Computer algebra independent integration tests

`2_Exponentials/2.1_u-F^-c-a+b_x-^n`

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Contents

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 Albert Rich Rubi web site.

1.1 Listing of CAS systems tested

The following systems were tested at this time.

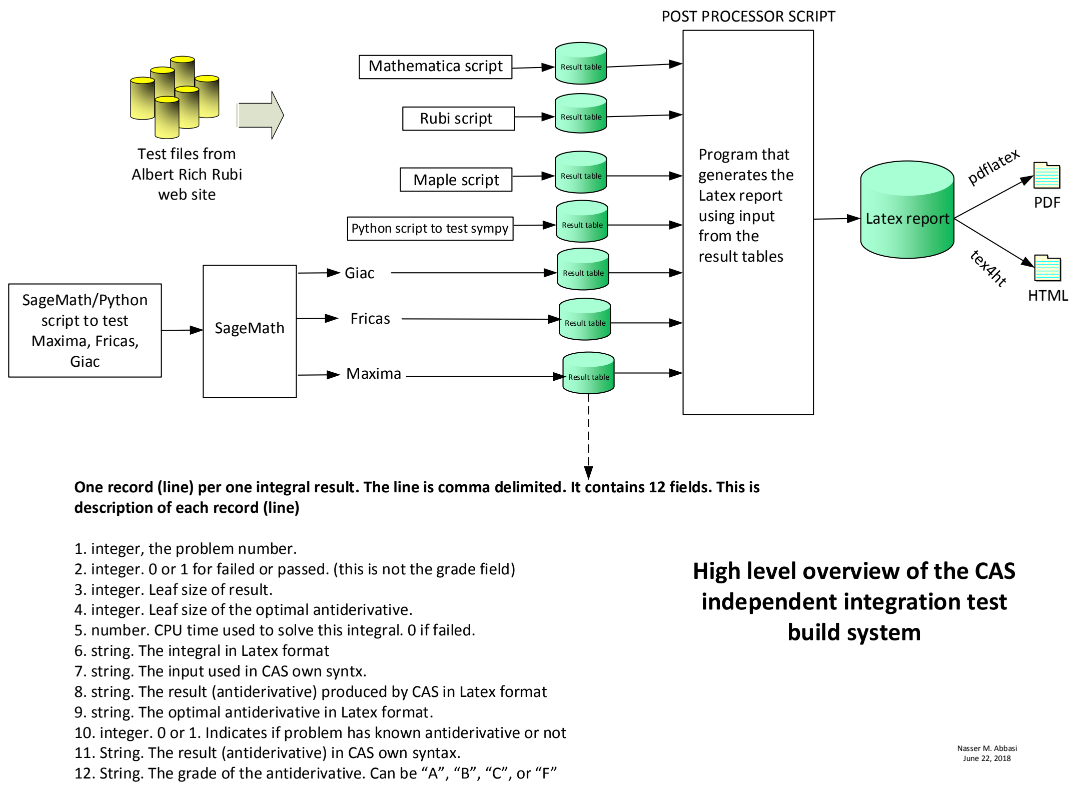
1. Mathematica 11.3 (64 bit).
2. Rubi 4.15.2 in Mathematica 11.3.
3. Rubi in Sympy (Version 1.3) under Python 3.7.0 using Anaconda distribution.
4. Maple 2018.1 (64 bit).
5. Maxima 5.41 Using Lisp ECL 16.1.2.
6. Fricas 1.3.4.
7. Sympy 1.3 under Python 3.7.0 using Anaconda distribution.
8. Giac/Xcas 1.4.9.

Maxima, Fricas and Giac/Xcas were called from inside SageMath version 8.3. 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. Rubi in Sympy was also called directly using sympy 1.3 in python.

1.2 Design of the test system

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



1.3 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.

1.4 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.

1.5 Important notes about some of the results

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 30 such integrals out of total 705, or about 4 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. If the output was an exception `ValueError` then this is most likely due to this reason.

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.

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.

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 is determined as follows.

For Fricas, Giac and Maxima (all called via sagemath) the following code is used

```
#see https://stackoverflow.com/questions/25202346/how-to-obtain-leaf-count-express

def tree(expr):
    if expr.operator() is None:
       return expr
    else:
       return [expr.operator()]+map(tree, expr.operands())

try:
    # 1.35 is a fudge factor since this estimate of leaf count is bit lower than
    #what it should be compared to Mathematica's
    leafCount = round(1.35*len(flatten(tree(anti))))
except Exception as ee:
    leafCount =1
```

For Sympy, called directly from Python, the following code is used

```
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
```

When these cas systems implement a buildin function to find the leaf size of expressions, it will be used instead, and these tests run again.

