \left(b^6c^2 + 2(4a+5)b^5cd + 2\left(3a^2\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4*(d*x+c)^2,x, algorithm="fricas")
```

```
[Out] -(b^6*d^2*x^6 + 2*(b^6*c*d + (2*a + 3)*b^5*d^2)*x^5 + (a^4 + 4*a^3 + 12*a^2
 + 24*a + 24)*b^2*c^2 + (b^6*c^2 + 2*(4*a + 5)*b^5*c*d + 2*(3*a^2 + 10*a +
15)*b^4*d^2)*x^4 + 2*(a^4 + 8*a^3 + 36*a^2 + 96*a + 120)*b*c*d + 4*((a + 1)
*b^5*c^2 + (3*a^2 + 8*a + 10)*b^4*c*d + (a^3 + 6*a^2 + 20*a + 30)*b^3*d^2)*
x^3 + 2*(a^4 + 12*a^3 + 72*a^2 + 240*a + 360)*d^2 + (6*(a^2 + 2*a + 2)*b^4*
c^2 + 4*(2*a^3 + 9*a^2 + 24*a + 30)*b^3*c*d + (a^4 + 12*a^3 + 72*a^2 + 240*
a + 360)*b^2*d^2)*x^2 + 2*(2*(a^3 + 3*a^2 + 6*a + 6)*b^3*c^2 + (a^4 + 8*a^3
 + 36*a^2 + 96*a + 120)*b^2*c*d + (a^4 + 12*a^3 + 72*a^2 + 240*a + 360)*b*d
^2)*x)*e^(-b*x - a)/b^3
```

giac [A] time = 0.45, size = 674, normalized size = 1.36

$$-\frac{\left(b^{10}d^2x^6 + 2b^{10}cdx^5 + 4ab^9d^2x^5 + b^{10}c^2x^4 + 8ab^9cdx^4 + 6a^2b^8d^2x^4 + 6b^9d^2x^5 + 4ab^9c^2x^3 + 12a^2b^8cdx^3 + \right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4*(d*x+c)^2,x, algorithm="giac")
```

```
[Out] -(b^10*d^2*x^6 + 2*b^10*c*d*x^5 + 4*a*b^9*d^2*x^5 + b^10*c^2*x^4 + 8*a*b^9*
c*d*x^4 + 6*a^2*b^8*d^2*x^4 + 6*b^9*d^2*x^5 + 4*a*b^9*c^2*x^3 + 12*a^2*b^8*
c*d*x^3 + 4*a^3*b^7*d^2*x^3 + 10*b^9*c*d*x^4 + 20*a*b^8*d^2*x^4 + 6*a^2*b^8
*c^2*x^2 + 8*a^3*b^7*c*d*x^2 + a^4*b^6*d^2*x^2 + 4*b^9*c^2*x^3 + 32*a*b^8*c
*d*x^3 + 24*a^2*b^7*d^2*x^3 + 30*b^8*d^2*x^4 + 4*a^3*b^7*c^2*x + 2*a^4*b^6*
c*d*x + 12*a*b^8*c^2*x^2 + 36*a^2*b^7*c*d*x^2 + 12*a^3*b^6*d^2*x^2 + 40*b^8
```

```
*c*d*x^3 + 80*a*b^7*d^2*x^3 + a^4*b^6*c^2 + 12*a^2*b^7*c^2*x + 16*a^3*b^6*c
*d*x + 2*a^4*b^5*d^2*x + 12*b^8*c^2*x^2 + 96*a*b^7*c*d*x^2 + 72*a^2*b^6*d^2
*x^2 + 120*b^7*d^2*x^3 + 4*a^3*b^6*c^2 + 2*a^4*b^5*c*d + 24*a*b^7*c^2*x + 7
2*a^2*b^6*c*d*x + 24*a^3*b^5*d^2*x + 120*b^7*c*d*x^2 + 240*a*b^6*d^2*x^2 +
12*a^2*b^6*c^2 + 16*a^3*b^5*c*d + 2*a^4*b^4*d^2 + 24*b^7*c^2*x + 192*a*b^6*
c*d*x + 144*a^2*b^5*d^2*x + 360*b^6*d^2*x^2 + 24*a*b^6*c^2 + 72*a^2*b^5*c*d
 + 24*a^3*b^4*d^2 + 240*b^6*c*d*x + 480*a*b^5*d^2*x + 24*b^6*c^2 + 192*a*b^
5*c*d + 144*a^2*b^4*d^2 + 720*b^5*d^2*x + 240*b^5*c*d + 480*a*b^4*d^2 + 720
*b^4*d^2)*e^(-b*x - a)/b^7
```

maple [A] time = 0.01, size = 640, normalized size = 1.29

$$-\frac{\left(d^2b^6x^6 + 4a\,b^5d^2x^5 + 2b^6cd\,x^5 + 6a^2b^4d^2x^4 + 8a\,b^5cd\,x^4 + b^6c^2x^4 + 6b^5d^2x^5 + 4a^3b^3d^2x^3 + 12a^2b^4cd\,x^3 + 4a\,b^5\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*(b*x+a)^4*(d*x+c)^2,x)
```

```
[Out] -(b^6*d^2*x^6+4*a*b^5*d^2*x^5+2*b^6*c*d*x^5+6*a^2*b^4*d^2*x^4+8*a*b^5*c*d*x
^4+b^6*c^2*x^4+6*b^5*d^2*x^5+4*a^3*b^3*d^2*x^3+12*a^2*b^4*c*d*x^3+4*a*b^5*c
^2*x^3+20*a*b^4*d^2*x^4+10*b^5*c*d*x^4+a^4*b^2*d^2*x^2+8*a^3*b^3*c*d*x^2+6*
a^2*b^4*c^2*x^2+24*a^2*b^3*d^2*x^3+32*a*b^4*c*d*x^3+4*b^5*c^2*x^3+30*b^4*d^
2*x^4+2*a^4*b^2*c*d*x+4*a^3*b^3*c^2*x+12*a^3*b^2*d^2*x^2+36*a^2*b^3*c*d*x^2
+12*a*b^4*c^2*x^2+80*a*b^3*d^2*x^3+40*b^4*c*d*x^3+a^4*b^2*c^2+2*a^4*b*d^2*x
+16*a^3*b^2*c*d*x+12*a^2*b^3*c^2*x+72*a^2*b^2*d^2*x^2+96*a*b^3*c*d*x^2+12*b
^4*c^2*x^2+120*b^3*d^2*x^3+2*a^4*b*c*d+4*a^3*b^2*c^2+24*a^3*b*d^2*x+72*a^2*
b^2*c*d*x+24*a*b^3*c^2*x+240*a*b^2*d^2*x^2+120*b^3*c*d*x^2+2*a^4*d^2+16*a^3
*b*c*d+12*a^2*b^2*c^2+144*a^2*b*d^2*x+192*a*b^2*c*d*x+24*b^3*c^2*x+360*b^2*
d^2*x^2+24*a^3*d^2+72*a^2*b*c*d+24*a*b^2*c^2+480*a*b*d^2*x+240*b^2*c*d*x+14
4*a^2*d^2+192*a*b*c*d+24*b^2*c^2+720*b*d^2*x+480*a*d^2+240*b*c*d+720*d^2)*e
xp(-b*x-a)/b^3
```

maxima [A] time = 0.87, size = 599, normalized size = 1.21

$$-\frac{4\,(bx+1)a^3c^2e^{(-bx-a)}}{b}-\frac{a^4c^2e^{(-bx-a)}}{b}-\frac{2\,(bx+1)a^4cde^{(-bx-a)}}{b^2}-\frac{6\left(b^2x^2+2\,bx+2\right)a^2c^2e^{(-bx-a)}}{b}-\frac{8\left(b^2x^2+2\,bx+2\right)}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4*(d*x+c)^2,x, algorithm="maxima")
```

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

```
 - a)/b - 12*(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a^2*c*d*e^(-b*x - a)/b^2 - 4
*(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a^3*d^2*e^(-b*x - a)/b^3 - (b^4*x^4 + 4*
b^3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*c^2*e^(-b*x - a)/b - 8*(b^4*x^4 + 4*b^3
*x^3 + 12*b^2*x^2 + 24*b*x + 24)*a*c*d*e^(-b*x - a)/b^2 - 6*(b^4*x^4 + 4*b^
3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*a^2*d^2*e^(-b*x - a)/b^3 - 2*(b^5*x^5 + 5
*b^4*x^4 + 20*b^3*x^3 + 60*b^2*x^2 + 120*b*x + 120)*c*d*e^(-b*x - a)/b^2 -
4*(b^5*x^5 + 5*b^4*x^4 + 20*b^3*x^3 + 60*b^2*x^2 + 120*b*x + 120)*a*d^2*e^(
-b*x - a)/b^3 - (b^6*x^6 + 6*b^5*x^5 + 30*b^4*x^4 + 120*b^3*x^3 + 360*b^2*x
^2 + 720*b*x + 720)*d^2*e^(-b*x - a)/b^3
```

mupad [**B**] time = 3.66, size = 537, normalized size = 1.08

$$-x^2\, e^{-a-b\,x}\, \left(120\,c\,d + b\,\left(6\,a^2\,c^2 + 12\,a\,c^2 + 12\,c^2\right) + \frac{a^4\,d^2 + 12\,a^3\,d^2 + 72\,a^2\,d^2 + 240\,a\,d^2 + 360\,d^2}{b} + 96\,a\,c\,d + 3\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(- a - b*x)*(a + b*x)^4*(c + d*x)^2,x)
```

```
[Out] - x^2*exp(- a - b*x)*(120*c*d + b*(12*a*c^2 + 12*c^2 + 6*a^2*c^2) + (240*a*
d^2 + 360*d^2 + 72*a^2*d^2 + 12*a^3*d^2 + a^4*d^2)/b + 96*a*c*d + 36*a^2*c*
d + 8*a^3*c*d) - x^3*exp(- a - b*x)*(80*a*d^2 + 120*d^2 + 24*a^2*d^2 + 4*b^
2*c^2 + 4*a^3*d^2 + 4*a*b^2*c^2 + 40*b*c*d + 12*a^2*b*c*d + 32*a*b*c*d) - (
exp(- a - b*x)*(480*a*d^2 + 720*d^2 + 144*a^2*d^2 + 24*b^2*c^2 + 24*a^3*d^2
 + 2*a^4*d^2 + 24*a*b^2*c^2 + 240*b*c*d + 12*a^2*b^2*c^2 + 4*a^3*b^2*c^2 +
a^4*b^2*c^2 + 72*a^2*b*c*d + 16*a^3*b*c*d + 2*a^4*b*c*d + 192*a*b*c*d))/b^3
 - b^3*d^2*x^6*exp(- a - b*x) - b*x^4*exp(- a - b*x)*(20*a*d^2 + 30*d^2 + 6
*a^2*d^2 + b^2*c^2 + 10*b*c*d + 8*a*b*c*d) - (2*x*exp(- a - b*x)*(240*a*d^2
 + 360*d^2 + 72*a^2*d^2 + 12*b^2*c^2 + 12*a^3*d^2 + a^4*d^2 + 12*a*b^2*c^2
+ 120*b*c*d + 6*a^2*b^2*c^2 + 2*a^3*b^2*c^2 + 36*a^2*b*c*d + 8*a^3*b*c*d +
a^4*b*c*d + 96*a*b*c*d))/b^2 - 2*b^2*d*x^5*exp(- a - b*x)*(3*d + 2*a*d + b*
c)
```

sympy [**A**] time = 0.50, size = 899, normalized size = 1.82

$$\begin{cases} \frac{\left(-a^4b^2c^2-2a^4b^2cdx-a^4b^2d^2x^2-2a^4bcd-2a^4bd^2x-2a^4d^2-4a^3b^3c^2x-8a^3b^3cdx^2-4a^3b^3d^2x^3-4a^3b^2c^2-16a^3b^2cdx-12a^3b^2d^2x^2-16a^3bcd-24a^3bd^2x-2\right.}{} \\ a^4c^2x + \frac{b^4d^2x^7}{7} + x^6\left(\frac{2ab^3d^2}{3} + \frac{b^4cd}{3}\right) + x^5\left(\frac{6a^2b^2d^2}{5} + \frac{8ab^3cd}{5} + \frac{b^4c^2}{5}\right) + x^4\left(a^3bd^2 + 3a^2b^2cd + ab^3c^2\right) + x^3\left(\frac{a^4d^2}{3} + \frac{8a}{}\right.\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**4*(d*x+c)**2,x)
```

```
[Out] Piecewise(((-a**4*b**2*c**2 - 2*a**4*b**2*c*d*x - a**4*b**2*d**2*x**2 - 2*a
**4*b*c*d - 2*a**4*b*d**2*x - 2*a**4*d**2 - 4*a**3*b**3*c**2*x - 8*a**3*b**
```

```
3*c*d*x**2 - 4*a**3*b**3*d**2*x**3 - 4*a**3*b**2*c**2 - 16*a**3*b**2*c*d*x
- 12*a**3*b**2*d**2*x**2 - 16*a**3*b*c*d - 24*a**3*b*d**2*x - 24*a**3*d**2
- 6*a**2*b**4*c**2*x**2 - 12*a**2*b**4*c*d*x**3 - 6*a**2*b**4*d**2*x**4 - 1
2*a**2*b**3*c**2*x - 36*a**2*b**3*c*d*x**2 - 24*a**2*b**3*d**2*x**3 - 12*a*
*2*b**2*c**2 - 72*a**2*b**2*c*d*x - 72*a**2*b**2*d**2*x**2 - 72*a**2*b*c*d
- 144*a**2*b*d**2*x - 144*a**2*d**2 - 4*a*b**5*c**2*x**3 - 8*a*b**5*c*d*x**
4 - 4*a*b**5*d**2*x**5 - 12*a*b**4*c**2*x**2 - 32*a*b**4*c*d*x**3 - 20*a*b*
*4*d**2*x**4 - 24*a*b**3*c**2*x - 96*a*b**3*c*d*x**2 - 80*a*b**3*d**2*x**3
- 24*a*b**2*c**2 - 192*a*b**2*c*d*x - 240*a*b**2*d**2*x**2 - 192*a*b*c*d -
480*a*b*d**2*x - 480*a*d**2 - b**6*c**2*x**4 - 2*b**6*c*d*x**5 - b**6*d**2*
x**6 - 4*b**5*c**2*x**3 - 10*b**5*c*d*x**4 - 6*b**5*d**2*x**5 - 12*b**4*c**
2*x**2 - 40*b**4*c*d*x**3 - 30*b**4*d**2*x**4 - 24*b**3*c**2*x - 120*b**3*c
*d*x**2 - 120*b**3*d**2*x**3 - 24*b**2*c**2 - 240*b**2*c*d*x - 360*b**2*d**
2*x**2 - 240*b*c*d - 720*b*d**2*x - 720*d**2)*exp(-a - b*x)/b**3, Ne(b**3,
0)), (a**4*c**2*x + b**4*d**2*x**7/7 + x**6*(2*a*b**3*d**2/3 + b**4*c*d/3)
+ x**5*(6*a**2*b**2*d**2/5 + 8*a*b**3*c*d/5 + b**4*c**2/5) + x**4*(a**3*b*d
**2 + 3*a**2*b**2*c*d + a*b**3*c**2) + x**3*(a**4*d**2/3 + 8*a**3*b*c*d/3 +
 2*a**2*b**2*c**2) + x**2*(a**4*c*d + 2*a**3*b*c**2), True))
```

3.76 $\int e^{-a-bx}(a+bx)^4(c+dx)\,dx$

Optimal. Leaf size=271

$$-\frac{e^{-a-bx}(a+bx)^4(bc-ad)}{b^2}-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)}{b^2}-\frac{12e^{-a-bx}(a+bx)^2(bc-ad)}{b^2}-\frac{24e^{-a-bx}(a+bx)(bc-ad)}{b^2}-2$$

```
[Out] -120*d*exp(-b*x-a)/b^2-24*(-a*d+b*c)*exp(-b*x-a)/b^2-120*d*exp(-b*x-a)*(b*x
+a)/b^2-24*(-a*d+b*c)*exp(-b*x-a)*(b*x+a)/b^2-60*d*exp(-b*x-a)*(b*x+a)^2/b^
2-12*(-a*d+b*c)*exp(-b*x-a)*(b*x+a)^2/b^2-20*d*exp(-b*x-a)*(b*x+a)^3/b^2-4*
(-a*d+b*c)*exp(-b*x-a)*(b*x+a)^3/b^2-5*d*exp(-b*x-a)*(b*x+a)^4/b^2-(-a*d+b*
c)*exp(-b*x-a)*(b*x+a)^4/b^2-d*exp(-b*x-a)*(b*x+a)^5/b^2
```

Rubi [A] time = 0.34, antiderivative size = 271, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 3, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}} = 0.130$, Rules used = {2196, 2176, 2194}

$$-\frac{e^{-a-bx}(a+bx)^4(bc-ad)}{b^2}-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)}{b^2}-\frac{12e^{-a-bx}(a+bx)^2(bc-ad)}{b^2}-\frac{24e^{-a-bx}(a+bx)(bc-ad)}{b^2}-2$$

Antiderivative was successfully verified.

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

```
[Out] (-120*d*E^(-a - b*x))/b^2 - (24*(b*c - a*d)*E^(-a - b*x))/b^2 - (120*d*E^(-
a - b*x)*(a + b*x))/b^2 - (24*(b*c - a*d)*E^(-a - b*x)*(a + b*x))/b^2 - (60
*d*E^(-a - b*x)*(a + b*x)^2)/b^2 - (12*(b*c - a*d)*E^(-a - b*x)*(a + b*x)^2
)/b^2 - (20*d*E^(-a - b*x)*(a + b*x)^3)/b^2 - (4*(b*c - a*d)*E^(-a - b*x)*(
a + b*x)^3)/b^2 - (5*d*E^(-a - b*x)*(a + b*x)^4)/b^2 - ((b*c - a*d)*E^(-a -
 b*x)*(a + b*x)^4)/b^2 - (d*E^(-a - b*x)*(a + b*x)^5)/b^2
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2196

```
Int[(F_)^((c_.)*(v_))*(u_), x_Symbol] :> Int[ExpandIntegrand[F^(c*ExpandToS
um[v, x]), u, x], x] /; FreeQ[{F, c}, x] && PolynomialQ[u, x] && LinearQ[v,
 x] && !$UseGamma === True
```

Rubi steps

$$\int e^{-a-bx}(a+bx)^4(c+dx)\,dx = \int \left(\frac{(bc-ad)e^{-a-bx}(a+bx)^4}{b} + \frac{de^{-a-bx}(a+bx)^5}{b}\right) dx$$
$$= \frac{d\int e^{-a-bx}(a+bx)^5\,dx}{b} + \frac{(bc-ad)\int e^{-a-bx}(a+bx)^4\,dx}{b}$$
$$= -\frac{(bc-ad)e^{-a-bx}(a+bx)^4}{b^2} - \frac{de^{-a-bx}(a+bx)^5}{b^2} + \frac{(5d)\int e^{-a-bx}(a+bx)^4\,dx}{b} + \frac{(4(bc$$
$$= -\frac{4(bc-ad)e^{-a-bx}(a+bx)^3}{b^2} - \frac{5de^{-a-bx}(a+bx)^4}{b^2} - \frac{(bc-ad)e^{-a-bx}(a+bx)^4}{b^2} - \frac{de^{-}}{}$$
$$= -\frac{12(bc-ad)e^{-a-bx}(a+bx)^2}{b^2} - \frac{20de^{-a-bx}(a+bx)^3}{b^2} - \frac{4(bc-ad)e^{-a-bx}(a+bx)^3}{b^2} -$$
$$= -\frac{24(bc-ad)e^{-a-bx}(a+bx)}{b^2} - \frac{60de^{-a-bx}(a+bx)^2}{b^2} - \frac{12(bc-ad)e^{-a-bx}(a+bx)^2}{b^2} -$$
$$= -\frac{24(bc-ad)e^{-a-bx}}{b^2} - \frac{120de^{-a-bx}(a+bx)}{b^2} - \frac{24(bc-ad)e^{-a-bx}(a+bx)}{b^2} - \frac{60de^{-a-b}}{}$$
$$= -\frac{120de^{-a-bx}}{b^2} - \frac{24(bc-ad)e^{-a-bx}}{b^2} - \frac{120de^{-a-bx}(a+bx)}{b^2} - \frac{24(bc-ad)e^{-a-bx}(a+b}{b^2}$$

Mathematica [A] time = 0.27, size = 191, normalized size = 0.70

$$\frac{e^{-a-bx}\left(-2b^3x^2\left(3\left(a^2+2a+2\right)c+\left(3a^2+8a+10\right)dx\right)-2b^2x\left(2\left(a^3+3a^2+6a+6\right)c+\left(2a^3+9a^2+24a+30\right)\right.}{}$$

Antiderivative was successfully verified.

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

```
[Out] (E^(-a - b*x)*(-((120 + 96*a + 36*a^2 + 8*a^3 + a^4)*d) - b^5*x^4*(c + d*x)
 - b^4*x^3*(4*(1 + a)*c + (5 + 4*a)*d*x) - 2*b^3*x^2*(3*(2 + 2*a + a^2)*c +
 (10 + 8*a + 3*a^2)*d*x) - 2*b^2*x*(2*(6 + 6*a + 3*a^2 + a^3)*c + (30 + 24*
a + 9*a^2 + 2*a^3)*d*x) - b*((24 + 24*a + 12*a^2 + 4*a^3 + a^4)*c + (120 +
96*a + 36*a^2 + 8*a^3 + a^4)*d*x)))/b^2
```

fricas [A] time = 0.41, size = 197, normalized size = 0.73

$$-\frac{\left(b^5dx^5+\left(b^5c+(4a+5)b^4d\right)x^4+2\left(2(a+1)b^4c+\left(3a^2+8a+10\right)b^3d\right)x^3+\left(a^4+4a^3+12a^2+24a+24\right)bc\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^5*d*x^5 + (b^5*c + (4*a + 5)*b^4*d)*x^4 + 2*(2*(a + 1)*b^4*c + (3*a^2 +
 8*a + 10)*b^3*d)*x^3 + (a^4 + 4*a^3 + 12*a^2 + 24*a + 24)*b*c + 2*(3*(a^2
+ 2*a + 2)*b^3*c + (2*a^3 + 9*a^2 + 24*a + 30)*b^2*d)*x^2 + (a^4 + 8*a^3 +
36*a^2 + 96*a + 120)*d + (4*(a^3 + 3*a^2 + 6*a + 6)*b^2*c + (a^4 + 8*a^3 +
36*a^2 + 96*a + 120)*b*d)*x)*e^(-b*x - a)/b^2
```

giac [A] time = 0.42, size = 331, normalized size = 1.22

$$-\frac{\left(b^9dx^5 + b^9cx^4 + 4\,ab^8dx^4 + 4\,ab^8cx^3 + 6\,a^2b^7dx^3 + 5\,b^8dx^4 + 6\,a^2b^7cx^2 + 4\,a^3b^6dx^2 + 4\,b^8cx^3 + 16\,ab^7dx^3 + \cdots\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^9*d*x^5 + b^9*c*x^4 + 4*a*b^8*d*x^4 + 4*a*b^8*c*x^3 + 6*a^2*b^7*d*x^3 +
 5*b^8*d*x^4 + 6*a^2*b^7*c*x^2 + 4*a^3*b^6*d*x^2 + 4*b^8*c*x^3 + 16*a*b^7*d
*x^3 + 4*a^3*b^6*c*x + a^4*b^5*d*x + 12*a*b^7*c*x^2 + 18*a^2*b^6*d*x^2 + 20
*b^7*d*x^3 + a^4*b^5*c + 12*a^2*b^6*c*x + 8*a^3*b^5*d*x + 12*b^7*c*x^2 + 48
*a*b^6*d*x^2 + 4*a^3*b^5*c + a^4*b^4*d + 24*a*b^6*c*x + 36*a^2*b^5*d*x + 60
*b^6*d*x^2 + 12*a^2*b^5*c + 8*a^3*b^4*d + 24*b^6*c*x + 96*a*b^5*d*x + 24*a*
b^5*c + 36*a^2*b^4*d + 120*b^5*d*x + 24*b^5*c + 96*a*b^4*d + 120*b^4*d)*e^(
-b*x - a)/b^6
```

maple [A] time = 0.01, size = 297, normalized size = 1.10

$$-\frac{\left(d\,b^5x^5 + 4a\,b^4d\,x^4 + b^5c\,x^4 + 6a^2b^3d\,x^3 + 4a\,b^4c\,x^3 + 5b^4d\,x^4 + 4a^3b^2d\,x^2 + 6a^2b^3c\,x^2 + 16a\,b^3d\,x^3 + 4b^4c\,x^3 \cdots\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^5*d*x^5+4*a*b^4*d*x^4+b^5*c*x^4+6*a^2*b^3*d*x^3+4*a*b^4*c*x^3+5*b^4*d*x
^4+4*a^3*b^2*d*x^2+6*a^2*b^3*c*x^2+16*a*b^3*d*x^3+4*b^4*c*x^3+a^4*b*d*x+4*a
^3*b^2*c*x+18*a^2*b^2*d*x^2+12*a*b^3*c*x^2+20*b^3*d*x^3+a^4*b*c+8*a^3*b*d*x
+12*a^2*b^2*c*x+48*a*b^2*d*x^2+12*b^3*c*x^2+a^4*d+4*a^3*b*c+36*a^2*b*d*x+24
*a*b^2*c*x+60*b^2*d*x^2+8*a^3*d+12*a^2*b*c+96*a*b*d*x+24*b^2*c*x+36*a^2*d+2
4*a*b*c+120*b*d*x+96*a*d+24*b*c+120*d)*exp(-b*x-a)/b^2
```

maxima [A] time = 0.79, size = 344, normalized size = 1.27

$$-\frac{4\,(bx+1)a^3ce^{(-bx-a)}}{b}-\frac{a^4ce^{(-bx-a)}}{b}-\frac{(bx+1)a^4de^{(-bx-a)}}{b^2}-\frac{6\left(b^2x^2+2\,bx+2\right)a^2ce^{(-bx-a)}}{b}-\frac{4\left(b^2x^2+2\,bx+2\right)a^3de\cdots}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -4*(b*x + 1)*a^3*c*e^(-b*x - a)/b - a^4*c*e^(-b*x - a)/b - (b*x + 1)*a^4*d*
e^(-b*x - a)/b^2 - 6*(b^2*x^2 + 2*b*x + 2)*a^2*c*e^(-b*x - a)/b - 4*(b^2*x^
2 + 2*b*x + 2)*a^3*d*e^(-b*x - a)/b^2 - 4*(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)
*a*c*e^(-b*x - a)/b - 6*(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a^2*d*e^(-b*x - a
)/b^2 - (b^4*x^4 + 4*b^3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*c*e^(-b*x - a)/b -
 4*(b^4*x^4 + 4*b^3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*a*d*e^(-b*x - a)/b^2 -
(b^5*x^5 + 5*b^4*x^4 + 20*b^3*x^3 + 60*b^2*x^2 + 120*b*x + 120)*d*e^(-b*x -
 a)/b^2
```

mupad [B] time = 0.18, size = 264, normalized size = 0.97

$$-\frac{e^{-a-b\,x}\,\left(120\,d+96\,a\,d+24\,b\,c+36\,a^2\,d+8\,a^3\,d+a^4\,d+24\,a\,b\,c+12\,a^2\,b\,c+4\,a^3\,b\,c+a^4\,b\,c\right)}{b^2}-x^2\,e^{-a-b\,x}\,\left(60\,d\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] - (exp(- a - b*x)*(120*d + 96*a*d + 24*b*c + 36*a^2*d + 8*a^3*d + a^4*d + 2
4*a*b*c + 12*a^2*b*c + 4*a^3*b*c + a^4*b*c))/b^2 - x^2*exp(- a - b*x)*(60*d
 + 48*a*d + 12*b*c + 18*a^2*d + 4*a^3*d + 12*a*b*c + 6*a^2*b*c) - x*exp(- a
 - b*x)*(24*c + 24*a*c + 12*a^2*c + 4*a^3*c + (120*d + 96*a*d + 36*a^2*d +
8*a^3*d + a^4*d)/b) - b^3*d*x^5*exp(- a - b*x) - b^2*x^4*exp(- a - b*x)*(5*
d + 4*a*d + b*c) - 2*b*x^3*exp(- a - b*x)*(10*d + 8*a*d + 2*b*c + 3*a^2*d +
 2*a*b*c)
```

sympy [A] time = 0.31, size = 447, normalized size = 1.65

$$\begin{cases} \frac{\left(-a^4bc-a^4bdx-a^4d-4a^3b^2cx-4a^3b^2dx^2-4a^3bc-8a^3bdx-8a^3d-6a^2b^3cx^2-6a^2b^3dx^3-12a^2b^2cx-18a^2b^2dx^2-12a^2bc-36a^2bdx-36a^2d-4ab^4cx^3-4ab^4dx^4\right.}{} \\ a^4cx+\frac{b^4dx^6}{6}+x^5\left(\frac{4ab^3d}{5}+\frac{b^4c}{5}\right)+x^4\left(\frac{3a^2b^2d}{2}+ab^3c\right)+x^3\left(\frac{4a^3bd}{3}+2a^2b^2c\right)+x^2\left(\frac{a^4d}{2}+2a^3bc\right) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**4*(d*x+c),x)
```

```
[Out] Piecewise(((-a**4*b*c - a**4*b*d*x - a**4*d - 4*a**3*b**2*c*x - 4*a**3*b**2
*d*x**2 - 4*a**3*b*c - 8*a**3*b*d*x - 8*a**3*d - 6*a**2*b**3*c*x**2 - 6*a**
2*b**3*d*x**3 - 12*a**2*b**2*c*x - 18*a**2*b**2*d*x**2 - 12*a**2*b*c - 36*a
**2*b*d*x - 36*a**2*d - 4*a*b**4*c*x**3 - 4*a*b**4*d*x**4 - 12*a*b**3*c*x**
2 - 16*a*b**3*d*x**3 - 24*a*b**2*c*x - 48*a*b**2*d*x**2 - 24*a*b*c - 96*a*b
```

```
*d*x - 96*a*d - b**5*c*x**4 - b**5*d*x**5 - 4*b**4*c*x**3 - 5*b**4*d*x**4 -
 12*b**3*c*x**2 - 20*b**3*d*x**3 - 24*b**2*c*x - 60*b**2*d*x**2 - 24*b*c -
120*b*d*x - 120*d)*exp(-a - b*x)/b**2, Ne(b**2, 0)), (a**4*c*x + b**4*d*x**
6/6 + x**5*(4*a*b**3*d/5 + b**4*c/5) + x**4*(3*a**2*b**2*d/2 + a*b**3*c) +
x**3*(4*a**3*b*d/3 + 2*a**2*b**2*c) + x**2*(a**4*d/2 + 2*a**3*b*c), True))
```

3.77 $\int e^{-a-bx}(a+bx)^4\,dx$

Optimal. Leaf size=102

$$-\frac{e^{-a-bx}(a+bx)^4}{b}-\frac{4e^{-a-bx}(a+bx)^3}{b}-\frac{12e^{-a-bx}(a+bx)^2}{b}-\frac{24e^{-a-bx}(a+bx)}{b}-\frac{24e^{-a-bx}}{b}$$

```
[Out] -24*exp(-b*x-a)/b-24*exp(-b*x-a)*(b*x+a)/b-12*exp(-b*x-a)*(b*x+a)^2/b-4*exp
(-b*x-a)*(b*x+a)^3/b-exp(-b*x-a)*(b*x+a)^4/b
```

Rubi [A] time = 0.10, antiderivative size = 102, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 2, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111, Rules used = {2176, 2194}

$$-\frac{e^{-a-bx}(a+bx)^4}{b}-\frac{4e^{-a-bx}(a+bx)^3}{b}-\frac{12e^{-a-bx}(a+bx)^2}{b}-\frac{24e^{-a-bx}(a+bx)}{b}-\frac{24e^{-a-bx}}{b}$$

Antiderivative was successfully verified.

```
[In] Int[E^(-a - b*x)*(a + b*x)^4,x]
```

```
[Out] (-24*E^(-a - b*x))/b - (24*E^(-a - b*x)*(a + b*x))/b - (12*E^(-a - b*x)*(a
+ b*x)^2)/b - (4*E^(-a - b*x)*(a + b*x)^3)/b - (E^(-a - b*x)*(a + b*x)^4)/b
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int e^{-a-bx}(a+bx)^4\,dx = -\frac{e^{-a-bx}(a+bx)^4}{b} + 4\int e^{-a-bx}(a+bx)^3\,dx$$
$$= -\frac{4e^{-a-bx}(a+bx)^3}{b} - \frac{e^{-a-bx}(a+bx)^4}{b} + 12\int e^{-a-bx}(a+bx)^2\,dx$$
$$= -\frac{12e^{-a-bx}(a+bx)^2}{b} - \frac{4e^{-a-bx}(a+bx)^3}{b} - \frac{e^{-a-bx}(a+bx)^4}{b} + 24\int e^{-a-bx}(a+bx)\,dx$$
$$= -\frac{24e^{-a-bx}(a+bx)}{b} - \frac{12e^{-a-bx}(a+bx)^2}{b} - \frac{4e^{-a-bx}(a+bx)^3}{b} - \frac{e^{-a-bx}(a+bx)^4}{b} + 24\int e^{-a}$$
$$= -\frac{24e^{-a-bx}}{b} - \frac{24e^{-a-bx}(a+bx)}{b} - \frac{12e^{-a-bx}(a+bx)^2}{b} - \frac{4e^{-a-bx}(a+bx)^3}{b} - \frac{e^{-a-bx}(a+bx)^4}{b}$$

Mathematica [A] time = 0.07, size = 50, normalized size = 0.49

$$\frac{e^{-a-bx}\left(-(a+bx)^4-4(a+bx)^3-12(a+bx)^2-24(a+bx)-24\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[E^(-a - b*x)*(a + b*x)^4,x]
```

```
[Out] (E^(-a - b*x)*(-24 - 24*(a + b*x) - 12*(a + b*x)^2 - 4*(a + b*x)^3 - (a + b
*x)^4))/b
```

fricas [A] time = 0.40, size = 83, normalized size = 0.81

$$-\frac{\left(b^4x^4+4\,(a+1)b^3x^3+6\left(a^2+2\,a+2\right)b^2x^2+a^4+4\,a^3+4\left(a^3+3\,a^2+6\,a+6\right)bx+12\,a^2+24\,a+24\right)e^{(-bx-a}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^4*x^4 + 4*(a + 1)*b^3*x^3 + 6*(a^2 + 2*a + 2)*b^2*x^2 + a^4 + 4*a^3 + 4
*(a^3 + 3*a^2 + 6*a + 6)*b*x + 12*a^2 + 24*a + 24)*e^(-b*x - a)/b
```

giac [A] time = 0.37, size = 132, normalized size = 1.29

$$-\frac{\left(b^8x^4+4\,ab^7x^3+6\,a^2b^6x^2+4\,b^7x^3+4\,a^3b^5x+12\,ab^6x^2+a^4b^4+12\,a^2b^5x+12\,b^6x^2+4\,a^3b^4+24\,ab^5x+12}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^8*x^4 + 4*a*b^7*x^3 + 6*a^2*b^6*x^2 + 4*b^7*x^3 + 4*a^3*b^5*x + 12*a*b^
6*x^2 + a^4*b^4 + 12*a^2*b^5*x + 12*b^6*x^2 + 4*a^3*b^4 + 24*a*b^5*x + 12*a
^2*b^4 + 24*b^5*x + 24*a*b^4 + 24*b^4)*e^(-b*x - a)/b^5
```

maple [A] time = 0.01, size = 108, normalized size = 1.06

$$-\frac{\left(b^4x^4+4b^3x^3a+6a^2b^2x^2+4b^3x^3+4a^3bx+12a\,b^2x^2+a^4+12a^2bx+12b^2x^2+4a^3+24abx+12a^2+24bx+\right.}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*(b*x+a)^4,x)
```

```
[Out] -(b^4*x^4+4*a*b^3*x^3+6*a^2*b^2*x^2+4*b^3*x^3+4*a^3*b*x+12*a*b^2*x^2+a^4+12
*a^2*b*x+12*b^2*x^2+4*a^3+24*a*b*x+12*a^2+24*b*x+24*a+24)*exp(-b*x-a)/b
```

maxima [A] time = 0.61, size = 149, normalized size = 1.46

$$-\frac{4\,(bx+1)a^3e^{(-bx-a)}}{b}-\frac{a^4e^{(-bx-a)}}{b}-\frac{6\left(b^2x^2+2\,bx+2\right)a^2e^{(-bx-a)}}{b}-\frac{4\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)ae^{(-bx-a)}}{b}-\frac{\left(b^4x^4+4\,b\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -4*(b*x + 1)*a^3*e^(-b*x - a)/b - a^4*e^(-b*x - a)/b - 6*(b^2*x^2 + 2*b*x +
 2)*a^2*e^(-b*x - a)/b - 4*(b^3*x^3 + 3*b^2*x^2 + 6*b*x + 6)*a*e^(-b*x - a)
/b - (b^4*x^4 + 4*b^3*x^3 + 12*b^2*x^2 + 24*b*x + 24)*e^(-b*x - a)/b
```

mupad [B] time = 0.11, size = 120, normalized size = 1.18

$$-b^3\,x^4\,\mathrm{e}^{-a-b\,x}-x\,\mathrm{e}^{-a-b\,x}\,\left(4\,a^3+12\,a^2+24\,a+24\right)-\frac{\mathrm{e}^{-a-b\,x}\,\left(a^4+4\,a^3+12\,a^2+24\,a+24\right)}{b}-6\,b\,x^2\,\mathrm{e}^{-a-b\,x}\,\left(a^2+2\,a\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(- a - b*x)*(a + b*x)^4,x)
```

```
[Out] - b^3*x^4*exp(- a - b*x) - x*exp(- a - b*x)*(24*a + 12*a^2 + 4*a^3 + 24) -
(exp(- a - b*x)*(24*a + 12*a^2 + 4*a^3 + a^4 + 24))/b - 6*b*x^2*exp(- a - b
*x)*(2*a + a^2 + 2) - 4*b^2*x^3*exp(- a - b*x)*(a + 1)
```

sympy [A] time = 0.28, size = 158, normalized size = 1.55

$$\begin{cases} \frac{\left(-a^4-4a^3bx-4a^3-6a^2b^2x^2-12a^2bx-12a^2-4ab^3x^3-12ab^2x^2-24abx-24a-b^4x^4-4b^3x^3-12b^2x^2-24bx-24\right)e^{-a-bx}}{b} & \text{for}\ b\neq 0\\ a^4x+2a^3bx^2+2a^2b^2x^3+ab^3x^4+\frac{b^4x^5}{5} & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**4,x)
```

```
[Out] Piecewise(((-a**4 - 4*a**3*b*x - 4*a**3 - 6*a**2*b**2*x**2 - 12*a**2*b*x -
12*a**2 - 4*a*b**3*x**3 - 12*a*b**2*x**2 - 24*a*b*x - 24*a - b**4*x**4 - 4*
b**3*x**3 - 12*b**2*x**2 - 24*b*x - 24)*exp(-a - b*x)/b, Ne(b, 0)), (a**4*x
 + 2*a**3*b*x**2 + 2*a**2*b**2*x**3 + a*b**3*x**4 + b**4*x**5/5, True))
```

3.78 $\int \frac{e^{-a-bx}(a+bx)^4}{c+dx}\,dx$

Optimal. Leaf size=277

$$\frac{e^{\frac{bc}{d}-a}(bc-ad)^4\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+\frac{e^{-a-bx}(bc-ad)^3}{d^4}-\frac{e^{-a-bx}(bc-ad)^2}{d^3}-\frac{e^{-a-bx}(a+bx)(bc-ad)^2}{d^3}+\frac{2e^{-a-bx}(bc-ad)}{d^2}+\frac{e^{-a\cdot}}{}$$

```
[Out] -6*exp(-b*x-a)/d+2*(-a*d+b*c)*exp(-b*x-a)/d^2-(-a*d+b*c)^2*exp(-b*x-a)/d^3+
(-a*d+b*c)^3*exp(-b*x-a)/d^4-6*exp(-b*x-a)*(b*x+a)/d+2*(-a*d+b*c)*exp(-b*x-
a)*(b*x+a)/d^2-(-a*d+b*c)^2*exp(-b*x-a)*(b*x+a)/d^3-3*exp(-b*x-a)*(b*x+a)^2
/d+(-a*d+b*c)*exp(-b*x-a)*(b*x+a)^2/d^2-exp(-b*x-a)*(b*x+a)^3/d+(-a*d+b*c)^
4*exp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^5
```

Rubi [A] time = 0.34, antiderivative size = 277, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 4, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.160, Rules used = {2199, 2194, 2176, 2178}

$$\frac{e^{\frac{bc}{d}-a}(bc-ad)^4\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+\frac{e^{-a-bx}(bc-ad)^3}{d^4}-\frac{e^{-a-bx}(bc-ad)^2}{d^3}-\frac{e^{-a-bx}(a+bx)(bc-ad)^2}{d^3}+\frac{2e^{-a-bx}(bc-ad)}{d^2}+\frac{e^{-a\cdot}}{}$$

Antiderivative was successfully verified.

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

```
[Out] (-6*E^(-a - b*x))/d + (2*(b*c - a*d)*E^(-a - b*x))/d^2 - ((b*c - a*d)^2*E^(
-a - b*x))/d^3 + ((b*c - a*d)^3*E^(-a - b*x))/d^4 - (6*E^(-a - b*x)*(a + b*
x))/d + (2*(b*c - a*d)*E^(-a - b*x)*(a + b*x))/d^2 - ((b*c - a*d)^2*E^(-a -
 b*x)*(a + b*x))/d^3 - (3*E^(-a - b*x)*(a + b*x)^2)/d + ((b*c - a*d)*E^(-a
- b*x)*(a + b*x)^2)/d^2 - (E^(-a - b*x)*(a + b*x)^3)/d + ((b*c - a*d)^4*E^(
-a + (b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/d^5
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
```

```
reeQ[{F, c, d, e, f, g}, x] && !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] && !$UseGamma === True
```

Rubi steps

$$\int \frac{e^{-a-bx}(a+bx)^4}{c+dx}\,dx = \int \left(-\frac{b(bc-ad)^3e^{-a-bx}}{d^4}+\frac{b(bc-ad)^2e^{-a-bx}(a+bx)}{d^3}-\frac{b(bc-ad)e^{-a-bx}(a+bx)^2}{d^2}+\frac{be^{-a-}}{}\right.$$

$$=\frac{b\int e^{-a-bx}(a+bx)^3\,dx}{d}-\frac{(b(bc-ad))\int e^{-a-bx}(a+bx)^2\,dx}{d^2}+\frac{\left(b(bc-ad)^2\right)\int e^{-a-bx}(a+}{d^3}$$

$$=\frac{(bc-ad)^3e^{-a-bx}}{d^4}-\frac{(bc-ad)^2e^{-a-bx}(a+bx)}{d^3}+\frac{(bc-ad)e^{-a-bx}(a+bx)^2}{d^2}-\frac{e^{-a-bx}(a+bx)}{d}$$

$$=-\frac{(bc-ad)^2e^{-a-bx}}{d^3}+\frac{(bc-ad)^3e^{-a-bx}}{d^4}+\frac{2(bc-ad)e^{-a-bx}(a+bx)}{d^2}-\frac{(bc-ad)^2e^{-a-bx}(a+}{d^3}$$

$$=\frac{2(bc-ad)e^{-a-bx}}{d^2}-\frac{(bc-ad)^2e^{-a-bx}}{d^3}+\frac{(bc-ad)^3e^{-a-bx}}{d^4}-\frac{6e^{-a-bx}(a+bx)}{d}+\frac{2(bc-ad)e}{}$$

$$=-\frac{6e^{-a-bx}}{d}+\frac{2(bc-ad)e^{-a-bx}}{d^2}-\frac{(bc-ad)^2e^{-a-bx}}{d^3}+\frac{(bc-ad)^3e^{-a-bx}}{d^4}-\frac{6e^{-a-bx}(a+bx)}{d}+$$

Mathematica [A] time = 0.31, size = 175, normalized size = 0.63

$$\frac{e^{-a-bx}\left((bc-ad)^4e^{b\left(\frac{c}{d}+x\right)}\text{Ei}\left(-\frac{b(c+dx)}{d}\right)-d\left(2bd^2\left(\left(3a^2+4a+3\right)dx-\left(3a^2+2a+1\right)c\right)+2\left(2a^3+3a^2+4a+3\right)\right.\right.}{d^5}$$

Antiderivative was successfully verified.

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

```
[Out] (E^(-a - b*x)*(-(d*(2*(3 + 4*a + 3*a^2 + 2*a^3)*d^3 + 2*b*d^2*(-((1 + 2*a +
 3*a^2)*c) + (3 + 4*a + 3*a^2)*d*x) + b^2*d*((1 + 4*a)*c^2 - 2*(1 + 2*a)*c*
d*x + (3 + 4*a)*d^2*x^2) + b^3*(-c^3 + c^2*d*x - c*d^2*x^2 + d^3*x^3))) + (
b*c - a*d)^4*E^(b*(c/d + x))*ExpIntegralEi[-((b*(c + d*x))/d)]))/d^5
```

fricas [A] time = 0.41, size = 235, normalized size = 0.85

$$\left(b^4c^4 - 4\,ab^3c^3d + 6\,a^2b^2c^2d^2 - 4\,a^3bcd^3 + a^4d^4\right)\mathrm{Ei}\left(-\frac{bdx+bc}{d}\right)e^{\left(\frac{bc-ad}{d}\right)} - \left(b^3d^4x^3 - b^3c^3d + (4\,a+1)b^2c^2d^2 - 2\left(3\,a^2 \cdots\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [B] time = 0.40, size = 546, normalized size = 1.97

$$-\frac{b^3d^4x^3e^{(-bx-a)} - b^3cd^3x^2e^{(-bx-a)} + 4\,ab^2d^4x^2e^{(-bx-a)} - b^4c^4\mathrm{Ei}\left(-\frac{bdx+bc}{d}\right)e^{\left(-a+\frac{bc}{d}\right)} + 4\,ab^3c^3d\mathrm{Ei}\left(-\frac{bdx+bc}{d}\right)e^{\left(-a+\frac{bc}{d}\right)} - \cdots}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(b^3*d^4*x^3*e^(-b*x - a) - b^3*c*d^3*x^2*e^(-b*x - a) + 4*a*b^2*d^4*x^2*e
^(-b*x - a) - b^4*c^4*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 4*a*b^3*c^3*d*E
i(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 6*a^2*b^2*c^2*d^2*Ei(-(b*d*x + b*c)/d)
*e^(-a + b*c/d) + 4*a^3*b*c*d^3*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - a^4*d
^4*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + b^3*c^2*d^2*x*e^(-b*x - a) - 4*a*b
^2*c*d^3*x*e^(-b*x - a) + 6*a^2*b*d^4*x*e^(-b*x - a) + 3*b^2*d^4*x^2*e^(-b*
x - a) - b^3*c^3*d*e^(-b*x - a) + 4*a*b^2*c^2*d^2*e^(-b*x - a) - 6*a^2*b*c*
d^3*e^(-b*x - a) + 4*a^3*d^4*e^(-b*x - a) - 2*b^2*c*d^3*x*e^(-b*x - a) + 8*
a*b*d^4*x*e^(-b*x - a) + b^2*c^2*d^2*e^(-b*x - a) - 4*a*b*c*d^3*e^(-b*x - a
) + 6*a^2*d^4*e^(-b*x - a) + 6*b*d^4*x*e^(-b*x - a) - 2*b*c*d^3*e^(-b*x - a
) + 8*a*d^4*e^(-b*x - a) + 6*d^4*e^(-b*x - a))/d^5
```

maple [A] time = 0.02, size = 489, normalized size = 1.77

$$-\frac{\frac{a^3b\,\mathrm{e}^{-bx-a}}{d} - \frac{3a^2b^2c\,\mathrm{e}^{-bx-a}}{d^2} + \frac{3a\,b^3c^2\mathrm{e}^{-bx-a}}{d^3} - \frac{b^4c^3\mathrm{e}^{-bx-a}}{d^4} - \frac{\left((-bx-a)\mathrm{e}^{-bx-a}-\mathrm{e}^{-bx-a}\right)a^2b}{d} + \frac{2\left((-bx-a)\mathrm{e}^{-bx-a}-\mathrm{e}^{-bx-a}\right)a\,b^2c}{d^2} - \frac{\left((-bx-a)\mathrm{e}^{-bx-a} \cdots\right.}{d^3} \cdots}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/b*(-b/d*((-b*x-a)^3*exp(-b*x-a)-3*(-b*x-a)^2*exp(-b*x-a)+6*(-b*x-a)*exp(
-b*x-a)-6*exp(-b*x-a))+1/d*b*a*((-b*x-a)^2*exp(-b*x-a)-2*(-b*x-a)*exp(-b*x-
a)+2*exp(-b*x-a))-1/d^2*b^2*c*((-b*x-a)^2*exp(-b*x-a)-2*(-b*x-a)*exp(-b*x-a
)+2*exp(-b*x-a))-1/d*b*a^2*((-b*x-a)*exp(-b*x-a)-exp(-b*x-a))+2/d^2*b^2*a*c
*((-b*x-a)*exp(-b*x-a)-exp(-b*x-a))-1/d^3*b^3*c^2*((-b*x-a)*exp(-b*x-a)-exp
(-b*x-a))+1/d*b*a^3*exp(-b*x-a)-3/d^2*b^2*a^2*c*exp(-b*x-a)+3/d^3*b^3*a*c^2
*exp(-b*x-a)-1/d^4*b^4*c^3*exp(-b*x-a)+(a^4*d^4-4*a^3*b*c*d^3+6*a^2*b^2*c^2
*d^2-4*a*b^3*c^3*d+b^4*c^4)*b/d^5*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d)
)
```

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

$$-\frac{a^4 e^{\left(-a+\frac{bc}{d}\right)} E_1\left(\frac{(dx+c)b}{d}\right)}{d} - \frac{\left(b^3 d^2 x^4 + \left(4\,ab^2 d^2 + 3\,b^2 d^2\right)x^3 + \left(6\,a^2 b d^2 + b^2 c d + 8\,abd^2 + 6\,bd^2\right)x^2 + \left(4\,a^3 d^2 - b^2 c^2\right.}{d^3 x e^a + c d^2 e^a}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -a^4*e^(-a + b*c/d)*exp_integral_e(1, (d*x + c)*b/d)/d - (b^3*d^2*x^4 + (4*
a*b^2*d^2 + 3*b^2*d^2)*x^3 + (6*a^2*b*d^2 + b^2*c*d + 8*a*b*d^2 + 6*b*d^2)*
x^2 + (4*a^3*d^2 - b^2*c^2 + 6*a^2*d^2 + 4*b*c*d + 4*(b*c*d + 2*d^2)*a + 6*
d^2)*x)*e^(-b*x)/(d^3*x*e^a + c*d^2*e^a) + integrate((4*a^3*c*d^2 - b^2*c^3
 + 6*a^2*c*d^2 + 4*b*c^2*d + 6*c*d^2 + 4*(b*c^2*d + 2*c*d^2)*a + (b^3*c^3 +
 6*a^2*b*c*d^2 - 2*b^2*c^2*d + 6*b*c*d^2 - 4*(b^2*c^2*d - 2*b*c*d^2)*a)*x)*
e^(-b*x)/(d^4*x^2*e^a + 2*c*d^3*x*e^a + c^2*d^2*e^a), x)
```