1.6 Grading of results

The table below summarizes the grading of each CAS system.

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. (98)	% 0. (0)
Rubi in Sympy	% 100. (98)	% 0. (0)
Mathematica	% 100. (98)	% 0. (0)
Maple	% 78.57 (77)	% 21.43 (21)
Maxima	% 84.69 (83)	% 15.31 (15)
Fricas	% 88.78 (87)	% 11.22 (11)
Sympy	% 34.69 (34)	% 65.31 (64)
Giac	% 55.1 (54)	% 44.9 (44)

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.

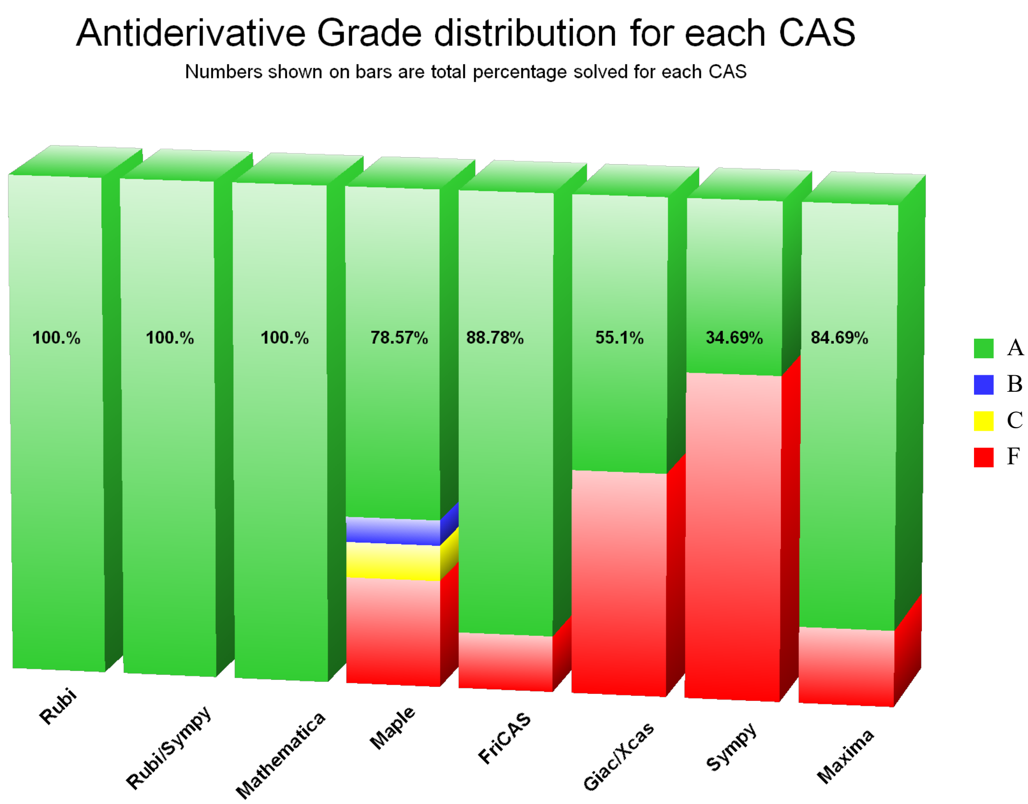
Grading is currently implemented only for for Mathematica, Rubi and Maple results. For all other CAS systems (Maxima, Fricas, Sympy, Giac, Rubi in sympy), the grading function is not yet implemented.

For these systems, a grade of A is assigned if the integrate command completes successfully and a grade of F otherwise.

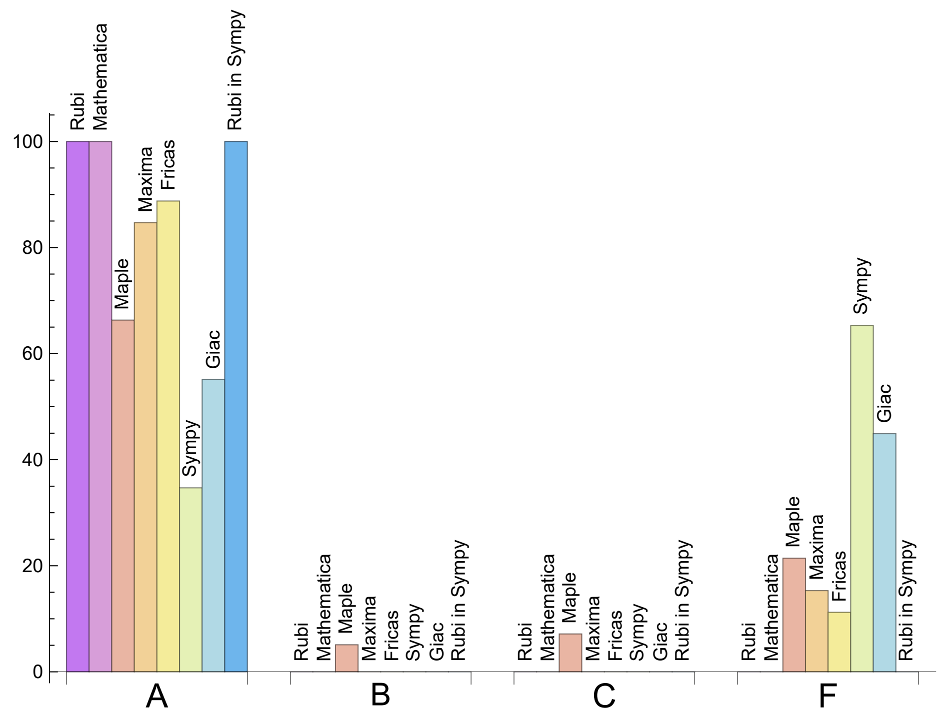
Based on the above, the following table summarizes the grading for this test suite.