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

$$\int \frac{\mathrm{e}^{-a-b\,x}\,{\left(a+b\,x\right)}^4}{c+d\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int((exp(- a - b*x)*(a + b*x)^4)/(c + d*x), x)
```

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

$$\left(\int \frac{a^4}{ce^{bx} + dxe^{bx}}\,dx + \int \frac{b^4 x^4}{ce^{bx} + dxe^{bx}}\,dx + \int \frac{4ab^3 x^3}{ce^{bx} + dxe^{bx}}\,dx + \int \frac{6a^2 b^2 x^2}{ce^{bx} + dxe^{bx}}\,dx + \int \frac{4a^3 bx}{ce^{bx} + dxe^{bx}}\,dx\right) e^{-a}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (Integral(a**4/(c*exp(b*x) + d*x*exp(b*x)), x) + Integral(b**4*x**4/(c*exp(
b*x) + d*x*exp(b*x)), x) + Integral(4*a*b**3*x**3/(c*exp(b*x) + d*x*exp(b*x
)), x) + Integral(6*a**2*b**2*x**2/(c*exp(b*x) + d*x*exp(b*x)), x) + Integr
al(4*a**3*b*x/(c*exp(b*x) + d*x*exp(b*x)), x))*exp(-a)
```

3.79 $\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^2} \, dx$

Optimal. Leaf size=258

$$-\frac{b^3e^{-a-bx}(c+dx)^2}{d^4}+\frac{4b^2e^{-a-bx}(c+dx)(bc-ad)}{d^4}-\frac{2b^2e^{-a-bx}(c+dx)}{d^3}-\frac{be^{\frac{bc}{d}-a}(bc-ad)^4\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^6}-\frac{4be^{\frac{bc}{d}-a}(bc-$$

```
[Out] -2*b*exp(-b*x-a)/d^2+4*b*(-a*d+b*c)*exp(-b*x-a)/d^3-6*b*(-a*d+b*c)^2*exp(-b
*x-a)/d^4-(-a*d+b*c)^4*exp(-b*x-a)/d^5/(d*x+c)-2*b^2*exp(-b*x-a)*(d*x+c)/d^
3+4*b^2*(-a*d+b*c)*exp(-b*x-a)*(d*x+c)/d^4-b^3*exp(-b*x-a)*(d*x+c)^2/d^4-4*
b*(-a*d+b*c)^3*exp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^5-b*(-a*d+b*c)^4*exp(-a+b*c
/d)*Ei(-b*(d*x+c)/d)/d^6
```

Rubi [A] time = 0.38, antiderivative size = 258, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 5, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {2199, 2194, 2177, 2178, 2176}

$$\frac{4b^2e^{-a-bx}(c+dx)(bc-ad)}{d^4}-\frac{b^3e^{-a-bx}(c+dx)^2}{d^4}-\frac{2b^2e^{-a-bx}(c+dx)}{d^3}-\frac{be^{\frac{bc}{d}-a}(bc-ad)^4\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^6}-\frac{4be^{\frac{bc}{d}-a}(bc-a$$

Antiderivative was successfully verified.

```
[In] Int[(E^(-a - b*x)*(a + b*x)^4)/(c + d*x)^2,x]
```

```
[Out] (-2*b*E^(-a - b*x))/d^2 + (4*b*(b*c - a*d)*E^(-a - b*x))/d^3 - (6*b*(b*c -
a*d)^2*E^(-a - b*x))/d^4 - ((b*c - a*d)^4*E^(-a - b*x))/(d^5*(c + d*x)) - (
2*b^2*E^(-a - b*x)*(c + d*x))/d^3 + (4*b^2*(b*c - a*d)*E^(-a - b*x)*(c + d*
x))/d^4 - (b^3*E^(-a - b*x)*(c + d*x)^2)/d^4 - (4*b*(b*c - a*d)^3*E^(-a + (
b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/d^5 - (b*(b*c - a*d)^4*E^(-a + (
b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/d^6
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
```

```
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^2}\,dx = \int \left(\frac{6b^2(bc-ad)^2e^{-a-bx}}{d^4} + \frac{(-bc+ad)^4e^{-a-bx}}{d^4(c+dx)^2} - \frac{4b(bc-ad)^3e^{-a-bx}}{d^4(c+dx)} - \frac{4b^3(bc-ad)e^{-a-bx}(c}{d^4}\right.$$

$$= \frac{b^4\int e^{-a-bx}(c+dx)^2\,dx}{d^4} - \frac{\left(4b^3(bc-ad)\right)\int e^{-a-bx}(c+dx)\,dx}{d^4} + \frac{\left(6b^2(bc-ad)^2\right)\int e^{-a-bx}\,d}{d^4}$$

$$= -\frac{6b(bc-ad)^2e^{-a-bx}}{d^4} - \frac{(bc-ad)^4e^{-a-bx}}{d^5(c+dx)} + \frac{4b^2(bc-ad)e^{-a-bx}(c+dx)}{d^4} - \frac{b^3e^{-a-bx}(c+dx)^2}{d^4}$$

$$= \frac{4b(bc-ad)e^{-a-bx}}{d^3} - \frac{6b(bc-ad)^2e^{-a-bx}}{d^4} - \frac{(bc-ad)^4e^{-a-bx}}{d^5(c+dx)} - \frac{2b^2e^{-a-bx}(c+dx)}{d^3} + \frac{4b^2(bc}{}$$

$$= -\frac{2be^{-a-bx}}{d^2} + \frac{4b(bc-ad)e^{-a-bx}}{d^3} - \frac{6b(bc-ad)^2e^{-a-bx}}{d^4} - \frac{(bc-ad)^4e^{-a-bx}}{d^5(c+dx)} - \frac{2b^2e^{-a-bx}(c+d}{d^3}$$

Mathematica [A] time = 0.44, size = 163, normalized size = 0.63

$$\frac{e^{-a}\left(-\frac{de^{-bx}\left(bd(c+dx)\left(2\left(3a^2+2a+1\right)d^2-2(4a+1)bcd+3b^2c^2\right)-2b^2d^2x(c+dx)(bc-(2a+1)d)+(bc-ad)^4+b^3d^3x^2(c+dx)\right)}{c+dx}-be^{\frac{bc}{d}}(bc-(a-4)d)(bc\right.}{d^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[(E^(-a - b*x)*(a + b*x)^4)/(c + d*x)^2,x]
```

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

fricas [A] time = 0.42, size = 353, normalized size = 1.37

$$-\frac{\left(b^5c^5-4\,(a-1)b^4c^4d+6\left(a^2-2\,a\right)b^3c^3d^2-4\left(a^3-3\,a^2\right)b^2c^2d^3+\left(a^4-4\,a^3\right)bcd^4+\left(b^5c^4d-4\,(a-1)b^4c^3d^2+\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^2,x, algorithm="fricas")
```

```
[Out] -((b^5*c^5 - 4*(a - 1)*b^4*c^4*d + 6*(a^2 - 2*a)*b^3*c^3*d^2 - 4*(a^3 - 3*a
^2)*b^2*c^2*d^3 + (a^4 - 4*a^3)*b*c*d^4 + (b^5*c^4*d - 4*(a - 1)*b^4*c^3*d^
2 + 6*(a^2 - 2*a)*b^3*c^2*d^3 - 4*(a^3 - 3*a^2)*b^2*c*d^4 + (a^4 - 4*a^3)*b
*d^5)*x)*Ei(-(b*d*x + b*c)/d)*e^((b*c - a*d)/d) + (b^3*d^5*x^3 + b^4*c^4*d
- (4*a - 3)*b^3*c^3*d^2 + a^4*d^5 + 2*(3*a^2 - 4*a - 1)*b^2*c^2*d^3 - 2*(2*
a^3 - 3*a^2 - 2*a - 1)*b*c*d^4 - (b^3*c*d^4 - 2*(2*a + 1)*b^2*d^5)*x^2 + (b
^3*c^2*d^3 - 4*a*b^2*c*d^4 + 2*(3*a^2 + 2*a + 1)*b*d^5)*x)*e^(-b*x - a))/(d
^7*x + c*d^6)
```

giac [B] time = 0.69, size = 2861, normalized size = 11.09

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^2,x, algorithm="giac")
```

```
[Out] -((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^6*c^4*Ei(-((d*x + c)*(b -
 b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + b^7*c^5
*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c
 - a*d)/d) - 4*(d*x + c)*a*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^5*c^3*d*Ei
(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c -
```

a*d)/d) - 5*a*b^6*c^4*d*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + 6*(d*x + c)*a^2*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^4*c^2*d^2*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + 10*a^2*b^5*c^3*d^2*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) - 4*(d*x + c)*a^3*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^3*c*d^3*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) - 10*a^3*b^4*c^2*d^3*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + (d*x + c)*a^4*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^2*d^4*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + 5*a^4*b^3*c*d^4*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) - a^5*b^2*d^5*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + 4*(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^5*c^3*d*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + 4*b^6*c^4*d*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) - 12*(d*x + c)*a*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^4*c^2*d^2*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) - 16*a*b^5*c^3*d^2*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + 12*(d*x + c)*a^2*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^3*c*d^3*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + 24*a^2*b^4*c^2*d^3*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) - 4*(d*x + c)*a^3*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^2*d^4*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) - 16*a^3*b^3*c*d^4*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + 4*a^4*b^2*d^5*Ei(-((d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c)) + b*c - a*d)/d)*e^((b*c - a*d)/d) + b^6*c^4*d*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) - 4*a*b^5*c^3*d^2*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + 6*a^2*b^4*c^2*d^3*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) - 4*a^3*b^3*c*d^4*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + a^4*b^2*d^5*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + (d*x + c)^3*(b - b*c/(d*x + c) + a*d/(d*x + c))^3*b^2*d^2*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) - (d*x + c)^2*(b - b*c/(d*x + c) + a*d/(d*x + c))^2*b^3*c*d^2*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + (d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^4*c^2*d^2*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + 3*b^5*c^3*d^2*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + (d*x + c)^2*a*(b - b*c/(d*x + c) + a*d/(d*x + c))^2*b^2*d^3*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) - 2*(d*x + c)*a*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^3*c*d^3*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) - 9*a*b^4*c^2*d^3*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + (d*x + c)*a^2*(b - b*c/(d*x + c) + a*d/(d*x + c))*b^2*d^4*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + 9*a^2*b^3*c*d^4*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) - 3*a^3*b^2*d^5*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x

```
 + c))/d) + 2*(d*x + c)^2*(b - b*c/(d*x + c) + a*d/(d*x + c))^2*b^2*d^3*e^(
-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) - 2*b^4*c^2*d^3*e^(-(d*x
+ c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + 4*a*b^3*c*d^4*e^(-(d*x + c)*(
b - b*c/(d*x + c) + a*d/(d*x + c))/d) - 2*a^2*b^2*d^5*e^(-(d*x + c)*(b - b*
c/(d*x + c) + a*d/(d*x + c))/d) + 2*(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x
 + c))*b^2*d^4*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) + 2*b^3
*c*d^4*e^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d) - 2*a*b^2*d^5*e
^(-(d*x + c)*(b - b*c/(d*x + c) + a*d/(d*x + c))/d))*d^2/((((d*x + c)*(b - b
*c/(d*x + c) + a*d/(d*x + c))*d^8 + b*c*d^8 - a*d^9)*b)
```

maple [A] time = 0.02, size = 406, normalized size = 1.57

$$-\frac{\frac{3a^2b^2e^{-bx-a}}{d^2} - \frac{6ab^3c\,e^{-bx-a}}{d^3} + \frac{3b^4c^2e^{-bx-a}}{d^4} - \frac{2\left((-bx-a)e^{-bx-a}-e^{-bx-a}\right)ab^2}{d^2} + \frac{2\left((-bx-a)e^{-bx-a}-e^{-bx-a}\right)b^3c}{d^3} + \frac{\left((-bx-a)^2e^{-bx-a}-2(-bx-a)e\cdots\right.}{d^2}}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^2,x)
```

```
[Out] -1/b*(b^2/d^2*((-b*x-a)^2*exp(-b*x-a)-2*(-b*x-a)*exp(-b*x-a)+2*exp(-b*x-a))
-2/d^2*b^2*a*((-b*x-a)*exp(-b*x-a)-exp(-b*x-a))+2/d^3*b^3*c*((-b*x-a)*exp(-
b*x-a)-exp(-b*x-a))+3/d^2*b^2*a^2*exp(-b*x-a)-6/d^3*b^3*a*c*exp(-b*x-a)+3/d
^4*b^4*c^2*exp(-b*x-a)+(a^4*d^4-4*a^3*b*c*d^3+6*a^2*b^2*c^2*d^2-4*a*b^3*c^3
*d+b^4*c^4)*b^2/d^6*(-exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)-exp(-(a*d-b*c)/d)*Ei
(1,b*x+a-(a*d-b*c)/d))+4/d^5*(a^3*d^3-3*a^2*b*c*d^2+3*a*b^2*c^2*d-b^3*c^3)*
b^2*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))
```

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

$$-\frac{a^4e^{\left(-a+\frac{bc}{d}\right)}E_2\left(\frac{(dx+c)b}{d}\right)}{(dx+c)d}-\frac{\left(b^3d^2x^4+2\left(2\,ab^2d^2+b^2d^2\right)x^3+2\left(3\,a^2bd^2+b^2cd+2\,abd^2+bd^2\right)x^2+2\left(2\,a^3d^2-b^2c\cdots\right.\right.}{d^4x^2e^a+2\,cd^3xe^a+c^2d^2e^a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^2,x, algorithm="maxima")
```

```
[Out] -a^4*e^(-a + b*c/d)*exp_integral_e(2, (d*x + c)*b/d)/((d*x + c)*d) - (b^3*d
^2*x^4 + 2*(2*a*b^2*d^2 + b^2*d^2)*x^3 + 2*(3*a^2*b*d^2 + b^2*c*d + 2*a*b*d
^2 + b*d^2)*x^2 + 2*(2*a^3*d^2 - b^2*c^2 + 4*a*b*c*d + 2*b*c*d)*x)*e^(-b*x)
/(d^4*x^2*e^a + 2*c*d^3*x*e^a + c^2*d^2*e^a) - integrate(-2*(2*a^3*c*d^2 -
b^2*c^3 + 4*a*b*c^2*d + 2*b*c^2*d + (b^3*c^3 - 4*a*b^2*c^2*d + 6*a^2*b*c*d^
2 - 2*a^3*d^3 + b^2*c^2*d)*x)*e^(-b*x)/(d^5*x^3*e^a + 3*c*d^4*x^2*e^a + 3*c
^2*d^3*x*e^a + c^3*d^2*e^a), x)
```

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

$$\int \frac{\mathrm{e}^{-a-b\,x}\,(a+b\,x)^4}{(c+d\,x)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(- a - b*x)*(a + b*x)^4)/(c + d*x)^2,x)
```

```
[Out] int((exp(- a - b*x)*(a + b*x)^4)/(c + d*x)^2, x)
```

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

$$\left(\int \frac{a^4}{c^2e^{bx}+2cdxe^{bx}+d^2x^2e^{bx}}\,dx+\int \frac{b^4x^4}{c^2e^{bx}+2cdxe^{bx}+d^2x^2e^{bx}}\,dx+\int \frac{4ab^3x^3}{c^2e^{bx}+2cdxe^{bx}+d^2x^2e^{bx}}\,dx+\int \frac{}{c^2e^{bx}}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**4/(d*x+c)**2,x)
```

```
[Out] (Integral(a**4/(c**2*exp(b*x) + 2*c*d*x*exp(b*x) + d**2*x**2*exp(b*x)), x)
+ Integral(b**4*x**4/(c**2*exp(b*x) + 2*c*d*x*exp(b*x) + d**2*x**2*exp(b*x)
), x) + Integral(4*a*b**3*x**3/(c**2*exp(b*x) + 2*c*d*x*exp(b*x) + d**2*x**
2*exp(b*x)), x) + Integral(6*a**2*b**2*x**2/(c**2*exp(b*x) + 2*c*d*x*exp(b*
x) + d**2*x**2*exp(b*x)), x) + Integral(4*a**3*b*x/(c**2*exp(b*x) + 2*c*d*x
*exp(b*x) + d**2*x**2*exp(b*x)), x))*exp(-a)
```

3.80 $\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^3}\,dx$

Optimal. Leaf size=294

$$-\frac{b^3xe^{-a-bx}}{d^3}+\frac{b^2e^{\frac{bc}{d}-a}(bc-ad)^4\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{2d^7}+\frac{4b^2e^{\frac{bc}{d}-a}(bc-ad)^3\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^6}+\frac{6b^2e^{\frac{bc}{d}-a}(bc-ad)^2\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+$$

```
[Out] -b^2*exp(-b*x-a)/d^3+b^2*(-4*a*d+3*b*c)*exp(-b*x-a)/d^4-b^3*exp(-b*x-a)*x/d
^3-1/2*(-a*d+b*c)^4*exp(-b*x-a)/d^5/(d*x+c)^2+4*b*(-a*d+b*c)^3*exp(-b*x-a)/
d^5/(d*x+c)+1/2*b*(-a*d+b*c)^4*exp(-b*x-a)/d^6/(d*x+c)+6*b^2*(-a*d+b*c)^2*e
xp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^5+4*b^2*(-a*d+b*c)^3*exp(-a+b*c/d)*Ei(-b*(d
*x+c)/d)/d^6+1/2*b^2*(-a*d+b*c)^4*exp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^7
```

Rubi [A] time = 0.41, antiderivative size = 294, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 5, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {2199, 2194, 2176, 2177, 2178}

$$\frac{b^2e^{\frac{bc}{d}-a}(bc-ad)^4\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{2d^7}+\frac{4b^2e^{\frac{bc}{d}-a}(bc-ad)^3\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^6}+\frac{6b^2e^{\frac{bc}{d}-a}(bc-ad)^2\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+\frac{b^2e^{-a-bx}(3bc-}{d^4}$$

Antiderivative was successfully verified.

```
[In] Int[(E^(-a - b*x)*(a + b*x)^4)/(c + d*x)^3,x]
```

```
[Out] -((b^2*E^(-a - b*x))/d^3) + (b^2*(3*b*c - 4*a*d)*E^(-a - b*x))/d^4 - (b^3*E
^(-a - b*x)*x)/d^3 - ((b*c - a*d)^4*E^(-a - b*x))/(2*d^5*(c + d*x)^2) + (4*
b*(b*c - a*d)^3*E^(-a - b*x))/(d^5*(c + d*x)) + (b*(b*c - a*d)^4*E^(-a - b*
x))/(2*d^6*(c + d*x)) + (6*b^2*(b*c - a*d)^2*E^(-a + (b*c)/d)*ExpIntegralEi
[-((b*(c + d*x))/d)])/d^5 + (4*b^2*(b*c - a*d)^3*E^(-a + (b*c)/d)*ExpIntegr
alEi[-((b*(c + d*x))/d)])/d^6 + (b^2*(b*c - a*d)^4*E^(-a + (b*c)/d)*ExpInte
gralEi[-((b*(c + d*x))/d)])/(2*d^7)
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
```

```
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^3}\,dx = \int \left(-\frac{b^3(3bc-4ad)e^{-a-bx}}{d^4}+\frac{b^4e^{-a-bx}x}{d^3}+\frac{(-bc+ad)^4e^{-a-bx}}{d^4(c+dx)^3}-\frac{4b(bc-ad)^3e^{-a-bx}}{d^4(c+dx)^2}+\frac{6b^2(b}{d}\right.$$

$$=\frac{b^4\int e^{-a-bx}x\,dx}{d^3}-\frac{\left(b^3(3bc-4ad)\right)\int e^{-a-bx}\,dx}{d^4}+\frac{\left(6b^2(bc-ad)^2\right)\int \frac{e^{-a-bx}}{c+dx}\,dx}{d^4}-\frac{\left(4b(bc-ad\right.}{}$$

$$=\frac{b^2(3bc-4ad)e^{-a-bx}}{d^4}-\frac{b^3e^{-a-bx}x}{d^3}-\frac{(bc-ad)^4e^{-a-bx}}{2d^5(c+dx)^2}+\frac{4b(bc-ad)^3e^{-a-bx}}{d^5(c+dx)}+\frac{6b^2(bc-ad)^2}{}$$

$$=-\frac{b^2e^{-a-bx}}{d^3}+\frac{b^2(3bc-4ad)e^{-a-bx}}{d^4}-\frac{b^3e^{-a-bx}x}{d^3}-\frac{(bc-ad)^4e^{-a-bx}}{2d^5(c+dx)^2}+\frac{4b(bc-ad)^3e^{-a-bx}}{d^5(c+dx)}+$$

$$=-\frac{b^2e^{-a-bx}}{d^3}+\frac{b^2(3bc-4ad)e^{-a-bx}}{d^4}-\frac{b^3e^{-a-bx}x}{d^3}-\frac{(bc-ad)^4e^{-a-bx}}{2d^5(c+dx)^2}+\frac{4b(bc-ad)^3e^{-a-bx}}{d^5(c+dx)}+$$

Mathematica [A] time = 0.66, size = 267, normalized size = 0.91

$$\frac{e^{-a}\left(b^2e^{\frac{bc}{d}}\left(\left(a^2-8a+12\right)d^2-2(a-4)bcd+b^2c^2\right)(bc-ad)^2\text{Ei}\left(-\frac{b(c+dx)}{d}\right)+\frac{de^{-bx}\left(-a^4d^5+a^3bd^4((a-4)c+(a-8)dx)+2b^3d^2\left(\left(\right.\right.\right.}{}\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(E^(-a - b*x)*(a + b*x)^4)/(c + d*x)^3,x]
```

```
[Out] ((d*(-(a^4*d^5) + b^5*c^4*(c + d*x) + a^3*b*d^4*((-4 + a)*c + (-8 + a)*d*x)
 + b^4*c^3*d*((7 - 4*a)*c - 4*(-2 + a)*d*x) - 2*b^2*d^3*((1 + 4*a - 9*a^2 +
 2*a^3)*c^2 + 2*(1 + 4*a - 6*a^2 + a^3)*c*d*x + (1 + 4*a)*d^2*x^2) + 2*b^3*
d^2*((3 - 10*a + 3*a^2)*c^3 + (5 - 12*a + 3*a^2)*c^2*d*x + c*d^2*x^2 - d^3*
x^3)))/(E^(b*x)*(c + d*x)^2) + b^2*(b*c - a*d)^2*(b^2*c^2 - 2*(-4 + a)*b*c*
d + (12 - 8*a + a^2)*d^2)*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/(2
*d^7*E^a)
```

fricas [A] time = 0.46, size = 550, normalized size = 1.87

$$\frac{\left(b^6c^6-4\,(a-2)b^5c^5d+6\left(a^2-4\,a+2\right)b^4c^4d^2-4\left(a^3-6\,a^2+6\,a\right)b^3c^3d^3+\left(a^4-8\,a^3+12\,a^2\right)b^2c^2d^4+\left(b^6c^4d^2\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^3,x, algorithm="fricas")
```

```
[Out] 1/2*((b^6*c^6 - 4*(a - 2)*b^5*c^5*d + 6*(a^2 - 4*a + 2)*b^4*c^4*d^2 - 4*(a^
3 - 6*a^2 + 6*a)*b^3*c^3*d^3 + (a^4 - 8*a^3 + 12*a^2)*b^2*c^2*d^4 + (b^6*c^
4*d^2 - 4*(a - 2)*b^5*c^3*d^3 + 6*(a^2 - 4*a + 2)*b^4*c^2*d^4 - 4*(a^3 - 6*
a^2 + 6*a)*b^3*c*d^5 + (a^4 - 8*a^3 + 12*a^2)*b^2*d^6)*x^2 + 2*(b^6*c^5*d -
 4*(a - 2)*b^5*c^4*d^2 + 6*(a^2 - 4*a + 2)*b^4*c^3*d^3 - 4*(a^3 - 6*a^2 + 6
*a)*b^3*c^2*d^4 + (a^4 - 8*a^3 + 12*a^2)*b^2*c*d^5)*x)*Ei(-(b*d*x + b*c)/d)
*e^((b*c - a*d)/d) - (2*b^3*d^6*x^3 - b^5*c^5*d + (4*a - 7)*b^4*c^4*d^2 - 2
*(3*a^2 - 10*a + 3)*b^3*c^3*d^3 + a^4*d^6 + 2*(2*a^3 - 9*a^2 + 4*a + 1)*b^2
*c^2*d^4 - (a^4 - 4*a^3)*b*c*d^5 - 2*(b^3*c*d^5 - (4*a + 1)*b^2*d^6)*x^2 -
(b^5*c^4*d^2 - 4*(a - 2)*b^4*c^3*d^3 + 2*(3*a^2 - 12*a + 5)*b^3*c^2*d^4 - 4
*(a^3 - 6*a^2 + 4*a + 1)*b^2*c*d^5 + (a^4 - 8*a^3)*b*d^6)*x)*e^(-b*x - a))/
(d^9*x^2 + 2*c*d^8*x + c^2*d^7)
```

giac [B] time = 0.47, size = 1995, normalized size = 6.79

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^3,x, algorithm="giac")

[Out] 1/2*(b^6*c^4*d^2*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 4*a*b^5*c^3*d^3*
x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 6*a^2*b^4*c^2*d^4*x^2*Ei(-(b*d*x
+ b*c)/d)*e^(-a + b*c/d) - 4*a^3*b^3*c*d^5*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a +
 b*c/d) + a^4*b^2*d^6*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 2*b^6*c^5*d
*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 8*a*b^5*c^4*d^2*x*Ei(-(b*d*x + b*c
)/d)*e^(-a + b*c/d) + 12*a^2*b^4*c^3*d^3*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c
/d) - 8*a^3*b^3*c^2*d^4*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 2*a^4*b^2*c
*d^5*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 8*b^5*c^3*d^3*x^2*Ei(-(b*d*x +
 b*c)/d)*e^(-a + b*c/d) - 24*a*b^4*c^2*d^4*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a +
 b*c/d) + 24*a^2*b^3*c*d^5*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 8*a^3*
b^2*d^6*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + b^6*c^6*Ei(-(b*d*x + b*c)
/d)*e^(-a + b*c/d) - 4*a*b^5*c^5*d*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 6*
a^2*b^4*c^4*d^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 4*a^3*b^3*c^3*d^3*Ei(
-(b*d*x + b*c)/d)*e^(-a + b*c/d) + a^4*b^2*c^2*d^4*Ei(-(b*d*x + b*c)/d)*e^(
-a + b*c/d) + 16*b^5*c^4*d^2*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 48*a*b
^4*c^3*d^3*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 48*a^2*b^3*c^2*d^4*x*Ei(
-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 16*a^3*b^2*c*d^5*x*Ei(-(b*d*x + b*c)/d)*
e^(-a + b*c/d) + 12*b^4*c^2*d^4*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 2
4*a*b^3*c*d^5*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 12*a^2*b^2*d^6*x^2*
Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + b^5*c^4*d^2*x*e^(-b*x - a) - 4*a*b^4*
c^3*d^3*x*e^(-b*x - a) + 6*a^2*b^3*c^2*d^4*x*e^(-b*x - a) - 4*a^3*b^2*c*d^5
*x*e^(-b*x - a) + a^4*b*d^6*x*e^(-b*x - a) - 2*b^3*d^6*x^3*e^(-b*x - a) + 8
*b^5*c^5*d*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 24*a*b^4*c^4*d^2*Ei(-(b*d*
x + b*c)/d)*e^(-a + b*c/d) + 24*a^2*b^3*c^3*d^3*Ei(-(b*d*x + b*c)/d)*e^(-a
+ b*c/d) - 8*a^3*b^2*c^2*d^4*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 24*b^4*c
^3*d^3*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 48*a*b^3*c^2*d^4*x*Ei(-(b*d*
x + b*c)/d)*e^(-a + b*c/d) + 24*a^2*b^2*c*d^5*x*Ei(-(b*d*x + b*c)/d)*e^(-a
+ b*c/d) + b^5*c^5*d*e^(-b*x - a) - 4*a*b^4*c^4*d^2*e^(-b*x - a) + 6*a^2*b^
3*c^3*d^3*e^(-b*x - a) - 4*a^3*b^2*c^2*d^4*e^(-b*x - a) + a^4*b*c*d^5*e^(-b
*x - a) + 8*b^4*c^3*d^3*x*e^(-b*x - a) - 24*a*b^3*c^2*d^4*x*e^(-b*x - a) +
24*a^2*b^2*c*d^5*x*e^(-b*x - a) - 8*a^3*b*d^6*x*e^(-b*x - a) + 2*b^3*c*d^5*
x^2*e^(-b*x - a) - 8*a*b^2*d^6*x^2*e^(-b*x - a) + 12*b^4*c^4*d^2*Ei(-(b*d*x
 + b*c)/d)*e^(-a + b*c/d) - 24*a*b^3*c^3*d^3*Ei(-(b*d*x + b*c)/d)*e^(-a + b
*c/d) + 12*a^2*b^2*c^2*d^4*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 7*b^4*c^4*
d^2*e^(-b*x - a) - 20*a*b^3*c^3*d^3*e^(-b*x - a) + 18*a^2*b^2*c^2*d^4*e^(-b
*x - a) - 4*a^3*b*c*d^5*e^(-b*x - a) - a^4*d^6*e^(-b*x - a) + 10*b^3*c^2*d^
4*x*e^(-b*x - a) - 16*a*b^2*c*d^5*x*e^(-b*x - a) - 2*b^2*d^6*x^2*e^(-b*x -
a) + 6*b^3*c^3*d^3*e^(-b*x - a) - 8*a*b^2*c^2*d^4*e^(-b*x - a) - 4*b^2*c*d^
5*x*e^(-b*x - a) - 2*b^2*c^2*d^4*e^(-b*x - a))/(d^9*x^2 + 2*c*d^8*x + c^2*d
^7)
```

maple [A] time = 0.02, size = 418, normalized size = 1.42

$$-\frac{\frac{3a\,b^3 e^{-bx-a}}{d^3}-\frac{3b^4 c\,e^{-bx-a}}{d^4}-\frac{\left((-bx-a)e^{-bx-a}-e^{-bx-a}\right)b^3}{d^3}+\frac{6\left(a^2d^2-2abcd+b^2c^2\right)b^3\,\mathrm{Ei}\left(1,bx+a-\frac{ad-bc}{d}\right)e^{-\frac{ad-bc}{d}}}{d^5}+\frac{4\left(a^3d^3-3a^2bc\,d^2+3a\,b^2c^2d-b^3\right.}{}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^3,x)
```

```
[Out] -1/b*(-b^3/d^3*((-b*x-a)*exp(-b*x-a)-exp(-b*x-a))+3/d^3*b^3*a*exp(-b*x-a)-3
/d^4*b^4*c*exp(-b*x-a)-(a^4*d^4-4*a^3*b*c*d^3+6*a^2*b^2*c^2*d^2-4*a*b^3*c^3
*d+b^4*c^4)*b^3/d^7*(-1/2*exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)^2-1/2/(-b*x-a+(a
*d-b*c)/d)*exp(-b*x-a)-1/2*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))+4/d^6
*(a^3*d^3-3*a^2*b*c*d^2+3*a*b^2*c^2*d-b^3*c^3)*b^3*(-1/(-b*x-a+(a*d-b*c)/d)
*exp(-b*x-a)-exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))+6/d^5*(a^2*d^2-2*a*
b*c*d+b^2*c^2)*b^3*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))
```

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

$$-\frac{a^4 e^{\left(-a+\frac{bc}{d}\right)} E_3\left(\frac{(dx+c)b}{d}\right)}{(dx+c)^2 d}-\frac{\left(b^3d^2x^4+\left(4\,ab^2d^2+b^2d^2\right)x^3+3\left(2\,a^2bd^2+b^2cd\right)x^2+\left(4\,a^3d^2-3\,b^2c^2+12\,abcd-6\,a\right.}{d^5x^3e^a+3\,cd^4x^2e^a+3\,c^2d^3xe^a+c^3d^2e^a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^3,x, algorithm="maxima")
```

```
[Out] -a^4*e^(-a + b*c/d)*exp_integral_e(3, (d*x + c)*b/d)/((d*x + c)^2*d) - (b^3
*d^2*x^4 + (4*a*b^2*d^2 + b^2*d^2)*x^3 + 3*(2*a^2*b*d^2 + b^2*c*d)*x^2 + (4
*a^3*d^2 - 3*b^2*c^2 + 12*a*b*c*d - 6*a^2*d^2)*x)*e^(-b*x)/(d^5*x^3*e^a + 3
*c*d^4*x^2*e^a + 3*c^2*d^3*x*e^a + c^3*d^2*e^a) - integrate(-(4*a^3*c*d^2 -
 3*b^2*c^3 + 12*a*b*c^2*d - 6*a^2*c*d^2 + (3*b^3*c^3 - 8*a^3*d^3 + 12*b^2*c
^2*d + 6*(3*b*c*d^2 + 2*d^3)*a^2 - 12*(b^2*c^2*d + 2*b*c*d^2)*a)*x)*e^(-b*x
)/(d^6*x^4*e^a + 4*c*d^5*x^3*e^a + 6*c^2*d^4*x^2*e^a + 4*c^3*d^3*x*e^a + c^
4*d^2*e^a), x)
```

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

$$\int \frac{e^{-a-b\,x}\,{(a+b\,x)}^4}{{(c+d\,x)}^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(- a - b*x)*(a + b*x)^4)/(c + d*x)^3,x)
```

```
[Out] int((exp(- a - b*x)*(a + b*x)^4)/(c + d*x)^3, x)
```

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

$$\left(\int \frac{a^4}{c^3e^{bx} + 3c^2dxe^{bx} + 3cd^2x^2e^{bx} + d^3x^3e^{bx}}\,dx + \int \frac{b^4x^4}{c^3e^{bx} + 3c^2dxe^{bx} + 3cd^2x^2e^{bx} + d^3x^3e^{bx}}\,dx + \int \frac{}{c^3e^{bx} + 3c^2dx}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**4/(d*x+c)**3,x)
```

```
[Out] (Integral(a**4/(c**3*exp(b*x) + 3*c**2*d*x*exp(b*x) + 3*c*d**2*x**2*exp(b*x
) + d**3*x**3*exp(b*x)), x) + Integral(b**4*x**4/(c**3*exp(b*x) + 3*c**2*d*
x*exp(b*x) + 3*c*d**2*x**2*exp(b*x) + d**3*x**3*exp(b*x)), x) + Integral(4*
a*b**3*x**3/(c**3*exp(b*x) + 3*c**2*d*x*exp(b*x) + 3*c*d**2*x**2*exp(b*x) +
 d**3*x**3*exp(b*x)), x) + Integral(6*a**2*b**2*x**2/(c**3*exp(b*x) + 3*c**
2*d*x*exp(b*x) + 3*c*d**2*x**2*exp(b*x) + d**3*x**3*exp(b*x)), x) + Integra
l(4*a**3*b*x/(c**3*exp(b*x) + 3*c**2*d*x*exp(b*x) + 3*c*d**2*x**2*exp(b*x)
+ d**3*x**3*exp(b*x)), x))*exp(-a)
```

3.81 $\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^4} \, dx$

Optimal. Leaf size=396

$$-\frac{b^3 e^{\frac{bc}{d}-a}(bc-ad)^4 \text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{6d^8}-\frac{2b^3 e^{\frac{bc}{d}-a}(bc-ad)^3 \text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^7}-\frac{6b^3 e^{\frac{bc}{d}-a}(bc-ad)^2 \text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^6}-\frac{4b^3 e^{\frac{bc}{d}-a}(bc-}{}$$

```
[Out] -b^3*exp(-b*x-a)/d^4-1/3*(-a*d+b*c)^4*exp(-b*x-a)/d^5/(d*x+c)^3+2*b*(-a*d+b
*c)^3*exp(-b*x-a)/d^5/(d*x+c)^2+1/6*b*(-a*d+b*c)^4*exp(-b*x-a)/d^6/(d*x+c)^
2-6*b^2*(-a*d+b*c)^2*exp(-b*x-a)/d^5/(d*x+c)-2*b^2*(-a*d+b*c)^3*exp(-b*x-a)
/d^6/(d*x+c)-1/6*b^2*(-a*d+b*c)^4*exp(-b*x-a)/d^7/(d*x+c)-4*b^3*(-a*d+b*c)*
exp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^5-6*b^3*(-a*d+b*c)^2*exp(-a+b*c/d)*Ei(-b*(
d*x+c)/d)/d^6-2*b^3*(-a*d+b*c)^3*exp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^7-1/6*b^3
*(-a*d+b*c)^4*exp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^8
```

Rubi [A] time = 0.52, antiderivative size = 396, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 4, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.160, Rules used = {2199, 2194, 2177, 2178}

$$-\frac{b^3 e^{\frac{bc}{d}-a}(bc-ad)^4 \text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{6d^8}-\frac{2b^3 e^{\frac{bc}{d}-a}(bc-ad)^3 \text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^7}-\frac{6b^3 e^{\frac{bc}{d}-a}(bc-ad)^2 \text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^6}-\frac{4b^3 e^{\frac{bc}{d}-a}(bc-}{}$$

Antiderivative was successfully verified.

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

```
[Out] -((b^3*E^(-a - b*x))/d^4) - ((b*c - a*d)^4*E^(-a - b*x))/(3*d^5*(c + d*x)^3
) + (2*b*(b*c - a*d)^3*E^(-a - b*x))/(d^5*(c + d*x)^2) + (b*(b*c - a*d)^4*E
^(-a - b*x))/(6*d^6*(c + d*x)^2) - (6*b^2*(b*c - a*d)^2*E^(-a - b*x))/(d^5*
(c + d*x)) - (2*b^2*(b*c - a*d)^3*E^(-a - b*x))/(d^6*(c + d*x)) - (b^2*(b*c
 - a*d)^4*E^(-a - b*x))/(6*d^7*(c + d*x)) - (4*b^3*(b*c - a*d)*E^(-a + (b*c
)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/d^5 - (6*b^3*(b*c - a*d)^2*E^(-a +
(b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/d^6 - (2*b^3*(b*c - a*d)^3*E^(-
a + (b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/d^7 - (b^3*(b*c - a*d)^4*E^
(-a + (b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/(6*d^8)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^4}\,dx = \int \left(\frac{b^4e^{-a-bx}}{d^4} + \frac{(-bc+ad)^4e^{-a-bx}}{d^4(c+dx)^4} - \frac{4b(bc-ad)^3e^{-a-bx}}{d^4(c+dx)^3} + \frac{6b^2(bc-ad)^2e^{-a-bx}}{d^4(c+dx)^2} - \frac{4b^3(bc-}{d^4(c}\right.$$

$$= \frac{b^4\int e^{-a-bx}\,dx}{d^4} - \frac{\left(4b^3(bc-ad)\right)\int \frac{e^{-a-bx}}{c+dx}\,dx}{d^4} + \frac{\left(6b^2(bc-ad)^2\right)\int \frac{e^{-a-bx}}{(c+dx)^2}\,dx}{d^4} - \frac{\left(4b(bc-ad)^3\right.}{d}$$

$$= -\frac{b^3e^{-a-bx}}{d^4} - \frac{(bc-ad)^4e^{-a-bx}}{3d^5(c+dx)^3} + \frac{2b(bc-ad)^3e^{-a-bx}}{d^5(c+dx)^2} - \frac{6b^2(bc-ad)^2e^{-a-bx}}{d^5(c+dx)} - \frac{4b^3(bc-ad)e}{}$$

$$= -\frac{b^3e^{-a-bx}}{d^4} - \frac{(bc-ad)^4e^{-a-bx}}{3d^5(c+dx)^3} + \frac{2b(bc-ad)^3e^{-a-bx}}{d^5(c+dx)^2} + \frac{b(bc-ad)^4e^{-a-bx}}{6d^6(c+dx)^2} - \frac{6b^2(bc-ad)^2e^{-}}{d^5(c+dx)}$$

$$= -\frac{b^3e^{-a-bx}}{d^4} - \frac{(bc-ad)^4e^{-a-bx}}{3d^5(c+dx)^3} + \frac{2b(bc-ad)^3e^{-a-bx}}{d^5(c+dx)^2} + \frac{b(bc-ad)^4e^{-a-bx}}{6d^6(c+dx)^2} - \frac{6b^2(bc-ad)^2e^{-}}{d^5(c+dx)}$$

$$= -\frac{b^3e^{-a-bx}}{d^4} - \frac{(bc-ad)^4e^{-a-bx}}{3d^5(c+dx)^3} + \frac{2b(bc-ad)^3e^{-a-bx}}{d^5(c+dx)^2} + \frac{b(bc-ad)^4e^{-a-bx}}{6d^6(c+dx)^2} - \frac{6b^2(bc-ad)^2e^{-}}{d^5(c+dx)}$$

Mathematica [A] time = 0.82, size = 389, normalized size = 0.98

$$e^{-a}\left(-\left(b^3e^{\frac{bc}{d}}\left(6\left(a^2-6a+6\right)b^2c^2d^2-4\left(a^3-9a^2+18a-6\right)bcd^3+a\left(a^3-12a^2+36a-24\right)d^4-4(a-3)b^3c^3d\right.\right.\right.$$

Antiderivative was successfully verified.

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

```
[Out] (-((d*(2*a^4*d^6 + b^6*c^4*(c + d*x)^2 - a^3*b*d^5*((-4 + a)*c + (-12 + a)*
d*x) - b^5*c^3*d*(c + d*x)*((-11 + 4*a)*c + 4*(-3 + a)*d*x) + a^2*b^2*d^4*(
(12 - 8*a + a^2)*c^2 + 2*(18 - 10*a + a^2)*c*d*x + (-6 + a)^2*d^2*x^2) + 2*
b^4*c^2*d^2*((13 - 16*a + 3*a^2)*c^2 + 2*(15 - 17*a + 3*a^2)*c*d*x + 3*(6 -
 6*a + a^2)*d^2*x^2) + 2*b^3*d^3*((3 - 22*a + 15*a^2 - 2*a^3)*c^3 + (9 - 54
*a + 33*a^2 - 4*a^3)*c^2*d*x + (9 - 36*a + 18*a^2 - 2*a^3)*c*d^2*x^2 + 3*d^
3*x^3)))/(E^(b*x)*(c + d*x)^3)) - b^3*(b^4*c^4 - 4*(-3 + a)*b^3*c^3*d + 6*(
6 - 6*a + a^2)*b^2*c^2*d^2 - 4*(-6 + 18*a - 9*a^2 + a^3)*b*c*d^3 + a*(-24 +
 36*a - 12*a^2 + a^3)*d^4)*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/(
6*d^8*E^a)
```

fricas [B] time = 0.45, size = 793, normalized size = 2.00

$$-\frac{\left(b^7c^7 - 4\,(a-3)b^6c^6d + 6\left(a^2 - 6\,a + 6\right)b^5c^5d^2 - 4\left(a^3 - 9\,a^2 + 18\,a - 6\right)b^4c^4d^3 + \left(a^4 - 12\,a^3 + 36\,a^2 - 24\,a\right)b^3}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/6*((b^7*c^7 - 4*(a - 3)*b^6*c^6*d + 6*(a^2 - 6*a + 6)*b^5*c^5*d^2 - 4*(a
^3 - 9*a^2 + 18*a - 6)*b^4*c^4*d^3 + (a^4 - 12*a^3 + 36*a^2 - 24*a)*b^3*c^3
*d^4 + (b^7*c^4*d^3 - 4*(a - 3)*b^6*c^3*d^4 + 6*(a^2 - 6*a + 6)*b^5*c^2*d^5
 - 4*(a^3 - 9*a^2 + 18*a - 6)*b^4*c*d^6 + (a^4 - 12*a^3 + 36*a^2 - 24*a)*b^
3*d^7)*x^3 + 3*(b^7*c^5*d^2 - 4*(a - 3)*b^6*c^4*d^3 + 6*(a^2 - 6*a + 6)*b^5
*c^3*d^4 - 4*(a^3 - 9*a^2 + 18*a - 6)*b^4*c^2*d^5 + (a^4 - 12*a^3 + 36*a^2
- 24*a)*b^3*c*d^6)*x^2 + 3*(b^7*c^6*d - 4*(a - 3)*b^6*c^5*d^2 + 6*(a^2 - 6*
a + 6)*b^5*c^4*d^3 - 4*(a^3 - 9*a^2 + 18*a - 6)*b^4*c^3*d^4 + (a^4 - 12*a^3
 + 36*a^2 - 24*a)*b^3*c^2*d^5)*x)*Ei(-(b*d*x + b*c)/d)*e^((b*c - a*d)/d) +
(b^6*c^6*d - (4*a - 11)*b^5*c^5*d^2 + 6*b^3*d^7*x^3 + 2*(3*a^2 - 16*a + 13)
*b^4*c^4*d^3 - 2*(2*a^3 - 15*a^2 + 22*a - 3)*b^3*c^3*d^4 + 2*a^4*d^7 + (a^4
 - 8*a^3 + 12*a^2)*b^2*c^2*d^5 - (a^4 - 4*a^3)*b*c*d^6 + (b^6*c^4*d^3 - 4*(
a - 3)*b^5*c^3*d^4 + 6*(a^2 - 6*a + 6)*b^4*c^2*d^5 - 2*(2*a^3 - 18*a^2 + 36
*a - 9)*b^3*c*d^6 + (a^4 - 12*a^3 + 36*a^2)*b^2*d^7)*x^2 + (2*b^6*c^5*d^2 -
 (8*a - 23)*b^5*c^4*d^3 + 4*(3*a^2 - 17*a + 15)*b^4*c^3*d^4 - 2*(4*a^3 - 33
*a^2 + 54*a - 9)*b^3*c^2*d^5 + 2*(a^4 - 10*a^3 + 18*a^2)*b^2*c*d^6 - (a^4 -
 12*a^3)*b*d^7)*x)*e^(-b*x - a))/(d^11*x^3 + 3*c*d^10*x^2 + 3*c^2*d^9*x + c
^3*d^8)
```

giac [B] time = 0.53, size = 3178, normalized size = 8.03

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/6*(b^7*c^4*d^3*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 4*a*b^6*c^3*d^4
*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 6*a^2*b^5*c^2*d^5*x^3*Ei(-(b*d*x
 + b*c)/d)*e^(-a + b*c/d) - 4*a^3*b^4*c*d^6*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a
+ b*c/d) + a^4*b^3*d^7*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 3*b^7*c^5*
d^2*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 12*a*b^6*c^4*d^3*x^2*Ei(-(b*d
*x + b*c)/d)*e^(-a + b*c/d) + 18*a^2*b^5*c^3*d^4*x^2*Ei(-(b*d*x + b*c)/d)*e
^(-a + b*c/d) - 12*a^3*b^4*c^2*d^5*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d)
+ 3*a^4*b^3*c*d^6*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 12*b^6*c^3*d^4*
x^3*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 36*a*b^5*c^2*d^5*x^3*Ei(-(b*d*x +
 b*c)/d)*e^(-a + b*c/d) + 36*a^2*b^4*c*d^6*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a +
 b*c/d) - 12*a^3*b^3*d^7*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 3*b^7*c^
6*d*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 12*a*b^6*c^5*d^2*x*Ei(-(b*d*x +
 b*c)/d)*e^(-a + b*c/d) + 18*a^2*b^5*c^4*d^3*x*Ei(-(b*d*x + b*c)/d)*e^(-a +
 b*c/d) - 12*a^3*b^4*c^3*d^4*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 3*a^4*
b^3*c^2*d^5*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 36*b^6*c^4*d^3*x^2*Ei(-
(b*d*x + b*c)/d)*e^(-a + b*c/d) - 108*a*b^5*c^3*d^4*x^2*Ei(-(b*d*x + b*c)/d
)*e^(-a + b*c/d) + 108*a^2*b^4*c^2*d^5*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c
/d) - 36*a^3*b^3*c*d^6*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 36*b^5*c^2
*d^5*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 72*a*b^4*c*d^6*x^3*Ei(-(b*d*
x + b*c)/d)*e^(-a + b*c/d) + 36*a^2*b^3*d^7*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a
+ b*c/d) + b^6*c^4*d^3*x^2*e^(-b*x - a) - 4*a*b^5*c^3*d^4*x^2*e^(-b*x - a)
+ 6*a^2*b^4*c^2*d^5*x^2*e^(-b*x - a) - 4*a^3*b^3*c*d^6*x^2*e^(-b*x - a) + a
^4*b^2*d^7*x^2*e^(-b*x - a) + b^7*c^7*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) -
 4*a*b^6*c^6*d*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 6*a^2*b^5*c^5*d^2*Ei(-
(b*d*x + b*c)/d)*e^(-a + b*c/d) - 4*a^3*b^4*c^4*d^3*Ei(-(b*d*x + b*c)/d)*e^
(-a + b*c/d) + a^4*b^3*c^3*d^4*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 36*b^6
*c^5*d^2*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 108*a*b^5*c^4*d^3*x*Ei(-(b
*d*x + b*c)/d)*e^(-a + b*c/d) + 108*a^2*b^4*c^3*d^4*x*Ei(-(b*d*x + b*c)/d)*
e^(-a + b*c/d) - 36*a^3*b^3*c^2*d^5*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) +
 108*b^5*c^3*d^4*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 216*a*b^4*c^2*d^
5*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 108*a^2*b^3*c*d^6*x^2*Ei(-(b*d*
x + b*c)/d)*e^(-a + b*c/d) + 24*b^4*c*d^6*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a +
b*c/d) - 24*a*b^3*d^7*x^3*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 2*b^6*c^5*d
^2*x*e^(-b*x - a) - 8*a*b^5*c^4*d^3*x*e^(-b*x - a) + 12*a^2*b^4*c^3*d^4*x*e
^(-b*x - a) - 8*a^3*b^3*c^2*d^5*x*e^(-b*x - a) + 2*a^4*b^2*c*d^6*x*e^(-b*x
- a) + 12*b^5*c^3*d^4*x^2*e^(-b*x - a) - 36*a*b^4*c^2*d^5*x^2*e^(-b*x - a)
+ 36*a^2*b^3*c*d^6*x^2*e^(-b*x - a) - 12*a^3*b^2*d^7*x^2*e^(-b*x - a) + 12*
b^6*c^6*d*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 36*a*b^5*c^5*d^2*Ei(-(b*d*x
 + b*c)/d)*e^(-a + b*c/d) + 36*a^2*b^4*c^4*d^3*Ei(-(b*d*x + b*c)/d)*e^(-a +
 b*c/d) - 12*a^3*b^3*c^3*d^4*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 108*b^5*
c^4*d^3*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 216*a*b^4*c^3*d^4*x*Ei(-(b*
```

```
d*x + b*c)/d)*e^(-a + b*c/d) + 108*a^2*b^3*c^2*d^5*x*Ei(-(b*d*x + b*c)/d)*e
^(-a + b*c/d) + 72*b^4*c^2*d^5*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 72
*a*b^3*c*d^6*x^2*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + b^6*c^6*d*e^(-b*x -
a) - 4*a*b^5*c^5*d^2*e^(-b*x - a) + 6*a^2*b^4*c^4*d^3*e^(-b*x - a) - 4*a^3*
b^3*c^3*d^4*e^(-b*x - a) + a^4*b^2*c^2*d^5*e^(-b*x - a) + 23*b^5*c^4*d^3*x*
e^(-b*x - a) - 68*a*b^4*c^3*d^4*x*e^(-b*x - a) + 66*a^2*b^3*c^2*d^5*x*e^(-b
*x - a) - 20*a^3*b^2*c*d^6*x*e^(-b*x - a) - a^4*b*d^7*x*e^(-b*x - a) + 36*b
^4*c^2*d^5*x^2*e^(-b*x - a) - 72*a*b^3*c*d^6*x^2*e^(-b*x - a) + 36*a^2*b^2*
d^7*x^2*e^(-b*x - a) + 6*b^3*d^7*x^3*e^(-b*x - a) + 36*b^5*c^5*d^2*Ei(-(b*d
*x + b*c)/d)*e^(-a + b*c/d) - 72*a*b^4*c^4*d^3*Ei(-(b*d*x + b*c)/d)*e^(-a +
 b*c/d) + 36*a^2*b^3*c^3*d^4*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) + 72*b^4*c
^3*d^4*x*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 72*a*b^3*c^2*d^5*x*Ei(-(b*d*
x + b*c)/d)*e^(-a + b*c/d) + 11*b^5*c^5*d^2*e^(-b*x - a) - 32*a*b^4*c^4*d^3
*e^(-b*x - a) + 30*a^2*b^3*c^3*d^4*e^(-b*x - a) - 8*a^3*b^2*c^2*d^5*e^(-b*x
 - a) - a^4*b*c*d^6*e^(-b*x - a) + 60*b^4*c^3*d^4*x*e^(-b*x - a) - 108*a*b^
3*c^2*d^5*x*e^(-b*x - a) + 36*a^2*b^2*c*d^6*x*e^(-b*x - a) + 12*a^3*b*d^7*x
*e^(-b*x - a) + 18*b^3*c*d^6*x^2*e^(-b*x - a) + 24*b^4*c^4*d^3*Ei(-(b*d*x +
 b*c)/d)*e^(-a + b*c/d) - 24*a*b^3*c^3*d^4*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c
/d) + 26*b^4*c^4*d^3*e^(-b*x - a) - 44*a*b^3*c^3*d^4*e^(-b*x - a) + 12*a^2*
b^2*c^2*d^5*e^(-b*x - a) + 4*a^3*b*c*d^6*e^(-b*x - a) + 2*a^4*d^7*e^(-b*x -
 a) + 18*b^3*c^2*d^5*x*e^(-b*x - a) + 6*b^3*c^3*d^4*e^(-b*x - a))/(d^11*x^3
 + 3*c*d^10*x^2 + 3*c^2*d^9*x + c^3*d^8)
```

maple [A] time = 0.02, size = 511, normalized size = 1.29

$$-\frac{\frac{b^4 e^{-bx-a}}{d^4}+\frac{4(ad-bc)b^4 \operatorname{Ei}\left(1,bx+a-\frac{ad-bc}{d}\right)e^{-\frac{ad-bc}{d}}}{d^5}+\frac{6\left(a^2d^2-2abcd+b^2c^2\right)\left(-\operatorname{Ei}\left(1,bx+a-\frac{ad-bc}{d}\right)e^{-\frac{ad-bc}{d}}-\frac{e^{-bx-a}}{-bx-a+\frac{ad-bc}{d}}\right)b^4}{d^6}-\frac{4\left(a^3d^3-3a^2bc\,d^2+3\cdots\right.}{\cdots}}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/b*(b^4/d^4*exp(-b*x-a)-4/d^7*(a^3*d^3-3*a^2*b*c*d^2+3*a*b^2*c^2*d-b^3*c^
3)*b^4*(-1/2/(-b*x-a+(a*d-b*c)/d)^2*exp(-b*x-a)-1/2/(-b*x-a+(a*d-b*c)/d)*ex
p(-b*x-a)-1/2*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))+6/d^6*(a^2*d^2-2*a
*b*c*d+b^2*c^2)*b^4*(-1/(-b*x-a+(a*d-b*c)/d)*exp(-b*x-a)-exp(-(a*d-b*c)/d)*
Ei(1,b*x+a-(a*d-b*c)/d))+(a^4*d^4-4*a^3*b*c*d^3+6*a^2*b^2*c^2*d^2-4*a*b^3*c
^3*d+b^4*c^4)*b^4/d^8*(-1/3*exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)^3-1/6/(-b*x-a+
(a*d-b*c)/d)^2*exp(-b*x-a)-1/6/(-b*x-a+(a*d-b*c)/d)*exp(-b*x-a)-1/6*exp(-(a
*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))+4/d^5*(a*d-b*c)*b^4*exp(-(a*d-b*c)/d)*E
i(1,b*x+a-(a*d-b*c)/d))
```

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

$$-\frac{a^4 e^{\left(-a+\frac{bc}{d}\right)} E_4\left(\frac{(dx+c)b}{d}\right)}{(dx+c)^3 d} - \frac{\left(b^3 d^2 x^4 + 4\,ab^2 d^2 x^3 + 2\left(3\,a^2 b d^2 + 2\,b^2 c d - 2\,abd^2\right)x^2 + 4\left(a^3 d^2 - b^2 c^2 - 3\,a^2 d^2 - 2\,bcd\right.}{d^6 x^4 e^a + 4\,cd^5 x^3 e^a + 6\,c^2 d^4 x^2 e^a + 4\,c^3 d^3 x e^a + c^4 d^2 e^a}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -a^4*e^(-a + b*c/d)*exp_integral_e(4, (d*x + c)*b/d)/((d*x + c)^3*d) - (b^3
*d^2*x^4 + 4*a*b^2*d^2*x^3 + 2*(3*a^2*b*d^2 + 2*b^2*c*d - 2*a*b*d^2)*x^2 +
4*(a^3*d^2 - b^2*c^2 - 3*a^2*d^2 - 2*b*c*d + 2*(2*b*c*d + d^2)*a)*x)*e^(-b*
x)/(d^6*x^4*e^a + 4*c*d^5*x^3*e^a + 6*c^2*d^4*x^2*e^a + 4*c^3*d^3*x*e^a + c
^4*d^2*e^a) - integrate(-4*(a^3*c*d^2 - b^2*c^3 - 3*a^2*c*d^2 - 2*b*c^2*d +
 2*(2*b*c^2*d + c*d^2)*a + (b^3*c^3 - 3*a^3*d^3 + 7*b^2*c^2*d + 6*b*c*d^2 +
 3*(2*b*c*d^2 + 3*d^3)*a^2 - 2*(2*b^2*c^2*d + 8*b*c*d^2 + 3*d^3)*a)*x)*e^(-
b*x)/(d^7*x^5*e^a + 5*c*d^6*x^4*e^a + 10*c^2*d^5*x^3*e^a + 10*c^3*d^4*x^2*e
^a + 5*c^4*d^3*x*e^a + c^5*d^2*e^a), x)
```

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

$$\int \frac{\mathrm{e}^{-a-b\,x}\,{(a+b\,x)}^4}{{(c+d\,x)}^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int((exp(- a - b*x)*(a + b*x)^4)/(c + d*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*x-a)*(b*x+a)**4/(d*x+c)**4,x)
```

```
[Out] Timed out
```

3.82 $\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^5} dx$

Optimal. Leaf size=557

$$\frac{b^4(bc-ad)^4e^{\frac{bc}{d}-a}\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{24d^9}+\frac{2b^4(bc-ad)^3e^{\frac{bc}{d}-a}\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{3d^8}+\frac{3b^4(bc-ad)^2e^{\frac{bc}{d}-a}\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^7}+\frac{4b^4(bc-ad)e}{}$$

```
[Out] -1/4*(-a*d+b*c)^4*exp(-b*x-a)/d^5/(d*x+c)^4+4/3*b*(-a*d+b*c)^3*exp(-b*x-a)/
d^5/(d*x+c)^3+1/12*b*(-a*d+b*c)^4*exp(-b*x-a)/d^6/(d*x+c)^3-3*b^2*(-a*d+b*c
)^2*exp(-b*x-a)/d^5/(d*x+c)^2-2/3*b^2*(-a*d+b*c)^3*exp(-b*x-a)/d^6/(d*x+c)^
2-1/24*b^2*(-a*d+b*c)^4*exp(-b*x-a)/d^7/(d*x+c)^2+4*b^3*(-a*d+b*c)*exp(-b*x
-a)/d^5/(d*x+c)+3*b^3*(-a*d+b*c)^2*exp(-b*x-a)/d^6/(d*x+c)+2/3*b^3*(-a*d+b*
c)^3*exp(-b*x-a)/d^7/(d*x+c)+1/24*b^3*(-a*d+b*c)^4*exp(-b*x-a)/d^8/(d*x+c)+
b^4*exp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^5+4*b^4*(-a*d+b*c)*exp(-a+b*c/d)*Ei(-b
*(d*x+c)/d)/d^6+3*b^4*(-a*d+b*c)^2*exp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^7+2/3*b
^4*(-a*d+b*c)^3*exp(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^8+1/24*b^4*(-a*d+b*c)^4*ex
p(-a+b*c/d)*Ei(-b*(d*x+c)/d)/d^9
```

Rubi [A] time = 0.68, antiderivative size = 557, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 3, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.120, Rules used = {2199, 2177, 2178}

$$\frac{b^4(bc-ad)^4e^{\frac{bc}{d}-a}\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{24d^9}+\frac{2b^4(bc-ad)^3e^{\frac{bc}{d}-a}\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{3d^8}+\frac{3b^4(bc-ad)^2e^{\frac{bc}{d}-a}\text{Ei}\left(-\frac{b(c+dx)}{d}\right)}{d^7}+\frac{4b^4(bc-ad)e}{}$$

Antiderivative was successfully verified.

```
[In] Int[(E^(-a - b*x)*(a + b*x)^4)/(c + d*x)^5,x]
```

```
[Out] -((b*c - a*d)^4*E^(-a - b*x))/(4*d^5*(c + d*x)^4) + (4*b*(b*c - a*d)^3*E^(-
a - b*x))/(3*d^5*(c + d*x)^3) + (b*(b*c - a*d)^4*E^(-a - b*x))/(12*d^6*(c +
 d*x)^3) - (3*b^2*(b*c - a*d)^2*E^(-a - b*x))/(d^5*(c + d*x)^2) - (2*b^2*(b
*c - a*d)^3*E^(-a - b*x))/(3*d^6*(c + d*x)^2) - (b^2*(b*c - a*d)^4*E^(-a -
b*x))/(24*d^7*(c + d*x)^2) + (4*b^3*(b*c - a*d)*E^(-a - b*x))/(d^5*(c + d*x
)) + (3*b^3*(b*c - a*d)^2*E^(-a - b*x))/(d^6*(c + d*x)) + (2*b^3*(b*c - a*d
)^3*E^(-a - b*x))/(3*d^7*(c + d*x)) + (b^3*(b*c - a*d)^4*E^(-a - b*x))/(24*
d^8*(c + d*x)) + (b^4*E^(-a + (b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])/d
^5 + (4*b^4*(b*c - a*d)*E^(-a + (b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)])
/d^6 + (3*b^4*(b*c - a*d)^2*E^(-a + (b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/
d)])/d^7 + (2*b^4*(b*c - a*d)^3*E^(-a + (b*c)/d)*ExpIntegralEi[-((b*(c + d*
x))/d)])/(3*d^8) + (b^4*(b*c - a*d)^4*E^(-a + (b*c)/d)*ExpIntegralEi[-((b*(
c + d*x))/d)])/(24*d^9)
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2199

```
Int[(F_)^((c_.)*(v_))*(u_)^(m_.)*(w_), x_Symbol] :> Int[ExpandIntegrand[F^(
c*ExpandToSum[v, x]), w*NormalizePowerOfLinear[u, x]^m, x], x] /; FreeQ[{F,
 c}, x] && PolynomialQ[w, x] && LinearQ[v, x] && PowerOfLinearQ[u, x] && In
tegerQ[m] &&  !$UseGamma === True
```

Rubi steps

$$\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^5}\,dx = \int \left(\frac{(-bc+ad)^4e^{-a-bx}}{d^4(c+dx)^5} - \frac{4b(bc-ad)^3e^{-a-bx}}{d^4(c+dx)^4} + \frac{6b^2(bc-ad)^2e^{-a-bx}}{d^4(c+dx)^3} - \frac{4b^3(bc-ad)e^{-a-bx}}{d^4(c+dx)^2}\right.$$

$$= \frac{b^4\int\frac{e^{-a-bx}}{c+dx}\,dx}{d^4} - \frac{\left(4b^3(bc-ad)\right)\int\frac{e^{-a-bx}}{(c+dx)^2}\,dx}{d^4} + \frac{\left(6b^2(bc-ad)^2\right)\int\frac{e^{-a-bx}}{(c+dx)^3}\,dx}{d^4} - \frac{\left(4b(bc-ad\right.}{}$$

$$= -\frac{(bc-ad)^4e^{-a-bx}}{4d^5(c+dx)^4} + \frac{4b(bc-ad)^3e^{-a-bx}}{3d^5(c+dx)^3} - \frac{3b^2(bc-ad)^2e^{-a-bx}}{d^5(c+dx)^2} + \frac{4b^3(bc-ad)e^{-a-bx}}{d^5(c+dx)} + \frac{b}{}$$

$$= -\frac{(bc-ad)^4e^{-a-bx}}{4d^5(c+dx)^4} + \frac{4b(bc-ad)^3e^{-a-bx}}{3d^5(c+dx)^3} + \frac{b(bc-ad)^4e^{-a-bx}}{12d^6(c+dx)^3} - \frac{3b^2(bc-ad)^2e^{-a-bx}}{d^5(c+dx)^2} - \frac{2b}{}$$

$$= -\frac{(bc-ad)^4e^{-a-bx}}{4d^5(c+dx)^4} + \frac{4b(bc-ad)^3e^{-a-bx}}{3d^5(c+dx)^3} + \frac{b(bc-ad)^4e^{-a-bx}}{12d^6(c+dx)^3} - \frac{3b^2(bc-ad)^2e^{-a-bx}}{d^5(c+dx)^2} - \frac{2b}{}$$

$$= -\frac{(bc-ad)^4e^{-a-bx}}{4d^5(c+dx)^4} + \frac{4b(bc-ad)^3e^{-a-bx}}{3d^5(c+dx)^3} + \frac{b(bc-ad)^4e^{-a-bx}}{12d^6(c+dx)^3} - \frac{3b^2(bc-ad)^2e^{-a-bx}}{d^5(c+dx)^2} - \frac{2b}{}$$

$$= -\frac{(bc-ad)^4e^{-a-bx}}{4d^5(c+dx)^4} + \frac{4b(bc-ad)^3e^{-a-bx}}{3d^5(c+dx)^3} + \frac{b(bc-ad)^4e^{-a-bx}}{12d^6(c+dx)^3} - \frac{3b^2(bc-ad)^2e^{-a-bx}}{d^5(c+dx)^2} - \frac{2b}{}$$

Mathematica [A] time = 0.74, size = 669, normalized size = 1.20

$$\frac{e^{-a}\left(a^4b^4d^4e^{\frac{bc}{d}}\operatorname{Ei}\left(-\frac{b(c+dx)}{d}\right) - 4a^3b^5cd^3e^{\frac{bc}{d}}\operatorname{Ei}\left(-\frac{b(c+dx)}{d}\right) - 16a^3b^4d^4e^{\frac{bc}{d}}\operatorname{Ei}\left(-\frac{b(c+dx)}{d}\right) + 6a^2b^6c^2d^2e^{\frac{bc}{d}}\operatorname{Ei}\left(-\frac{b(c+dx)}{d}\right) + \right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(E^(-a - b*x)*(a + b*x)^4)/(c + d*x)^5,x]
```

```
[Out] ((d*(-6*d^3*(b*c - a*d)^4 + 2*b*d^2*(b*c - (-16 + a)*d)*(b*c - a*d)^3*(c +
d*x) - b^2*d*(b*c - a*d)^2*(b^2*c^2 - 2*(-8 + a)*b*c*d + (72 - 16*a + a^2)*
d^2)*(c + d*x)^2 + b^3*(b^4*c^4 - 4*(-4 + a)*b^3*c^3*d + 6*(12 - 8*a + a^2)
*b^2*c^2*d^2 - 4*(-24 + 36*a - 12*a^2 + a^3)*b*c*d^3 + a*(-96 + 72*a - 16*a
^2 + a^3)*d^4)*(c + d*x)^3))/(E^(b*x)*(c + d*x)^4) + b^8*c^4*E^((b*c)/d)*Ex
pIntegralEi[-((b*(c + d*x))/d)] + 16*b^7*c^3*d*E^((b*c)/d)*ExpIntegralEi[-(
(b*(c + d*x))/d)] - 4*a*b^7*c^3*d*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d*x))
/d)] + 72*b^6*c^2*d^2*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)] - 48*a*
b^6*c^2*d^2*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)] + 6*a^2*b^6*c^2*d
^2*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)] + 96*b^5*c*d^3*E^((b*c)/d)
```

```
*ExpIntegralEi[-((b*(c + d*x))/d)] - 144*a*b^5*c*d^3*E^((b*c)/d)*ExpIntegra
lEi[-((b*(c + d*x))/d)] + 48*a^2*b^5*c*d^3*E^((b*c)/d)*ExpIntegralEi[-((b*(
c + d*x))/d)] - 4*a^3*b^5*c*d^3*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d
)] + 24*b^4*d^4*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)] - 96*a*b^4*d^
4*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d*x))/d)] + 72*a^2*b^4*d^4*E^((b*c)/d
)*ExpIntegralEi[-((b*(c + d*x))/d)] - 16*a^3*b^4*d^4*E^((b*c)/d)*ExpIntegra
lEi[-((b*(c + d*x))/d)] + a^4*b^4*d^4*E^((b*c)/d)*ExpIntegralEi[-((b*(c + d
*x))/d)])/(24*d^9*E^a)
```

fricas [B] time = 0.51, size = 1084, normalized size = 1.95

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^5,x, algorithm="fricas")
```

```
[Out] 1/24*((b^8*c^8 - 4*(a - 4)*b^7*c^7*d + 6*(a^2 - 8*a + 12)*b^6*c^6*d^2 - 4*(
a^3 - 12*a^2 + 36*a - 24)*b^5*c^5*d^3 + (a^4 - 16*a^3 + 72*a^2 - 96*a + 24)
*b^4*c^4*d^4 + (b^8*c^4*d^4 - 4*(a - 4)*b^7*c^3*d^5 + 6*(a^2 - 8*a + 12)*b^
6*c^2*d^6 - 4*(a^3 - 12*a^2 + 36*a - 24)*b^5*c*d^7 + (a^4 - 16*a^3 + 72*a^2
 - 96*a + 24)*b^4*d^8)*x^4 + 4*(b^8*c^5*d^3 - 4*(a - 4)*b^7*c^4*d^4 + 6*(a^
2 - 8*a + 12)*b^6*c^3*d^5 - 4*(a^3 - 12*a^2 + 36*a - 24)*b^5*c^2*d^6 + (a^4
 - 16*a^3 + 72*a^2 - 96*a + 24)*b^4*c*d^7)*x^3 + 6*(b^8*c^6*d^2 - 4*(a - 4)
*b^7*c^5*d^3 + 6*(a^2 - 8*a + 12)*b^6*c^4*d^4 - 4*(a^3 - 12*a^2 + 36*a - 24
)*b^5*c^3*d^5 + (a^4 - 16*a^3 + 72*a^2 - 96*a + 24)*b^4*c^2*d^6)*x^2 + 4*(b
^8*c^7*d - 4*(a - 4)*b^7*c^6*d^2 + 6*(a^2 - 8*a + 12)*b^6*c^5*d^3 - 4*(a^3
- 12*a^2 + 36*a - 24)*b^5*c^4*d^4 + (a^4 - 16*a^3 + 72*a^2 - 96*a + 24)*b^4
*c^3*d^5)*x)*Ei(-(b*d*x + b*c)/d)*e^((b*c - a*d)/d) + (b^7*c^7*d - (4*a - 1
5)*b^6*c^6*d^2 + 2*(3*a^2 - 22*a + 29)*b^5*c^5*d^3 - 2*(2*a^3 - 21*a^2 + 52
*a - 25)*b^4*c^4*d^4 + (a^4 - 12*a^3 + 36*a^2 - 24*a)*b^3*c^3*d^5 - 6*a^4*d
^8 - (a^4 - 8*a^3 + 12*a^2)*b^2*c^2*d^6 + 2*(a^4 - 4*a^3)*b*c*d^7 + (b^7*c^
4*d^4 - 4*(a - 4)*b^6*c^3*d^5 + 6*(a^2 - 8*a + 12)*b^5*c^2*d^6 - 4*(a^3 - 1
2*a^2 + 36*a - 24)*b^4*c*d^7 + (a^4 - 16*a^3 + 72*a^2 - 96*a)*b^3*d^8)*x^3
+ (3*b^7*c^5*d^3 - (12*a - 47)*b^6*c^4*d^4 + 2*(9*a^2 - 70*a + 100)*b^5*c^3
*d^5 - 6*(2*a^3 - 23*a^2 + 64*a - 36)*b^4*c^2*d^6 + (3*a^4 - 44*a^3 + 168*a
^2 - 144*a)*b^3*c*d^7 - (a^4 - 16*a^3 + 72*a^2)*b^2*d^8)*x^2 + (3*b^7*c^6*d
^2 - 2*(6*a - 23)*b^6*c^5*d^3 + 2*(9*a^2 - 68*a + 93)*b^5*c^4*d^4 - 4*(3*a^
3 - 33*a^2 + 86*a - 44)*b^4*c^3*d^5 + (3*a^4 - 40*a^3 + 132*a^2 - 96*a)*b^3
*c^2*d^6 - 2*(a^4 - 12*a^3 + 24*a^2)*b^2*c*d^7 + 2*(a^4 - 16*a^3)*b*d^8)*x)
*e^(-b*x - a))/(d^13*x^4 + 4*c*d^12*x^3 + 6*c^2*d^11*x^2 + 4*c^3*d^10*x + c
^4*d^9)
```

giac [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*x-a)*(b*x+a)^4/(d*x+c)^5,x, algorithm="giac")
```

```
[Out] Timed out
```

maple [A] time = 0.02, size = 596, normalized size = 1.07

$$-\frac{\frac{b^5 \operatorname{Ei}\left(1, bx+a-\frac{ad-bc}{d}\right) e^{-\frac{ad-bc}{d}}}{d^5} + \frac{4(ad-bc)\left(-\operatorname{Ei}\left(1, bx+a-\frac{ad-bc}{d}\right) e^{-\frac{ad-bc}{d}} - \frac{e^{-bx-a}}{-bx-a+\frac{ad-bc}{d}}\right) b^5}{d^6} - \frac{6(ad-bc)^2\left(-\frac{\operatorname{Ei}\left(1, bx+a-\frac{ad-bc}{d}\right) e^{-\frac{ad-bc}{d}}}{2} - \frac{e^{-bx-a}}{2\left(-bx-a+\frac{ad-bc}{d}\right.}\right.}{d^7}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^5,x)
```

```
[Out] -1/b*(-6*b^5*(a*d-b*c)^2/d^7*(-1/2/(-b*x-a+(a*d-b*c)/d)^2*exp(-b*x-a)-1/2/(
-b*x-a+(a*d-b*c)/d)*exp(-b*x-a)-1/2*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/
d))+4*b^5*(a*d-b*c)/d^6*(-1/(-b*x-a+(a*d-b*c)/d)*exp(-b*x-a)-exp(-(a*d-b*c)
/d)*Ei(1,b*x+a-(a*d-b*c)/d))-b^5*(a*d-b*c)^4/d^9*(-1/4*exp(-b*x-a)/(-b*x-a+
(a*d-b*c)/d)^4-1/12/(-b*x-a+(a*d-b*c)/d)^3*exp(-b*x-a)-1/24/(-b*x-a+(a*d-b*
c)/d)^2*exp(-b*x-a)-1/24/(-b*x-a+(a*d-b*c)/d)*exp(-b*x-a)-1/24*exp(-(a*d-b*
c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))+4*b^5*(a*d-b*c)^3/d^8*(-1/3/(-b*x-a+(a*d-b*c
)/d)^3*exp(-b*x-a)-1/6/(-b*x-a+(a*d-b*c)/d)^2*exp(-b*x-a)-1/6/(-b*x-a+(a*d-
b*c)/d)*exp(-b*x-a)-1/6*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))+b^5/d^5*
exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))
```

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

$$-\frac{\left(b^3 d^2 x^4 + \left(4\, ab^2 d^2 - b^2 d^2\right) x^3 + \left(6\, a^2 bd^2 + 5\, b^2 cd - 8\, abd^2 + 2\, bd^2\right) x^2 + \left(4\, a^3 d^2 - 5\, b^2 c^2 - 18\, a^2 d^2 - 20\, bcd + 4\right.}{d^7 x^5 e^a + 5\, cd^6 x^4 e^a + 10\, c^2 d^5 x^3 e^a + 10\, c^3 d^4 x^2 e^a + 5\, c^4 d^3 x e^a + c^5 d^2 e^a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^5,x, algorithm="maxima")
```

```
[Out] -(b^3*d^2*x^4 + (4*a*b^2*d^2 - b^2*d^2)*x^3 + (6*a^2*b*d^2 + 5*b^2*c*d - 8*
a*b*d^2 + 2*b*d^2)*x^2 + (4*a^3*d^2 - 5*b^2*c^2 - 18*a^2*d^2 - 20*b*c*d + 4
*(5*b*c*d + 6*d^2)*a - 6*d^2)*x)*e^(-b*x)/(d^7*x^5*e^a + 5*c*d^6*x^4*e^a +
10*c^2*d^5*x^3*e^a + 10*c^3*d^4*x^2*e^a + 5*c^4*d^3*x*e^a + c^5*d^2*e^a) -
a^4*e^(-a + b*c/d)*exp_integral_e(5, (d*x + c)*b/d)/((d*x + c)^4*d) - integ
rate(-(4*a^3*c*d^2 - 5*b^2*c^3 - 18*a^2*c*d^2 - 20*b*c^2*d - 6*c*d^2 + 4*(5
*b*c^2*d + 6*c*d^2)*a + (5*b^3*c^3 - 16*a^3*d^3 + 50*b^2*c^2*d + 90*b*c*d^2
 + 6*(5*b*c*d^2 + 12*d^3)*a^2 + 24*d^3 - 4*(5*b^2*c^2*d + 30*b*c*d^2 + 24*d
```

```
^3)*a)*x)*e^(-b*x)/(d^8*x^6*e^a + 6*c*d^7*x^5*e^a + 15*c^2*d^6*x^4*e^a + 20
*c^3*d^5*x^3*e^a + 15*c^4*d^4*x^2*e^a + 6*c^5*d^3*x*e^a + c^6*d^2*e^a), x)
```

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

$$\int \frac{e^{-a-b\,x}\,(a+b\,x)^4}{(c+d\,x)^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((exp(- a - b*x)*(a + b*x)^4)/(c + d*x)^5,x)
[Out] int((exp(- a - b*x)*(a + b*x)^4)/(c + d*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*x-a)*(b*x+a)**4/(d*x+c)**5,x)
[Out] Timed out
```

3.83 $\int F^{c(a+bx)}x^m \log^n(dx)(e+en+e(1+m+bcx\log(F))\log(dx$

Optimal. Leaf size=24

$$ex^{m+1}\log^{n+1}(dx)F^{c(a+bx)}$$

```
[Out] e*F^(c*(b*x+a))*x^(1+m)*ln(d*x)^(1+n)
```

Rubi [A] time = 0.15, antiderivative size = 24, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 39, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.026, Rules used = {2202}

$$ex^{m+1}\log^{n+1}(dx)F^{c(a+bx)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*x^m*Log[d*x]^n*(e + e*n + e*(1 + m + b*c*x*Log[F])*Log[
d*x]),x]
```

```
[Out] e*F^(c*(a + b*x))*x^(1 + m)*Log[d*x]^(1 + n)
```

Rule 2202

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

Rubi steps

$$\int F^{c(a+bx)}x^m \log^n(dx)(e+en+e(1+m+bcx\log(F))\log(dx))\,dx = eF^{c(a+bx)}x^{1+m}\log^{1+n}(dx)$$

Mathematica [A] time = 0.39, size = 24, normalized size = 1.00

$$ex^{m+1}\log^{n+1}(dx)F^{c(a+bx)}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*x^m*Log[d*x]^n*(e + e*n + e*(1 + m + b*c*x*Log[F]
)*Log[d*x]),x]
```

```
[Out] e*F^(c*(a + b*x))*x^(1 + m)*Log[d*x]^(1 + n)
```

fricas [A] time = 0.47, size = 32, normalized size = 1.33

$$\left(ex\log(d)+ex\log(x)\right)F^{bcx+ac}x^m\left(\log(d)+\log(x)\right)^n$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*x^m*log(d*x)^n*(e+e*n+e*(1+m+b*c*x*log(F))*log(d*x)
),x, algorithm="fricas")
```

```
[Out] (e*x*log(d) + e*x*log(x))*F^(b*c*x + a*c)*x^m*(log(d) + log(x))^n
```

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

$$\int\left(\left(bcx\log(F)+m+1\right)e\log\left(dx\right)+en+e\right)F^{(bx+a)c}x^m\log\left(dx\right)^n\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*x^m*log(d*x)^n*(e+e*n+e*(1+m+b*c*x*log(F))*log(d*x)
),x, algorithm="giac")
```

```
[Out] integrate(((b*c*x*log(F) + m + 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*x^m
*log(d*x)^n, x)
```

maple [C] time = 0.32, size = 192, normalized size = 8.00

$$\left(-i\pi ex\,F^{(bx+a)c}\operatorname{csgn}\left(id\right)\operatorname{csgn}\left(ix\right)\operatorname{csgn}\left(idx\right)+i\pi ex\,F^{(bx+a)c}\operatorname{csgn}\left(id\right)\operatorname{csgn}\left(idx\right)^2+i\pi ex\,F^{(bx+a)c}\operatorname{csgn}\left(ix\right)\operatorname{csgn}\left(id\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*x^m*ln(d*x)^n*(e+e*n+e*(1+m+b*c*x*ln(F))*ln(d*x)),x)
```

```
[Out] 1/2*(2*e*x*F^((b*x+a)*c)*ln(x)-I*x*F^((b*x+a)*c)*e*Pi*csgn(I*d*x)^3-I*x*F^(
(b*x+a)*c)*e*Pi*csgn(I*d)*csgn(I*d*x)*csgn(I*x)+2*x*F^((b*x+a)*c)*e*ln(d)+I
*x*F^((b*x+a)*c)*e*Pi*csgn(I*d)*csgn(I*d*x)^2+I*x*F^((b*x+a)*c)*e*Pi*csgn(I
*d*x)^2*csgn(I*x))*x^m*(ln(d)+ln(x)-1/2*I*Pi*csgn(I*d*x)*(-csgn(I*d*x)+csgn
(I*d))*(-csgn(I*d*x)+csgn(I*x)))^n
```

maxima [A] time = 1.68, size = 42, normalized size = 1.75

$$\left(F^{ac}ex\log(d)+F^{ac}ex\log(x)\right)e^{\left(bcx\log(F)+m\log(x)+n\log\left(\log(d)+\log(x)\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*x^m*log(d*x)^n*(e+e*n+e*(1+m+b*c*x*log(F))*log(d*x)
),x, algorithm="maxima")
```

```
[Out] (F^(a*c)*e*x*log(d) + F^(a*c)*e*x*log(x))*e^(b*c*x*log(F) + m*log(x) + n*lo
g(log(d) + log(x)))
```

mupad [B] time = 3.59, size = 25, normalized size = 1.04

$$F^{a\,c+b\,c\,x}\,e\,x^{m+1}\,\ln\left(d\,x\right)^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*x^m*log(d*x)^n*(e + e*n + e*log(d*x)*(m + b*c*x*log(F)
+ 1)),x)
```

```
[Out] F^(a*c + b*c*x)*e*x^(m + 1)*log(d*x)^(n + 1)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*x**m*ln(d*x)**n*(e+e*n+e*(1+m+b*c*x*ln(F))*ln(d*x)
),x)
```

```
[Out] Timed out
```

3.84 $\int F^{c(a+bx)}x^2\log^n(dx)(e+en+e(3+bcx\log(F))\log(dx))\,dx$

Optimal. Leaf size=22

$$ex^3\log^{n+1}(dx)F^{c(a+bx)}$$

```
[Out] e*F^(c*(b*x+a))*x^3*ln(d*x)^(1+n)
```

Rubi [A] time = 0.13, antiderivative size = 22, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 38, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.026, Rules used = {2202}

$$ex^3\log^{n+1}(dx)F^{c(a+bx)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*x^2*Log[d*x]^n*(e + e*n + e*(3 + b*c*x*Log[F])*Log[d*x]
),x]
```

```
[Out] e*F^(c*(a + b*x))*x^3*Log[d*x]^(1 + n)
```

Rule 2202

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

Rubi steps

$$\int F^{c(a+bx)}x^2\log^n(dx)(e+en+e(3+bcx\log(F))\log(dx))\,dx=eF^{c(a+bx)}x^3\log^{1+n}(dx)$$

Mathematica [A] time = 0.31, size = 23, normalized size = 1.05

$$ex^3\log^{n+1}(dx)F^{ac+bcx}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*x^2*Log[d*x]^n*(e + e*n + e*(3 + b*c*x*Log[F])*Lo
g[d*x]),x]
```

```
[Out] e*F^(a*c + b*c*x)*x^3*Log[d*x]^(1 + n)
```

fricas [A] time = 0.66, size = 25, normalized size = 1.14

$$F^{bcx+ac}ex^3\log(dx)^n\log(dx)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*x^2*log(d*x)^n*(e+e*n+e*(3+b*c*x*log(F))*log(d*x)),
x, algorithm="fricas")
```

```
[Out] F^(b*c*x + a*c)*e*x^3*log(d*x)^n*log(d*x)
```

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

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*x^2*log(d*x)^n*(e+e*n+e*(3+b*c*x*log(F))*log(d*x)),
x, algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> An error occurred running a Giac command:
INPUT:sage2OUTPUT:Warning, infinity is unsigned, perhaps you meant +infinit
yWarning, infinity is unsigned, perhaps you meant +infinityUnable to divide
, perhaps due to rounding error%%%{1,[0,2,0,0,0,2,1]%%%}+%%%{2,[0,2,0,0,0,1
,1]%%%}+%%%{1,[0,2,0,0,0,0,1]%%%} / %%%{1,[0,3,0,0,0,2,0]%%%}+%%%{2,[0,3,0,
0,0,1,0]%%%}+%%%{1,[0,3,0,0,0,0,0]%%%} Error: Bad Argument Value
```

maple [C] time = 0.21, size = 198, normalized size = 9.00

$$\left(-\frac{i\pi e\,x^3F^{(bx+a)c}\mathrm{csgn}\left(id\right)\mathrm{csgn}\left(ix\right)\mathrm{csgn}\left(idx\right)}{2}+\frac{i\pi e\,x^3F^{(bx+a)c}\mathrm{csgn}\left(id\right)\mathrm{csgn}\left(idx\right)^2}{2}+\frac{i\pi e\,x^3F^{(bx+a)c}\mathrm{csgn}\left(ix\right)\mathrm{csg}}{2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*x^2*ln(d*x)^n*(e+e*n+e*(3+b*c*x*ln(F))*ln(d*x)),x)
```

```
[Out] (1/2*I*Pi*e*x^3*csgn(I*d)*csgn(I*d*x)^2*F^((b*x+a)*c)-1/2*I*Pi*e*x^3*csgn(I
*d)*csgn(I*d*x)*csgn(I*x)*F^((b*x+a)*c)-1/2*I*Pi*e*x^3*csgn(I*d*x)^3*F^((b*
x+a)*c)+1/2*I*Pi*e*x^3*csgn(I*d*x)^2*csgn(I*x)*F^((b*x+a)*c)+ln(d)*e*x^3*F^
((b*x+a)*c)+e*x^3*F^((b*x+a)*c)*ln(x))*(-1/2*I*Pi*(csgn(I*d)-csgn(I*d*x))*(
csgn(I*x)-csgn(I*d*x))*csgn(I*d*x)+ln(d)+ln(x))^n
```

maxima [A] time = 1.63, size = 42, normalized size = 1.91

$$\left(F^{ac}ex^3\log(d)+F^{ac}ex^3\log(x)\right)e^{\left(bcx\log(F)+n\log\left(\log(d)+\log(x)\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*x^2*log(d*x)^n*(e+e*n+e*(3+b*c*x*log(F))*log(d*x)),
x, algorithm="maxima")
```

```
[Out] (F^(a*c)*e*x^3*log(d) + F^(a*c)*e*x^3*log(x))*e^(b*c*x*log(F) + n*log(log(d
) + log(x)))
```

mupad [B] time = 3.50, size = 23, normalized size = 1.05

$$F^{a\,c+b\,c\,x}\,e\,x^3\,\ln\left(d\,x\right)^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*x^2*log(d*x)^n*(e + e*n + e*log(d*x)*(b*c*x*log(F) + 3)
),x)
```

```
[Out] F^(a*c + b*c*x)*e*x^3*log(d*x)^(n + 1)
```

sympy [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*x**2*ln(d*x)**n*(e+e*n+e*(3+b*c*x*ln(F))*ln(d*x)),
x)
```

```
[Out] Timed out
```

3.85 $\int F^{c(a+bx)}x\log^n(dx)(e+en+e(2+bcx\log(F))\log(dx))\,dx$

Optimal. Leaf size=22

$$ex^2\log^{n+1}(dx)F^{c(a+bx)}$$

```
[Out] e*F^(c*(b*x+a))*x^2*ln(d*x)^(1+n)
```

Rubi [A] time = 0.09, antiderivative size = 22, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 36, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.028, Rules used = {2202}

$$ex^2\log^{n+1}(dx)F^{c(a+bx)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*x*Log[d*x]^n*(e + e*n + e*(2 + b*c*x*Log[F])*Log[d*x]),
x]
```

```
[Out] e*F^(c*(a + b*x))*x^2*Log[d*x]^(1 + n)
```

Rule 2202

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

Rubi steps

$$\int F^{c(a+bx)}x\log^n(dx)(e+en+e(2+bcx\log(F))\log(dx))\,dx=eF^{c(a+bx)}x^2\log^{1+n}(dx)$$

Mathematica [A] time = 0.27, size = 23, normalized size = 1.05

$$ex^2\log^{n+1}(dx)F^{ac+bcx}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*x*Log[d*x]^n*(e + e*n + e*(2 + b*c*x*Log[F])*Log[
d*x]),x]
```

```
[Out] e*F^(a*c + b*c*x)*x^2*Log[d*x]^(1 + n)
```

fricas [A] time = 0.48, size = 25, normalized size = 1.14

$$F^{bcx+ac}ex^2 \log(dx)^n \log(dx)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*x*log(d*x)^n*(e+e*n+e*(2+b*c*x*log(F))*log(d*x)),x,
 algorithm="fricas")
```

```
[Out] F^(b*c*x + a*c)*e*x^2*log(d*x)^n*log(d*x)
```

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

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*x*log(d*x)^n*(e+e*n+e*(2+b*c*x*log(F))*log(d*x)),x,
 algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> An error occurred running a Giac command:
INPUT:sage2OUTPUT:Warning, infinity is unsigned, perhaps you meant +infinit
yWarning, infinity is unsigned, perhaps you meant +infinityUnable to divide
, perhaps due to rounding error%%%{1,[0,2,0,0,0,2,1]%%%}+%%%{2,[0,2,0,0,0,1
,1]%%%}+%%%{1,[0,2,0,0,0,0,1]%%%} / %%%{1,[0,3,0,0,0,2,0]%%%}+%%%{2,[0,3,0,
0,0,1,0]%%%}+%%%{1,[0,3,0,0,0,0,0]%%%} Error: Bad Argument Value
```

maple [C] time = 0.21, size = 198, normalized size = 9.00

$$\left(-\frac{i\pi e\,x^2F^{(bx+a)c}\mathrm{csgn}\,(id)\,\mathrm{csgn}\,(ix)\,\mathrm{csgn}\,(idx)}{2}+\frac{i\pi e\,x^2F^{(bx+a)c}\mathrm{csgn}\,(id)\,\mathrm{csgn}\,(idx)^2}{2}+\frac{i\pi e\,x^2F^{(bx+a)c}\mathrm{csgn}\,(ix)\,\mathrm{csgn}}{2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*x*ln(d*x)^n*(e+e*n+e*(2+b*c*x*ln(F))*ln(d*x)),x)
```

```
[Out] (1/2*I*Pi*e*x^2*csgn(I*d)*csgn(I*d*x)^2*F^((b*x+a)*c)-1/2*I*Pi*e*x^2*csgn(I
*d)*csgn(I*d*x)*csgn(I*x)*F^((b*x+a)*c)-1/2*I*Pi*e*x^2*csgn(I*d*x)^3*F^((b*
x+a)*c)+1/2*I*Pi*e*x^2*csgn(I*d*x)^2*csgn(I*x)*F^((b*x+a)*c)+ln(d)*e*x^2*F^
((b*x+a)*c)+e*x^2*F^((b*x+a)*c)*ln(x))*(-1/2*I*Pi*(csgn(I*d)-csgn(I*d*x))*(
csgn(I*x)-csgn(I*d*x))*csgn(I*d*x)+ln(d)+ln(x))^n
```

maxima [A] time = 1.59, size = 42, normalized size = 1.91

$$\left(F^{ac}ex^2\log(d)+F^{ac}ex^2\log(x)\right)e^{\left(bcx\log(F)+n\log\left(\log(d)+\log(x)\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*x*log(d*x)^n*(e+e*n+e*(2+b*c*x*log(F))*log(d*x)),x,
 algorithm="maxima")
```

```
[Out] (F^(a*c)*e*x^2*log(d) + F^(a*c)*e*x^2*log(x))*e^(b*c*x*log(F) + n*log(log(d
) + log(x)))
```

mupad [**B**] time = 3.39, size = 23, normalized size = 1.05

$$F^{a\,c+b\,c\,x}\,e\,x^2\,\ln\left(d\,x\right)^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^(c*(a + b*x))*x*log(d*x)^n*(e + e*n + e*log(d*x)*(b*c*x*log(F) + 2)),
x)
```

```
[Out] F^(a*c + b*c*x)*e*x^2*log(d*x)^(n + 1)
```

sympy [**F(-1)**] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*x*ln(d*x)**n*(e+e*n+e*(2+b*c*x*ln(F))*ln(d*x)),x)
```

```
[Out] Timed out
```

3.86 $\int F^{c(a+bx)} \log^n(dx)(e+en+e(1+bcx\log(F))\log(dx))\,dx$

Optimal. Leaf size=20

$$ex\log^{n+1}(dx)F^{c(a+bx)}$$

```
[Out] e*F^(c*(b*x+a))*x*ln(d*x)^(1+n)
```

Rubi [A] time = 0.05, antiderivative size = 20, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 35, $\frac{\text{number of rules}}{\text{integrand size}} =$ 0.029, Rules used = {2201}

$$ex\log^{n+1}(dx)F^{c(a+bx)}$$

Antiderivative was successfully verified.

```
[In] Int[F^(c*(a + b*x))*Log[d*x]^n*(e + e*n + e*(1 + b*c*x*Log[F])*Log[d*x]),x]
```

```
[Out] e*F^(c*(a + b*x))*x*Log[d*x]^(1 + n)
```

Rule 2201

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

Rubi steps

$$\int F^{c(a+bx)}\log^n(dx)(e+en+e(1+bcx\log(F))\log(dx))\,dx = eF^{c(a+bx)}x\log^{1+n}(dx)$$

Mathematica [A] time = 0.18, size = 21, normalized size = 1.05

$$ex\log^{n+1}(dx)F^{ac+bcx}$$

Antiderivative was successfully verified.

```
[In] Integrate[F^(c*(a + b*x))*Log[d*x]^n*(e + e*n + e*(1 + b*c*x*Log[F])*Log[d*
x]),x]
```

```
[Out] e*F^(a*c + b*c*x)*x*Log[d*x]^(1 + n)
```

fricas [A] time = 0.46, size = 23, normalized size = 1.15

$$F^{bcx+ac}ex\log(dx)^n\log(dx)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+e*(1+b*c*x*log(F))*log(d*x)),x, a
lgorithm="fricas")
```

```
[Out] F^(b*c*x + a*c)*e*x*log(d*x)^n*log(d*x)
```

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

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+e*(1+b*c*x*log(F))*log(d*x)),x, a
lgorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> An error occurred running a Giac command:
INPUT:sage2OUTPUT:Warning, infinity is unsigned, perhaps you meant +infinit
yWarning, infinity is unsigned, perhaps you meant +infinityUnable to divide
, perhaps due to rounding error%%%{1,[0,2,0,0,0,2,1]%%%}+%%%{2,[0,2,0,0,0,1
,1]%%%}+%%%{1,[0,2,0,0,0,0,1]%%%} / %%%{1,[0,3,0,0,0,2,0]%%%}+%%%{2,[0,3,0,
0,0,1,0]%%%}+%%%{1,[0,3,0,0,0,0,0]%%%} Error: Bad Argument Value
```

maple [C] time = 0.24, size = 186, normalized size = 9.30

$$\left(-\frac{i\pi ex\,F^{(bx+a)c}\mathrm{csgn}\left(id\right)\mathrm{csgn}\left(ix\right)\mathrm{csgn}\left(idx\right)}{2}+\frac{i\pi ex\,F^{(bx+a)c}\mathrm{csgn}\left(id\right)\mathrm{csgn}\left(idx\right)^{2}}{2}+\frac{i\pi ex\,F^{(bx+a)c}\mathrm{csgn}\left(ix\right)\mathrm{csgn}\left(\right.}{2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*ln(d*x)^n*(e+e*n+e*(1+b*c*x*ln(F))*ln(d*x)),x)
```

```
[Out] (1/2*I*x*F^((b*x+a)*c)*e*Pi*csgn(I*d)*csgn(I*d*x)^2-1/2*I*Pi*e*x*csgn(I*d)*
csgn(I*d*x)*csgn(I*x)*F^((b*x+a)*c)-1/2*I*x*F^((b*x+a)*c)*e*Pi*csgn(I*d*x)^
3+1/2*I*Pi*e*x*csgn(I*d*x)^2*csgn(I*x)*F^((b*x+a)*c)+e*x*F^((b*x+a)*c)*ln(d
)+e*x*F^((b*x+a)*c)*ln(x))*(-1/2*I*Pi*(csgn(I*d)-csgn(I*d*x))*(csgn(I*x)-cs
gn(I*d*x))*csgn(I*d*x)+ln(d)+ln(x))^n
```

maxima [A] time = 1.60, size = 38, normalized size = 1.90

$$\left(F^{ac}ex\log(d)+F^{ac}ex\log(x)\right)e^{\left(bcx\log(F)+n\log\left(\log(d)+\log(x)\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+e*(1+b*c*x*log(F))*log(d*x)),x, a
lgorithm="maxima")
```

[Out] (F^(a*c)*e*x*log(d) + F^(a*c)*e*x*log(x))*e^(b*c*x*log(F) + n*log(log(d) + log(x)))

mupad [B] time = 3.48, size = 21, normalized size = 1.05

$$F^{a\,c+b\,c\,x}\,e\,x\,\ln\left(d\,x\right)^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(F^(c*(a + b*x))*log(d*x)^n*(e + e*n + e*log(d*x)*(b*c*x*log(F) + 1)),x)

[Out] F^(a*c + b*c*x)*e*x*log(d*x)^(n + 1)

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

$$e\left(\int F^{ac}F^{bcx}\log\left(dx\right)^{n}\,dx + \int F^{ac}F^{bcx}n\log\left(dx\right)^{n}\,dx + \int F^{ac}F^{bcx}\log\left(dx\right)\log\left(dx\right)^{n}\,dx + \int F^{ac}F^{bcx}bcx\log\left(F\right)\log$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(F**(c*(b*x+a))*ln(d*x)**n*(e+e*n+e*(1+b*c*x*ln(F))*ln(d*x)),x)

[Out] e*(Integral(F**(a*c)*F**(b*c*x)*log(d*x)**n, x) + Integral(F**(a*c)*F**(b*c*x)*n*log(d*x)**n, x) + Integral(F**(a*c)*F**(b*c*x)*log(d*x)*log(d*x)**n, x) + Integral(F**(a*c)*F**(b*c*x)*b*c*x*log(F)*log(d*x)*log(d*x)**n, x))

3.87 $\int \frac{F^{c(a+bx)}\log^n(dx)(e+en+bcex\log(F)\log(dx))}{x}\,dx$

Optimal. Leaf size=19

$$e\log^{n+1}(dx)F^{c(a+bx)}$$

```
[Out] e*F^(c*(b*x+a))*ln(d*x)^(1+n)
```

Rubi [A] time = 0.13, antiderivative size = 19, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 35, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.029, Rules used = {2202}

$$e\log^{n+1}(dx)F^{c(a+bx)}$$

Antiderivative was successfully verified.

```
[In] Int[(F^(c*(a + b*x))*Log[d*x]^n*(e + e*n + b*c*e*x*Log[F]*Log[d*x]))/x,x]
```

```
[Out] e*F^(c*(a + b*x))*Log[d*x]^(1 + n)
```

Rule 2202

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

Rubi steps

$$\int \frac{F^{c(a+bx)}\log^n(dx)(e+en+bcex\log(F)\log(dx))}{x}\,dx = eF^{c(a+bx)}\log^{1+n}(dx)$$

Mathematica [A] time = 0.03, size = 19, normalized size = 1.00

$$e\log^{n+1}(dx)F^{c(a+bx)}$$

Antiderivative was successfully verified.

```
[In] Integrate[(F^(c*(a + b*x))*Log[d*x]^n*(e + e*n + b*c*e*x*Log[F]*Log[d*x]))/
x,x]
```

```
[Out] e*F^(c*(a + b*x))*Log[d*x]^(1 + n)
```

fricas [A] time = 0.49, size = 22, normalized size = 1.16

$$F^{bcx+ac}e\log(dx)^n\log(dx)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+b*c*e*x*log(F)*log(d*x))/x,x, alg
orithm="fricas")
```

```
[Out] F^(b*c*x + a*c)*e*log(d*x)^n*log(d*x)
```

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

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+b*c*e*x*log(F)*log(d*x))/x,x, alg
orithm="giac")
```

```
[Out] Exception raised: RuntimeError >> An error occurred running a Giac command:
INPUT:sage2OUTPUT:Warning, infinity is unsigned, perhaps you meant +infinit
yWarning, infinity is unsigned, perhaps you meant +infinityUnable to divide
, perhaps due to rounding error%%%{1,[0,2,0,0,0,2,1]%%%}+%%%{2,[0,2,0,0,0,1
,1]%%%}+%%%{1,[0,2,0,0,0,0,1]%%%} / %%%{1,[0,3,0,0,0,2,0]%%%}+%%%{2,[0,3,0,
0,0,1,0]%%%}+%%%{1,[0,3,0,0,0,0,0]%%%} Error: Bad Argument Value
```

maple [C] time = 0.20, size = 180, normalized size = 9.47

$$\left(-\frac{i\pi e F^{(bx+a)c}\operatorname{csgn}(id)\operatorname{csgn}(ix)\operatorname{csgn}(idx)}{2}+\frac{i\pi e F^{(bx+a)c}\operatorname{csgn}(id)\operatorname{csgn}(idx)^2}{2}+\frac{i\pi e F^{(bx+a)c}\operatorname{csgn}(ix)\operatorname{csgn}(idx)^2}{2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*ln(d*x)^n*(e+e*n+b*c*e*x*ln(F)*ln(d*x))/x,x)
```

```
[Out] (1/2*I*Pi*e*csgn(I*d)*csgn(I*d*x)^2*F^((b*x+a)*c)-1/2*I*Pi*e*csgn(I*d)*csgn
(I*d*x)*csgn(I*x)*F^((b*x+a)*c)-1/2*I*Pi*e*csgn(I*d*x)^3*F^((b*x+a)*c)+1/2*
I*Pi*e*csgn(I*d*x)^2*csgn(I*x)*F^((b*x+a)*c)+ln(d)*e*F^((b*x+a)*c)+e*F^((b*
x+a)*c)*ln(x))*(-1/2*I*Pi*(csgn(I*d)-csgn(I*d*x))*(csgn(I*x)-csgn(I*d*x))*c
sgn(I*d*x)+ln(d)+ln(x))^n
```

maxima [A] time = 1.61, size = 36, normalized size = 1.89

$$\left(F^{ac}e\log(d)+F^{ac}e\log(x)\right)e^{\left(bcx\log(F)+n\log\left(\log(d)+\log(x)\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+b*c*e*x*log(F)*log(d*x))/x,x, alg
orithm="maxima")
```

```
[Out] (F^(a*c)*e*log(d) + F^(a*c)*e*log(x))*e^(b*c*x*log(F) + n*log(log(d) + log(
x)))
```

mupad [B] time = 3.52, size = 20, normalized size = 1.05

$$F^{a\,c+b\,c\,x}\,e\,\ln\left(d\,x\right)^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^(c*(a + b*x))*log(d*x)^n*(e + e*n + b*c*e*x*log(d*x)*log(F)))/x,x)
```

```
[Out] F^(a*c + b*c*x)*e*log(d*x)^(n + 1)
```

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

$$e\left(\int\frac{F^{ac}F^{bcx}\log\left(dx\right)^{n}}{x}\,dx+\int\frac{F^{ac}F^{bcx}n\log\left(dx\right)^{n}}{x}\,dx+\int F^{ac}F^{bcx}bc\log\left(F\right)\log\left(dx\right)\log\left(dx\right)^{n}\,dx\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*ln(d*x)**n*(e+e*n+b*c*e*x*ln(F)*ln(d*x))/x,x)
```

```
[Out] e*(Integral(F**(a*c)*F**(b*c*x)*log(d*x)**n/x, x) + Integral(F**(a*c)*F**(b
*c*x)*n*log(d*x)**n/x, x) + Integral(F**(a*c)*F**(b*c*x)*b*c*log(F)*log(d*x
)*log(d*x)**n, x))
```

3.88 $\int \frac{F^{c(a+bx)}\log^n(dx)(e+en+e(-1+bcx\log(F))\log(dx))}{x^2}\,dx$

Optimal. Leaf size=22

$$\frac{e\log^{n+1}(dx)F^{c(a+bx)}}{x}$$

```
[Out] e*F^(c*(b*x+a))*ln(d*x)^(1+n)/x
```

Rubi [A] time = 0.13, antiderivative size = 22, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 38, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.026, Rules used = {2202}

$$\frac{e\log^{n+1}(dx)F^{c(a+bx)}}{x}$$

Antiderivative was successfully verified.

```
[In] Int[(F^(c*(a + b*x))*Log[d*x]^n*(e + e*n + e*(-1 + b*c*x*Log[F])*Log[d*x]))
/x^2,x]
```

```
[Out] (e*F^(c*(a + b*x))*Log[d*x]^(1 + n))/x
```

Rule 2202

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

Rubi steps

$$\int \frac{F^{c(a+bx)}\log^n(dx)(e+en+e(-1+bcx\log(F))\log(dx))}{x^2}\,dx = \frac{eF^{c(a+bx)}\log^{1+n}(dx)}{x}$$

Mathematica [A] time = 0.35, size = 23, normalized size = 1.05

$$\frac{e\log^{n+1}(dx)F^{ac+bcx}}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[(F^(c*(a + b*x))*Log[d*x]^n*(e + e*n + e*(-1 + b*c*x*Log[F])*Log[
d*x]))/x^2,x]
```

```
[Out] (e*F^(a*c + b*c*x)*Log[d*x]^(1 + n))/x
```

fricas [A] time = 0.50, size = 25, normalized size = 1.14

$$\frac{F^{bcx+ac}e\log(dx)^n\log(dx)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+e*(-1+b*c*x*log(F))*log(d*x))/x^2
,x, algorithm="fricas")
```

```
[Out] F^(b*c*x + a*c)*e*log(d*x)^n*log(d*x)/x
```

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

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+e*(-1+b*c*x*log(F))*log(d*x))/x^2
,x, algorithm="giac")
```

```
[Out] Exception raised: RuntimeError >> An error occurred running a Giac command:
INPUT:sage2OUTPUT:Warning, infinity is unsigned, perhaps you meant +infinit
yWarning, infinity is unsigned, perhaps you meant +infinityUnable to divide
, perhaps due to rounding error%%%{1,[0,2,0,0,0,2,1]%%%}+%%%{2,[0,2,0,0,0,1
,1]%%%}+%%%{1,[0,2,0,0,0,0,1]%%%} / %%%{1,[0,3,0,0,0,2,0]%%%}+%%%{2,[0,3,0,
0,0,1,0]%%%}+%%%{1,[0,3,0,0,0,0,0]%%%} Error: Bad Argument Value
```

maple [C] time = 0.22, size = 136, normalized size = 6.18

$$\frac{\left(-i\pi\,\mathrm{csgn}\left(id\right)\mathrm{csgn}\left(ix\right)\mathrm{csgn}\left(idx\right)+i\pi\,\mathrm{csgn}\left(id\right)\mathrm{csgn}\left(idx\right)^{2}+i\pi\,\mathrm{csgn}\left(ix\right)\mathrm{csgn}\left(idx\right)^{2}-i\pi\mathrm{csgn}\left(idx\right)^{3}+2\ln(\right.}{2x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*ln(d*x)^n*(e+e*n+e*(-1+b*c*x*ln(F))*ln(d*x))/x^2,x)
```

```
[Out] 1/2*F^((b*x+a)*c)*e*(2*ln(d)+2*ln(x)+I*Pi*csgn(I*d)*csgn(I*d*x)^2-I*Pi*csgn
(I*d)*csgn(I*d*x)*csgn(I*x)-I*Pi*csgn(I*d*x)^3+I*Pi*csgn(I*d*x)^2*csgn(I*x)
)/x*(-1/2*I*Pi*(csgn(I*d)-csgn(I*d*x))*(csgn(I*x)-csgn(I*d*x))*csgn(I*d*x)+
ln(d)+ln(x))^n
```

maxima [A] time = 1.63, size = 39, normalized size = 1.77

$$\frac{\left(F^{ac}e\log(d)+F^{ac}e\log(x)\right)e^{\left(bcx\log(F)+n\log\left(\log(d)+\log(x)\right)\right)}}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+e*(-1+b*c*x*log(F))*log(d*x))/x^2
,x, algorithm="maxima")
```

```
[Out] (F^(a*c)*e*log(d) + F^(a*c)*e*log(x))*e^(b*c*x*log(F) + n*log(log(d) + log(
x)))/x
```

mupad [B] time = 3.57, size = 23, normalized size = 1.05

$$\frac{F^{a\,c+b\,c\,x}\,e\ln\left(d\,x\right)^{n+1}}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^(c*(a + b*x))*log(d*x)^n*(e + e*n + e*log(d*x)*(b*c*x*log(F) - 1)))/
x^2,x)
```

```
[Out] (F^(a*c + b*c*x)*e*log(d*x)^(n + 1))/x
```

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

$$e\left(\int\frac{F^{ac}F^{bcx}\log\left(dx\right)^{n}}{x^{2}}\,dx+\int\frac{F^{ac}F^{bcx}n\log\left(dx\right)^{n}}{x^{2}}\,dx+\int\left(-\frac{F^{ac}F^{bcx}\log\left(dx\right)\log\left(dx\right)^{n}}{x^{2}}\right)dx+\int\frac{F^{ac}F^{bcx}bc\log\left(F\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F**(c*(b*x+a))*ln(d*x)**n*(e+e*n+e*(-1+b*c*x*ln(F))*ln(d*x))/x**2
,x)
```

```
[Out] e*(Integral(F**(a*c)*F**(b*c*x)*log(d*x)**n/x**2, x) + Integral(F**(a*c)*F*
*(b*c*x)*n*log(d*x)**n/x**2, x) + Integral(-F**(a*c)*F**(b*c*x)*log(d*x)*lo
g(d*x)**n/x**2, x) + Integral(F**(a*c)*F**(b*c*x)*b*c*log(F)*log(d*x)*log(d
*x)**n/x, x))
```

3.89 $\int \frac{F^{c(a+bx)} \log^n(dx)(e+en+e(-2+bcx\log(F))\log(dx))}{x^3} dx$

Optimal. Leaf size=22

$$\frac{e\log^{n+1}(dx)F^{c(a+bx)}}{x^2}$$

```
[Out] e*F^(c*(b*x+a))*ln(d*x)^(1+n)/x^2
```

Rubi [A] time = 0.13, antiderivative size = 22, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 38, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.026, Rules used = {2202}

$$\frac{e\log^{n+1}(dx)F^{c(a+bx)}}{x^2}$$

Antiderivative was successfully verified.

```
[In] Int[(F^(c*(a + b*x))*Log[d*x]^n*(e + e*n + e*(-2 + b*c*x*Log[F])*Log[d*x]))
/x^3,x]
```

```
[Out] (e*F^(c*(a + b*x))*Log[d*x]^(1 + n))/x^2
```

Rule 2202

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

Rubi steps

$$\int \frac{F^{c(a+bx)} \log^n(dx)(e+en+e(-2+bcx\log(F))\log(dx))}{x^3} dx = \frac{eF^{c(a+bx)}\log^{1+n}(dx)}{x^2}$$

Mathematica [A] time = 0.34, size = 23, normalized size = 1.05

$$\frac{e\log^{n+1}(dx)F^{ac+bcx}}{x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(F^(c*(a + b*x))*Log[d*x]^n*(e + e*n + e*(-2 + b*c*x*Log[F])*Log[
d*x]))/x^3,x]
```

```
[Out] (e*F^(a*c + b*c*x)*Log[d*x]^(1 + n))/x^2
```

fricas [A] time = 0.49, size = 25, normalized size = 1.14

$$\frac{F^{bcx+ac}e\log(dx)^n\log(dx)}{x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+e*(-2+b*c*x*log(F))*log(d*x))/x^3
,x, algorithm="fricas")
```

```
[Out] F^(b*c*x + a*c)*e*log(d*x)^n*log(d*x)/x^2
```

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

$$\int\frac{\left(\left(bcx\log(F)-2\right)e\log(dx)+en+e\right)F^{(bx+a)c}\log(dx)^n}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+e*(-2+b*c*x*log(F))*log(d*x))/x^3
,x, algorithm="giac")
```

```
[Out] integrate(((b*c*x*log(F) - 2)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*log(d*x
)^n/x^3, x)
```

maple [C] time = 0.23, size = 136, normalized size = 6.18

$$\frac{\left(-i\pi\operatorname{csgn}(id)\operatorname{csgn}(ix)\operatorname{csgn}(idx)+i\pi\operatorname{csgn}(id)\operatorname{csgn}(idx)^2+i\pi\operatorname{csgn}(ix)\operatorname{csgn}(idx)^2-i\pi\operatorname{csgn}(idx)^3+2\ln(d)}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(F^((b*x+a)*c)*ln(d*x)^n*(e+e*n+e*(-2+b*c*x*ln(F))*ln(d*x))/x^3,x)
```

```
[Out] 1/2*F^((b*x+a)*c)*e*(-I*Pi*csgn(I*d)*csgn(I*x)*csgn(I*d*x)+I*Pi*csgn(I*d)*c
sgn(I*d*x)^2+I*Pi*csgn(I*x)*csgn(I*d*x)^2-I*Pi*csgn(I*d*x)^3+2*ln(d)+2*ln(x
))/x^2*(-1/2*I*Pi*(csgn(I*d)-csgn(I*d*x))*(csgn(I*x)-csgn(I*d*x))*csgn(I*d*
x)+ln(d)+ln(x))^n
```

maxima [A] time = 1.63, size = 39, normalized size = 1.77

$$\frac{\left(F^{ac}e\log(d)+F^{ac}e\log(x)\right)e^{\left(bcx\log(F)+n\log\left(\log(d)+\log(x)\right)\right)}}{x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^(c*(b*x+a))*log(d*x)^n*(e+e*n+e*(-2+b*c*x*log(F))*log(d*x))/x^3
,x, algorithm="maxima")
```

```
[Out] (F^(a*c)*e*log(d) + F^(a*c)*e*log(x))*e^(b*c*x*log(F) + n*log(log(d) + log(
x)))/x^2
```

mupad [B] time = 3.58, size = 23, normalized size = 1.05

$$\frac{F^{a\,c+b\,c\,x}\,e\,\ln\left(d\,x\right)^{n+1}}{x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((F^(c*(a + b*x))*log(d*x)^n*(e + e*n + e*log(d*x)*(b*c*x*log(F) - 2)))/
x^3,x)
```

```
[Out] (F^(a*c + b*c*x)*e*log(d*x)^(n + 1))/x^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(F**(c*(b*x+a))*ln(d*x)**n*(e+e*n+e*(-2+b*c*x*ln(F))*ln(d*x))/x**3
,x)
```

```
[Out] Timed out
```

3.90 $\int \sqrt{e^{a+bx}}\, x^4\, dx$

Optimal. Leaf size=91

$$\frac{768\sqrt{e^{a+bx}}}{b^5}-\frac{384x\sqrt{e^{a+bx}}}{b^4}+\frac{96x^2\sqrt{e^{a+bx}}}{b^3}-\frac{16x^3\sqrt{e^{a+bx}}}{b^2}+\frac{2x^4\sqrt{e^{a+bx}}}{b}$$

```
[Out] 768*exp(b*x+a)^(1/2)/b^5-384*x*exp(b*x+a)^(1/2)/b^4+96*x^2*exp(b*x+a)^(1/2)
/b^3-16*x^3*exp(b*x+a)^(1/2)/b^2+2*x^4*exp(b*x+a)^(1/2)/b
```

Rubi [A] time = 0.14, antiderivative size = 91, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {2176, 2194}

$$-\frac{16x^3\sqrt{e^{a+bx}}}{b^2}+\frac{96x^2\sqrt{e^{a+bx}}}{b^3}-\frac{384x\sqrt{e^{a+bx}}}{b^4}+\frac{768\sqrt{e^{a+bx}}}{b^5}+\frac{2x^4\sqrt{e^{a+bx}}}{b}$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[E^(a + b*x)]*x^4,x]
```

```
[Out] (768*Sqrt[E^(a + b*x)])/b^5 - (384*Sqrt[E^(a + b*x)]*x)/b^4 + (96*Sqrt[E^(a
 + b*x)]*x^2)/b^3 - (16*Sqrt[E^(a + b*x)]*x^3)/b^2 + (2*Sqrt[E^(a + b*x)]*x
^4)/b
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\begin{aligned}\int \sqrt{e^{a+bx}}\, x^4\, dx &= \frac{2\sqrt{e^{a+bx}}\, x^4}{b} - \frac{8\int \sqrt{e^{a+bx}}\, x^3\, dx}{b} \\ &= -\frac{16\sqrt{e^{a+bx}}\, x^3}{b^2} + \frac{2\sqrt{e^{a+bx}}\, x^4}{b} + \frac{48\int \sqrt{e^{a+bx}}\, x^2\, dx}{b^2} \\ &= \frac{96\sqrt{e^{a+bx}}\, x^2}{b^3} - \frac{16\sqrt{e^{a+bx}}\, x^3}{b^2} + \frac{2\sqrt{e^{a+bx}}\, x^4}{b} - \frac{192\int \sqrt{e^{a+bx}}\, x\, dx}{b^3} \\ &= -\frac{384\sqrt{e^{a+bx}}\, x}{b^4} + \frac{96\sqrt{e^{a+bx}}\, x^2}{b^3} - \frac{16\sqrt{e^{a+bx}}\, x^3}{b^2} + \frac{2\sqrt{e^{a+bx}}\, x^4}{b} + \frac{384\int \sqrt{e^{a+bx}}\, dx}{b^4} \\ &= \frac{768\sqrt{e^{a+bx}}}{b^5} - \frac{384\sqrt{e^{a+bx}}\, x}{b^4} + \frac{96\sqrt{e^{a+bx}}\, x^2}{b^3} - \frac{16\sqrt{e^{a+bx}}\, x^3}{b^2} + \frac{2\sqrt{e^{a+bx}}\, x^4}{b}\end{aligned}$$

Mathematica [A] time = 0.02, size = 45, normalized size = 0.49

$$\frac{2\left(b^4x^4 - 8b^3x^3 + 48b^2x^2 - 192bx + 384\right)\sqrt{e^{a+bx}}}{b^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[E^(a + b*x)]*x^4,x]
```

```
[Out] (2*Sqrt[E^(a + b*x)]*(384 - 192*b*x + 48*b^2*x^2 - 8*b^3*x^3 + b^4*x^4))/b^
5
```

fricas [A] time = 0.47, size = 43, normalized size = 0.47

$$\frac{2\left(b^4x^4 - 8\,b^3x^3 + 48\,b^2x^2 - 192\,bx + 384\right)e^{\left(\frac{1}{2}\,bx + \frac{1}{2}\,a\right)}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*exp(b*x+a)^(1/2),x, algorithm="fricas")
```

```
[Out] 2*(b^4*x^4 - 8*b^3*x^3 + 48*b^2*x^2 - 192*b*x + 384)*e^(1/2*b*x + 1/2*a)/b^
5
```

giac [A] time = 0.34, size = 43, normalized size = 0.47

$$\frac{2\left(b^4x^4 - 8\,b^3x^3 + 48\,b^2x^2 - 192\,bx + 384\right)e^{\left(\frac{1}{2}\,bx + \frac{1}{2}\,a\right)}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*exp(b*x+a)^(1/2),x, algorithm="giac")
```

```
[Out] 2*(b^4*x^4 - 8*b^3*x^3 + 48*b^2*x^2 - 192*b*x + 384)*e^(1/2*b*x + 1/2*a)/b^
5
```

maple [A] time = 0.00, size = 43, normalized size = 0.47

$$\frac{2\left(x^4b^4-8b^3x^3+48b^2x^2-192bx+384\right)\sqrt{\mathrm{e}^{bx+a}}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 2*(b^4*x^4-8*b^3*x^3+48*b^2*x^2-192*b*x+384)*exp(b*x+a)^(1/2)/b^5
```

maxima [A] time = 0.90, size = 60, normalized size = 0.66

$$\frac{2\left(b^4x^4e^{\left(\frac{1}{2}a\right)}-8\,b^3x^3e^{\left(\frac{1}{2}a\right)}+48\,b^2x^2e^{\left(\frac{1}{2}a\right)}-192\,bxe^{\left(\frac{1}{2}a\right)}+384\,e^{\left(\frac{1}{2}a\right)}\right)e^{\left(\frac{1}{2}bx\right)}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*exp(b*x+a)^(1/2),x, algorithm="maxima")
```

```
[Out] 2*(b^4*x^4*e^(1/2*a) - 8*b^3*x^3*e^(1/2*a) + 48*b^2*x^2*e^(1/2*a) - 192*b*x
*e^(1/2*a) + 384*e^(1/2*a))*e^(1/2*b*x)/b^5
```

mupad [B] time = 0.13, size = 45, normalized size = 0.49

$$\sqrt{\mathrm{e}^{a+b\,x}}\,\left(\frac{768}{b^5}-\frac{384\,x}{b^4}+\frac{2\,x^4}{b}-\frac{16\,x^3}{b^2}+\frac{96\,x^2}{b^3}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] exp(a + b*x)^(1/2)*(768/b^5 - (384*x)/b^4 + (2*x^4)/b - (16*x^3)/b^2 + (96*
x^2)/b^3)
```

sympy [A] time = 0.13, size = 51, normalized size = 0.56

$$\begin{cases} \frac{\left(2b^4x^4-16b^3x^3+96b^2x^2-384bx+768\right)\sqrt{e^{a+bx}}}{b^5} & \text{for } b^5 \neq 0 \\ \frac{x^5}{5} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*exp(b*x+a)**(1/2),x)
```

```
[Out] Piecewise(((2*b**4*x**4 - 16*b**3*x**3 + 96*b**2*x**2 - 384*b*x + 768)*sqrt
(exp(a + b*x))/b**5, Ne(b**5, 0)), (x**5/5, True))
```

3.91 $\int \sqrt{e^{a+bx}}\, x^3\, dx$

Optimal. Leaf size=72

$$-\frac{96\sqrt{e^{a+bx}}}{b^4}+\frac{48x\sqrt{e^{a+bx}}}{b^3}-\frac{12x^2\sqrt{e^{a+bx}}}{b^2}+\frac{2x^3\sqrt{e^{a+bx}}}{b}$$

```
[Out] -96*exp(b*x+a)^(1/2)/b^4+48*x*exp(b*x+a)^(1/2)/b^3-12*x^2*exp(b*x+a)^(1/2)/
b^2+2*x^3*exp(b*x+a)^(1/2)/b
```

Rubi [A] time = 0.10, antiderivative size = 72, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {2176, 2194}

$$-\frac{12x^2\sqrt{e^{a+bx}}}{b^2}+\frac{48x\sqrt{e^{a+bx}}}{b^3}-\frac{96\sqrt{e^{a+bx}}}{b^4}+\frac{2x^3\sqrt{e^{a+bx}}}{b}$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[E^(a + b*x)]*x^3,x]
```

```
[Out] (-96*Sqrt[E^(a + b*x)])/b^4 + (48*Sqrt[E^(a + b*x)]*x)/b^3 - (12*Sqrt[E^(a
+ b*x)]*x^2)/b^2 + (2*Sqrt[E^(a + b*x)]*x^3)/b
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\begin{aligned}\int \sqrt{e^{a+bx}}\, x^3\, dx &= \frac{2\sqrt{e^{a+bx}}\, x^3}{b} - \frac{6\int \sqrt{e^{a+bx}}\, x^2\, dx}{b} \\ &= -\frac{12\sqrt{e^{a+bx}}\, x^2}{b^2} + \frac{2\sqrt{e^{a+bx}}\, x^3}{b} + \frac{24\int \sqrt{e^{a+bx}}\, x\, dx}{b^2} \\ &= \frac{48\sqrt{e^{a+bx}}\, x}{b^3} - \frac{12\sqrt{e^{a+bx}}\, x^2}{b^2} + \frac{2\sqrt{e^{a+bx}}\, x^3}{b} - \frac{48\int \sqrt{e^{a+bx}}\, dx}{b^3} \\ &= -\frac{96\sqrt{e^{a+bx}}}{b^4} + \frac{48\sqrt{e^{a+bx}}\, x}{b^3} - \frac{12\sqrt{e^{a+bx}}\, x^2}{b^2} + \frac{2\sqrt{e^{a+bx}}\, x^3}{b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 37, normalized size = 0.51

$$\frac{2\left(b^3x^3 - 6b^2x^2 + 24bx - 48\right)\sqrt{e^{a+bx}}}{b^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[E^(a + b*x)]*x^3,x]
```

```
[Out] (2*Sqrt[E^(a + b*x)]*(-48 + 24*b*x - 6*b^2*x^2 + b^3*x^3))/b^4
```

fricas [A] time = 0.43, size = 35, normalized size = 0.49

$$\frac{2\left(b^3x^3 - 6\,b^2x^2 + 24\,bx - 48\right)e^{\left(\frac{1}{2}\,bx + \frac{1}{2}\,a\right)}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*exp(b*x+a)^(1/2),x, algorithm="fricas")
```

```
[Out] 2*(b^3*x^3 - 6*b^2*x^2 + 24*b*x - 48)*e^(1/2*b*x + 1/2*a)/b^4
```

giac [A] time = 0.29, size = 35, normalized size = 0.49

$$\frac{2\left(b^3x^3 - 6\,b^2x^2 + 24\,bx - 48\right)e^{\left(\frac{1}{2}\,bx + \frac{1}{2}\,a\right)}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*exp(b*x+a)^(1/2),x, algorithm="giac")
```

```
[Out] 2*(b^3*x^3 - 6*b^2*x^2 + 24*b*x - 48)*e^(1/2*b*x + 1/2*a)/b^4
```

maple [A] time = 0.00, size = 35, normalized size = 0.49

$$\frac{2\left(b^{3}x^{3}-6b^{2}x^{2}+24bx-48\right)\sqrt{\mathrm{e}^{bx+a}}}{b^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 2*(b^3*x^3-6*b^2*x^2+24*b*x-48)*exp(b*x+a)^(1/2)/b^4
```

maxima [A] time = 0.89, size = 48, normalized size = 0.67

$$\frac{2\left(b^{3}x^{3}e^{\left(\frac{1}{2}a\right)}-6\,b^{2}x^{2}e^{\left(\frac{1}{2}a\right)}+24\,bxe^{\left(\frac{1}{2}a\right)}-48\,e^{\left(\frac{1}{2}a\right)}\right)e^{\left(\frac{1}{2}bx\right)}}{b^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*exp(b*x+a)^(1/2),x, algorithm="maxima")
```

```
[Out] 2*(b^3*x^3*e^(1/2*a) - 6*b^2*x^2*e^(1/2*a) + 24*b*x*e^(1/2*a) - 48*e^(1/2*a
))*e^(1/2*b*x)/b^4
```

mupad [B] time = 0.05, size = 37, normalized size = 0.51

$$\sqrt{\mathrm{e}^{a+b\,x}}\,\left(\frac{48\,x}{b^3}-\frac{96}{b^4}+\frac{2\,x^3}{b}-\frac{12\,x^2}{b^2}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] exp(a + b*x)^(1/2)*((48*x)/b^3 - 96/b^4 + (2*x^3)/b - (12*x^2)/b^2)
```

sympy [A] time = 0.13, size = 42, normalized size = 0.58

$$\begin{cases} \frac{\left(2b^{3}x^{3}-12b^{2}x^{2}+48bx-96\right)\sqrt{e^{a+bx}}}{b^{4}} & \text{for}\: b^{4} \neq 0 \\ \frac{x^{4}}{4} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*exp(b*x+a)**(1/2),x)
```

```
[Out] Piecewise(((2*b**3*x**3 - 12*b**2*x**2 + 48*b*x - 96)*sqrt(exp(a + b*x))/b*
*4, Ne(b**4, 0)), (x**4/4, True))
```

3.92 $\int \sqrt{e^{a+bx}}\, x^2 \, dx$

Optimal. Leaf size=53

$$\frac{16\sqrt{e^{a+bx}}}{b^3} - \frac{8x\sqrt{e^{a+bx}}}{b^2} + \frac{2x^2\sqrt{e^{a+bx}}}{b}$$

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

Rubi [A] time = 0.06, antiderivative size = 53, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {2176, 2194}

$$-\frac{8x\sqrt{e^{a+bx}}}{b^2} + \frac{16\sqrt{e^{a+bx}}}{b^3} + \frac{2x^2\sqrt{e^{a+bx}}}{b}$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[E^(a + b*x)]*x^2,x]
```

```
[Out] (16*Sqrt[E^(a + b*x)])/b^3 - (8*Sqrt[E^(a + b*x)]*x)/b^2 + (2*Sqrt[E^(a + b
*x)]*x^2)/b
```

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\begin{aligned}\int \sqrt{e^{a+bx}}\,x^2\,dx &= \frac{2\sqrt{e^{a+bx}}\,x^2}{b}-\frac{4\int \sqrt{e^{a+bx}}\,x\,dx}{b}\\ &= -\frac{8\sqrt{e^{a+bx}}\,x}{b^2}+\frac{2\sqrt{e^{a+bx}}\,x^2}{b}+\frac{8\int \sqrt{e^{a+bx}}\,dx}{b^2}\\ &= \frac{16\sqrt{e^{a+bx}}}{b^3}-\frac{8\sqrt{e^{a+bx}}\,x}{b^2}+\frac{2\sqrt{e^{a+bx}}\,x^2}{b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 29, normalized size = 0.55

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

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[E^(a + b*x)]*x^2,x]
[Out] (2*Sqrt[E^(a + b*x)]*(8 - 4*b*x + b^2*x^2))/b^3
```

fricas [A] time = 0.43, size = 27, normalized size = 0.51

$$\frac{2\left(b^2x^2-4\,bx+8\right)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*exp(b*x+a)^(1/2),x, algorithm="fricas")
[Out] 2*(b^2*x^2 - 4*b*x + 8)*e^(1/2*b*x + 1/2*a)/b^3
```

giac [A] time = 0.35, size = 27, normalized size = 0.51

$$\frac{2\left(b^2x^2-4\,bx+8\right)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*exp(b*x+a)^(1/2),x, algorithm="giac")
[Out] 2*(b^2*x^2 - 4*b*x + 8)*e^(1/2*b*x + 1/2*a)/b^3
```

maple [A] time = 0.00, size = 27, normalized size = 0.51

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

Verification of antiderivative is not currently implemented for this CAS.

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

maxima [A] time = 0.90, size = 36, normalized size = 0.68

$$\frac{2\left(b^{2}x^{2}e^{\left(\frac{1}{2}a\right)}-4\,bxe^{\left(\frac{1}{2}a\right)}+8\,e^{\left(\frac{1}{2}a\right)}\right)e^{\left(\frac{1}{2}bx\right)}}{b^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*exp(b*x+a)^(1/2),x, algorithm="maxima")
[Out] 2*(b^2*x^2*e^(1/2*a) - 4*b*x*e^(1/2*a) + 8*e^(1/2*a))*e^(1/2*b*x)/b^3
```

mupad [B] time = 0.06, size = 29, normalized size = 0.55

$$\sqrt{\mathrm{e}^{a+b\,x}}\,\left(\frac{16}{b^{3}}-\frac{8\,x}{b^{2}}+\frac{2\,x^{2}}{b}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*exp(a + b*x)^(1/2),x)
[Out] exp(a + b*x)^(1/2)*(16/b^3 - (8*x)/b^2 + (2*x^2)/b)
```

sympy [A] time = 0.12, size = 34, normalized size = 0.64

$$\begin{cases} \frac{\left(2b^{2}x^{2}-8bx+16\right)\sqrt{e^{a+bx}}}{b^{3}} & \text{for}\: b^{3}\neq 0 \\ \frac{x^{3}}{3} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*exp(b*x+a)**(1/2),x)
[Out] Piecewise(((2*b**2*x**2 - 8*b*x + 16)*sqrt(exp(a + b*x))/b**3, Ne(b**3, 0))
, (x**3/3, True))
```

3.93 $\int \sqrt{e^{a+bx}}\, x \, dx$

Optimal. Leaf size=34

$$\frac{2x\sqrt{e^{a+bx}}}{b}-\frac{4\sqrt{e^{a+bx}}}{b^2}$$

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

Rubi [A] time = 0.03, antiderivative size = 34, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2176, 2194}

$$\frac{2x\sqrt{e^{a+bx}}}{b}-\frac{4\sqrt{e^{a+bx}}}{b^2}$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[E^(a + b*x)]*x,x]
```

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

Rule 2176

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_.), x_Symbol] :> Simp[((c + d*x)^m*(b*F^(g*(e + f*x)))^n)/(f*g*n*Log[F]),
x] - Dist[(d*m)/(f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*(b*F^(g*(e + f*x)))^n
, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && GtQ[m, 0] && IntegerQ[2*m
] &&  !$UseGamma === True
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\begin{aligned}\int \sqrt{e^{a+bx}}\, x \, dx &= \frac{2\sqrt{e^{a+bx}}\, x}{b}-\frac{2\int \sqrt{e^{a+bx}}\, dx}{b}\\ &= -\frac{4\sqrt{e^{a+bx}}}{b^2}+\frac{2\sqrt{e^{a+bx}}\, x}{b}\end{aligned}$$

Mathematica [A] time = 0.01, size = 21, normalized size = 0.62

$$\frac{2(bx-2)\sqrt{e^{a+bx}}}{b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[E^(a + b*x)]*x,x]
```

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

fricas [A] time = 0.41, size = 19, normalized size = 0.56

$$\frac{2\,(bx-2)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.45, size = 19, normalized size = 0.56

$$\frac{2\,(bx-2)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.00, size = 19, normalized size = 0.56

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 0.90, size = 24, normalized size = 0.71

$$\frac{2\left(bxe^{\left(\frac{1}{2}\,a\right)}-2\,e^{\left(\frac{1}{2}\,a\right)}\right)e^{\left(\frac{1}{2}\,bx\right)}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 0.04, size = 18, normalized size = 0.53

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

sympy [A] time = 0.11, size = 26, normalized size = 0.76

$$\begin{cases} \frac{(2bx-4)\sqrt{e^{a+bx}}}{b^2} & \text{for}\ b^2 \neq 0 \\ \frac{x^2}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.94 $\int \sqrt{e^{a+bx}}\,dx$

Optimal. Leaf size=16

$$\frac{2\sqrt{e^{a+bx}}}{b}$$

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

Rubi [A] time = 0.01, antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.091, Rules used = {2194}

$$\frac{2\sqrt{e^{a+bx}}}{b}$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[E^(a + b*x)],x]
```

```
[Out] (2*Sqrt[E^(a + b*x)])/b
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rubi steps

$$\int \sqrt{e^{a+bx}}\,dx = \frac{2\sqrt{e^{a+bx}}}{b}$$

Mathematica [A] time = 0.01, size = 16, normalized size = 1.00

$$\frac{2\sqrt{e^{a+bx}}}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[E^(a + b*x)],x]
```

```
[Out] (2*Sqrt[E^(a + b*x)])/b
```

fricas [A] time = 0.42, size = 14, normalized size = 0.88

$$\frac{2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.32, size = 14, normalized size = 0.88

$$\frac{2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [A] time = 0.00, size = 14, normalized size = 0.88

$$\frac{2\sqrt{e^{bx+a}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 0.87, size = 14, normalized size = 0.88

$$\frac{2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

mupad [B] time = 3.39, size = 13, normalized size = 0.81

$$\frac{2\,\sqrt{e^{a+b\,x}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

sympy [A] time = 0.09, size = 14, normalized size = 0.88

$$\begin{cases} \frac{2\sqrt{e^{a+bx}}}{b} & \text{for } b \neq 0 \\ x & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b*x+a)**(1/2),x)
[Out] Piecewise((2*sqrt(exp(a + b*x))/b, Ne(b, 0)), (x, True))
```

3.95 $\int \frac{\sqrt{e^{a+bx}}}{x}\,dx$

Optimal. Leaf size=27

$$e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)$$

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

Rubi [A] time = 0.06, antiderivative size = 27, 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 = {2182, 2178}

$$e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[E^(a + b*x)]/x,x]
```

```
[Out] (Sqrt[E^(a + b*x)]*ExpIntegralEi[(b*x)/2])/E^((b*x)/2)
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2182

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_)*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Dist[(b*F^(g*(e + f*x)))^n/F^(g*n*(e + f*x)), Int[(c + d*x
)^m*F^(g*n*(e + f*x)), x], x] /; FreeQ[{F, b, c, d, e, f, g, m, n}, x]
```

Rubi steps

$$\begin{aligned}\int \frac{\sqrt{e^{a+bx}}}{x}\,dx &= \left(e^{\frac{1}{2}(-a-bx)}\sqrt{e^{a+bx}}\right)\int \frac{e^{\frac{1}{2}(a+bx)}}{x}\,dx\\ &= e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)\end{aligned}$$

Mathematica [A] time = 0.02, size = 27, normalized size = 1.00

$$e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\mathrm{Ei}\left(\frac{bx}{2}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[E^(a + b*x)]/x,x]
```

```
[Out] (Sqrt[E^(a + b*x)]*ExpIntegralEi[(b*x)/2])/E^((b*x)/2)
```

fricas [A] time = 0.40, size = 10, normalized size = 0.37

$$\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.36, size = 10, normalized size = 0.37

$$\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [B] time = 0.06, size = 57, normalized size = 2.11

$$\left(-\mathrm{Ei}\left(1,-\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}\right)+\ln(x)+\ln\left(-b\,\mathrm{e}^{\frac{a}{2}}\right)-\ln\left(-\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}\right)-\ln(2)\right)\mathrm{e}^{-\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}}\sqrt{\mathrm{e}^{bx+a}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 1.23, size = 10, normalized size = 0.37

$$\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\sqrt{\mathrm{e}^{a+b\,x}}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\sqrt{e^{a}e^{bx}}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(sqrt(exp(a)*exp(b*x))/x, x)
```

3.96 $\int \frac{\sqrt{e^{a+bx}}}{x^2} \, dx$

Optimal. Leaf size=48

$$\frac{1}{2}be^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)-\frac{\sqrt{e^{a+bx}}}{x}$$

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

Rubi [A] time = 0.09, antiderivative size = 48, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {2177, 2182, 2178}

$$\frac{1}{2}be^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)-\frac{\sqrt{e^{a+bx}}}{x}$$

Antiderivative was successfully verified.

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

```
[Out] -(Sqrt[E^(a + b*x)]/x) + (b*Sqrt[E^(a + b*x)]*ExpIntegralEi[(b*x)/2])/(2*E^
((b*x)/2))
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2182

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_)*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Dist[(b*F^(g*(e + f*x)))^n/F^(g*n*(e + f*x)), Int[(c + d*x
)^m*F^(g*n*(e + f*x)), x], x] /; FreeQ[{F, b, c, d, e, f, g, m, n}, x]
```

Rubi steps

$$\begin{aligned}\int \frac{\sqrt{e^{a+bx}}}{x^2}\,dx &= -\frac{\sqrt{e^{a+bx}}}{x} + \frac{1}{2}b\int \frac{\sqrt{e^{a+bx}}}{x}\,dx\\ &= -\frac{\sqrt{e^{a+bx}}}{x} + \frac{1}{2}\left(be^{\frac{1}{2}(-a-bx)}\sqrt{e^{a+bx}}\right)\int \frac{e^{\frac{1}{2}(a+bx)}}{x}\,dx\\ &= -\frac{\sqrt{e^{a+bx}}}{x} + \frac{1}{2}be^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\mathrm{Ei}\left(\frac{bx}{2}\right)\end{aligned}$$

Mathematica [A] time = 0.03, size = 47, normalized size = 0.98

$$\frac{e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\left(bx\mathrm{Ei}\left(\frac{bx}{2}\right)-2e^{\frac{bx}{2}}\right)}{2x}$$

Antiderivative was successfully verified.

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

```
[Out] (Sqrt[E^(a + b*x)]*(-2*E^((b*x)/2) + b*x*ExpIntegralEi[(b*x)/2]))/(2*E^((b*
x)/2)*x)
```

fricas [A] time = 0.43, size = 29, normalized size = 0.60

$$\frac{bx\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}-2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{2\,x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

giac [A] time = 0.41, size = 29, normalized size = 0.60

$$\frac{bx\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}-2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{2\,x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maple [B] time = 0.04, size = 116, normalized size = 2.42

$$-\frac{\left(\mathrm{Ei}\left(1,-\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}\right)-\ln(x)-\ln\left(-b\,\mathrm{e}^{\frac{a}{2}}\right)+\ln\left(-\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}\right)-\frac{\left(bx\,\mathrm{e}^{\frac{a}{2}}+2\right)\mathrm{e}^{-\frac{a}{2}}}{bx}+\frac{2\,\mathrm{e}^{-\frac{a}{2}}}{bx}+\frac{2\,\mathrm{e}^{\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}-\frac{a}{2}}}{bx}+1+\ln(2)\right)b\,\mathrm{e}^{-\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}+\frac{a}{2}}\sqrt{\mathrm{e}^{l}}}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

maxima [A] time = 1.24, size = 13, normalized size = 0.27

$$\frac{1}{2}\,be^{\left(\frac{1}{2}\,a\right)}\Gamma\left(-1,-\frac{1}{2}\,bx\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\sqrt{\mathrm{e}^{a+b\,x}}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\sqrt{e^{a}e^{bx}}}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Integral(sqrt(exp(a)*exp(b*x))/x**2, x)
```

3.97 $\int \frac{\sqrt{e^{a+bx}}}{x^3}\,dx$

Optimal. Leaf size=71

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

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

Rubi [A] time = 0.12, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {2177, 2182, 2178}

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

Antiderivative was successfully verified.

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

```
[Out] -Sqrt[E^(a + b*x)]/(2*x^2) - (b*Sqrt[E^(a + b*x)])/(4*x) + (b^2*Sqrt[E^(a +
 b*x)]*ExpIntegralEi[(b*x)/2])/(8*E^((b*x)/2))
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2182

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_)*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Dist[(b*F^(g*(e + f*x)))^n/F^(g*n*(e + f*x)), Int[(c + d*x
)^m*F^(g*n*(e + f*x)), x], x] /; FreeQ[{F, b, c, d, e, f, g, m, n}, x]
```

Rubi steps

$$\begin{aligned}\int \frac{\sqrt{e^{a+bx}}}{x^3}\,dx &= -\frac{\sqrt{e^{a+bx}}}{2x^2}+\frac{1}{4}b\int \frac{\sqrt{e^{a+bx}}}{x^2}\,dx\\ &= -\frac{\sqrt{e^{a+bx}}}{2x^2}-\frac{b\sqrt{e^{a+bx}}}{4x}+\frac{1}{8}b^2\int \frac{\sqrt{e^{a+bx}}}{x}\,dx\\ &= -\frac{\sqrt{e^{a+bx}}}{2x^2}-\frac{b\sqrt{e^{a+bx}}}{4x}+\frac{1}{8}\left(b^2e^{\frac{1}{2}(-a-bx)}\sqrt{e^{a+bx}}\right)\int \frac{e^{\frac{1}{2}(a+bx)}}{x}\,dx\\ &= -\frac{\sqrt{e^{a+bx}}}{2x^2}-\frac{b\sqrt{e^{a+bx}}}{4x}+\frac{1}{8}b^2e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)\end{aligned}$$

Mathematica [A] time = 0.05, size = 56, normalized size = 0.79

$$\frac{e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\left(b^2x^2\text{Ei}\left(\frac{bx}{2}\right)-2e^{\frac{bx}{2}}(bx+2)\right)}{8x^2}$$

Antiderivative was successfully verified.

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

```
[Out] (Sqrt[E^(a + b*x)]*(-2*E^((b*x)/2)*(2 + b*x) + b^2*x^2*ExpIntegralEi[(b*x)/
2]))/(8*E^((b*x)/2)*x^2)
```

fricas [A] time = 0.46, size = 38, normalized size = 0.54

$$\frac{b^2x^2\text{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}-2\,(bx+2)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{8\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b*x+a)^(1/2)/x^3,x, algorithm="fricas")
```

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

giac [A] time = 0.36, size = 46, normalized size = 0.65

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b*x+a)^(1/2)/x^3,x, algorithm="giac")
```

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

maple [B] time = 0.05, size = 155, normalized size = 2.18

$$\frac{\left(-\frac{\mathrm{Ei}\left(1,-\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}\right)}{2}+\frac{\ln(x)}{2}+\frac{\ln\left(-b\,\mathrm{e}^{\frac{a}{2}}\right)}{2}-\frac{\ln\left(-\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}\right)}{2}-\frac{2\,\mathrm{e}^{-\frac{a}{2}}}{bx}+\frac{\left(\frac{9b^2x^2\mathrm{e}^a}{4}+6bx\,\mathrm{e}^{\frac{a}{2}}+6\right)\mathrm{e}^{-a}}{3b^2x^2}-\frac{2\,\mathrm{e}^{-a}}{b^2x^2}-\frac{2\left(\frac{3bx\,\mathrm{e}^{\frac{a}{2}}}{2}+3\right)\mathrm{e}^{\frac{bx\,\mathrm{e}^{\frac{a}{2}}}{2}-a}}{3b^2x^2}-\frac{3}{4}-\frac{\ln(2)}{2}\right)b^2}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*exp(b*x+a)^(1/2)*exp(a-1/2*b*x*exp(1/2*a))*b^2*(1/3/b^2/x^2*exp(-a)*(9/
4*b^2*x^2*exp(a)+6*b*x*exp(1/2*a)+6)-2/3/b^2/x^2*exp(-a+1/2*b*x*exp(1/2*a))
*(3/2*b*x*exp(1/2*a)+3)-1/2*ln(-1/2*b*x*exp(1/2*a))-1/2*Ei(1,-1/2*b*x*exp(1
/2*a))-3/4+1/2*ln(x)-1/2*ln(2)+1/2*ln(-b*exp(1/2*a))-2/x^2/b^2*exp(-a)-2/b/
x*exp(-1/2*a))
```

maxima [A] time = 1.24, size = 15, normalized size = 0.21

$$-\frac{1}{4}\,b^2e^{\left(\frac{1}{2}\,a\right)}\Gamma\left(-2,-\frac{1}{2}\,bx\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b*x+a)^(1/2)/x^3,x, algorithm="maxima")
```

```
[Out] -1/4*b^2*e^(1/2*a)*gamma(-2, -1/2*b*x)
```

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

$$\int \frac{\sqrt{\mathrm{e}^{a+b\,x}}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\sqrt{e^{a}e^{bx}}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b*x+a)**(1/2)/x**3,x)
```

```
[Out] Integral(sqrt(exp(a)*exp(b*x))/x**3, x)
```

3.98 $\int \frac{\sqrt{e^{a+bx}}}{x^4} \, dx$

Optimal. Leaf size=92

$$\frac{1}{48}b^3e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)-\frac{b^2\sqrt{e^{a+bx}}}{24x}-\frac{\sqrt{e^{a+bx}}}{3x^3}-\frac{b\sqrt{e^{a+bx}}}{12x^2}$$

```
[Out] -1/3*exp(b*x+a)^(1/2)/x^3-1/12*b*exp(b*x+a)^(1/2)/x^2-1/24*b^2*exp(b*x+a)^(
1/2)/x+1/48*b^3*Ei(1/2*b*x)*exp(b*x+a)^(1/2)/exp(1/2*b*x)
```

Rubi [A] time = 0.15, antiderivative size = 92, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {2177, 2182, 2178}

$$\frac{1}{48}b^3e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)-\frac{b^2\sqrt{e^{a+bx}}}{24x}-\frac{b\sqrt{e^{a+bx}}}{12x^2}-\frac{\sqrt{e^{a+bx}}}{3x^3}$$

Antiderivative was successfully verified.

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

```
[Out] -Sqrt[E^(a + b*x)]/(3*x^3) - (b*Sqrt[E^(a + b*x)])/(12*x^2) - (b^2*Sqrt[E^(
a + b*x)])/(24*x) + (b^3*Sqrt[E^(a + b*x)]*ExpIntegralEi[(b*x)/2])/(48*E^((
b*x)/2))
```

Rule 2177

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m
_), x_Symbol] :> Simp[((c + d*x)^(m + 1)*(b*F^(g*(e + f*x)))^n)/(d*(m + 1))
, x] - Dist[(f*g*n*Log[F])/(d*(m + 1)), Int[(c + d*x)^(m + 1)*(b*F^(g*(e +
f*x)))^n, x], x] /; FreeQ[{F, b, c, d, e, f, g, n}, x] && LtQ[m, -1] && Int
egerQ[2*m] &&  !$UseGamma === True
```

Rule 2178

```
Int[(F_)^((g_.)*((e_.) + (f_.)*(x_)))/((c_.) + (d_.)*(x_)), x_Symbol] :> Si
mp[(F^(g*(e - (c*f)/d))*ExpIntegralEi[(f*g*(c + d*x)*Log[F])/d])/d, x] /; F
reeQ[{F, c, d, e, f, g}, x] &&  !$UseGamma === True
```

Rule 2182

```
Int[((b_.)*(F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_)*((c_.) + (d_.)*(x_))^(m_
.), x_Symbol] :> Dist[(b*F^(g*(e + f*x)))^n/F^(g*n*(e + f*x)), Int[(c + d*x
)^m*F^(g*n*(e + f*x)), x], x] /; FreeQ[{F, b, c, d, e, f, g, m, n}, x]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\sqrt{e^{a+bx}}}{x^4}\,dx &= -\frac{\sqrt{e^{a+bx}}}{3x^3}+\frac{1}{6}b\int \frac{\sqrt{e^{a+bx}}}{x^3}\,dx\\
&= -\frac{\sqrt{e^{a+bx}}}{3x^3}-\frac{b\sqrt{e^{a+bx}}}{12x^2}+\frac{1}{24}b^2\int \frac{\sqrt{e^{a+bx}}}{x^2}\,dx\\
&= -\frac{\sqrt{e^{a+bx}}}{3x^3}-\frac{b\sqrt{e^{a+bx}}}{12x^2}-\frac{b^2\sqrt{e^{a+bx}}}{24x}+\frac{1}{48}b^3\int \frac{\sqrt{e^{a+bx}}}{x}\,dx\\
&= -\frac{\sqrt{e^{a+bx}}}{3x^3}-\frac{b\sqrt{e^{a+bx}}}{12x^2}-\frac{b^2\sqrt{e^{a+bx}}}{24x}+\frac{1}{48}\left(b^3e^{\frac{1}{2}(-a-bx)}\sqrt{e^{a+bx}}\right)\int \frac{e^{\frac{1}{2}(a+bx)}}{x}\,dx\\
&= -\frac{\sqrt{e^{a+bx}}}{3x^3}-\frac{b\sqrt{e^{a+bx}}}{12x^2}-\frac{b^2\sqrt{e^{a+bx}}}{24x}+\frac{1}{48}b^3e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\mathrm{Ei}\left(\frac{bx}{2}\right)
\end{aligned}
$$

Mathematica [A] time = 0.06, size = 64, normalized size = 0.70

$$\frac{e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\left(b^3x^3\mathrm{Ei}\left(\frac{bx}{2}\right)-2e^{\frac{bx}{2}}\left(b^2x^2+2bx+8\right)\right)}{48x^3}$$

Antiderivative was successfully verified.

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

```
[Out] (Sqrt[E^(a + b*x)]*(-2*E^((b*x)/2)*(8 + 2*b*x + b^2*x^2) + b^3*x^3*ExpInteg
ralEi[(b*x)/2]))/(48*E^((b*x)/2)*x^3)
```

fricas [A] time = 0.43, size = 46, normalized size = 0.50

$$\frac{b^3x^3\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}-2\left(b^2x^2+2\,bx+8\right)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{48\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b*x+a)^(1/2)/x^4,x, algorithm="fricas")
```

```
[Out] 1/48*(b^3*x^3*Ei(1/2*b*x)*e^(1/2*a) - 2*(b^2*x^2 + 2*b*x + 8)*e^(1/2*b*x +
1/2*a))/x^3
```

giac [A] time = 0.36, size = 63, normalized size = 0.68

$$\frac{b^3x^3\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}-2\,b^2x^2e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}-4\,bxe^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}-16\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{48\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b*x+a)^(1/2)/x^4,x, algorithm="giac")
```

```
[Out] 1/48*(b^3*x^3*Ei(1/2*b*x)*e^(1/2*a) - 2*b^2*x^2*e^(1/2*b*x + 1/2*a) - 4*b*x
*e^(1/2*b*x + 1/2*a) - 16*e^(1/2*b*x + 1/2*a))/x^3
```

maple [B] time = 0.05, size = 189, normalized size = 2.05

$$-\frac{\left(\frac{\mathrm{Ei}\left(1,-\frac{b x\,e^{\frac{a}{2}}}{2}\right)}{6}-\frac{\ln(x)}{6}-\frac{\ln\left(-b\,e^{\frac{a}{2}}\right)}{6}+\frac{\ln\left(-\frac{b x\,e^{\frac{a}{2}}}{2}\right)}{6}+\frac{e^{-\frac{a}{2}}}{bx}+\frac{2\,e^{-a}}{b^2x^2}-\frac{\left(\frac{11b^3x^3e^{\frac{3a}{2}}}{4}+9b^2x^2e^{a}+18bx\,e^{\frac{a}{2}}+24\right)e^{-\frac{3a}{2}}}{9b^3x^3}+\frac{8\,e^{-\frac{3a}{2}}}{3b^3x^3}+\frac{\left(b^2x^2e^{a}+2bx\,e^{\frac{a}{2}}\cdots\right.}{3b^3\cdots}\right.}{8}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -1/8*exp(b*x+a)^(1/2)*exp(3/2*a-1/2*b*x*exp(1/2*a))*b^3*(-1/9/b^3/x^3*exp(-
3/2*a)*(11/4*b^3*x^3*exp(3/2*a)+9*b^2*x^2*exp(a)+18*b*x*exp(1/2*a)+24)+1/3/
b^3/x^3*exp(-3/2*a+1/2*b*x*exp(1/2*a))*(b^2*x^2*exp(a)+2*b*x*exp(1/2*a)+8)+
1/6*ln(-1/2*b*x*exp(1/2*a))+1/6*Ei(1,-1/2*b*x*exp(1/2*a))+11/36-1/6*ln(x)+1
/6*ln(2)-1/6*ln(-b*exp(1/2*a))+8/3/x^3/b^3*exp(-3/2*a)+2/b^2/x^2*exp(-a)+1/
b/x*exp(-1/2*a))
```

maxima [A] time = 1.25, size = 15, normalized size = 0.16

$$\frac{1}{8}\,b^3e^{\left(\frac{1}{2}\,a\right)}\Gamma\left(-3,-\frac{1}{2}\,bx\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b*x+a)^(1/2)/x^4,x, algorithm="maxima")
```

```
[Out] 1/8*b^3*e^(1/2*a)*gamma(-3, -1/2*b*x)
```

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

$$\int \frac{\sqrt{e^{a+b\,x}}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] int(exp(a + b*x)^(1/2)/x^4, x)
```

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

$$\int \frac{\sqrt{e^{a}e^{bx}}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(b*x+a)**(1/2)/x**4,x)
```

```
[Out] Integral(sqrt(exp(a)*exp(b*x))/x**4, 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"
```