System	% A grade	% B grade	% C grade	% F grade
Rubi	100.	0.	0.	0.
Rubi in Sympy	100.	0.	0.	0.
Mathematica	100.	0.	0.	0.
Maple	66.33	5.1	7.14	21.43
Maxima	84.69	0.	0.	15.31
Fricas	88.78	0.	0.	11.22
Sympy	34.69	0.	0.	65.31
Giac	55.1	0.	0.	44.9

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.



1.7 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	0.28	134.81	1.	95.5	1.
Rubi in Sympy	28.35	127.45	0.93	87.	0.92
Mathematica	0.12	95.34	0.79	73.5	0.77
Maple	0.04	175.99	1.74	136.	1.12
Maxima	0.84	142.98	1.2	81.	1.07
Fricas	0.26	188.15	1.28	113.	1.17
Sympy	1.94	212.97	1.2	141.	1.
Giac	0.27	105.78	0.8	37.5	0.79

1.8 list of integrals that has no closed form antiderivative

{}

1.9 list of integrals not solved by each system

Not solved by Rubi {}

Not solved by Rubi in Sympy {}

Not solved by Mathematica {}

Not solved by Maple {1, 19, 20, 21, 22, 23, 24, 25, 26, 39, 40, 41, 42, 43, 44, 45, 46, 47, 49, 50, 83}

Not solved by Maxima {1, 19, 20, 21, 22, 23, 24, 25, 26, 50, 78, 79, 80, 81, 82}

Not solved by Fricas {20, 21, 22, 25, 26, 84, 85, 86, 87, 88, 89}

Not solved by Sympy {1, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 55, 60, 61, 64, 69, 70, 71, 72, 73, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 95, 96, 97, 98}

Not solved by Giac {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, 79, 82, 83, 84, 85, 86, 87, 88, 89}

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

Rubi {}

Rubi in Sympy {}

Mathematica {}

Maple {}

Maxima {}

Fricas {}

Sympy {}

Giac {}

1.11 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.

Rubi in Sympy Verification phase not implemented yet.

2 detailed summary tables of results

2.1 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	Rubi in Sympy
grade	A	A	A	F	F	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	67	67	66	0	0	88	0	0	60
normalized size	1	1.	0.99	0.	0.	1.31	0.	0.	0.9
time (sec)	N/A	0.075	0.42	0.23	0.	0.257	0.	0.	6.511

Problem 2	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	141	141	100	260	417	306	350	1	139
normalized size	1	1.	0.71	1.84	2.96	2.17	2.48	0.01	0.99
time (sec)	N/A	0.203	0.074	0.017	0.716	0.257	0.605	0.355	39.746

Problem 3	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	110	110	78	165	278	198	231	1	107
normalized size	1	1.	0.71	1.5	2.53	1.8	2.1	0.01	0.97
time (sec)	N/A	0.134	0.061	0.012	0.703	0.237	0.494	0.325	27.086

Problem 4	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	79	79	56	91	166	113	133	1	75
normalized size	1	1.	0.71	1.15	2.1	1.43	1.68	0.01	0.95
time (sec)	N/A	0.083	0.048	0.013	0.697	0.261	0.4	0.301	15.498

Problem 5	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	48	48	34	38	81	51	60	1	41
normalized size	1	1.	0.71	0.79	1.69	1.06	1.25	0.02	0.85
time (sec)	N/A	0.037	0.026	0.004	0.692	0.234	0.294	0.261	6.634

Problem 6	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	20	20	21	21	27	28	20	27	14
normalized size	1	1.	1.05	1.05	1.35	1.4	1.	1.35	0.7
time (sec)	N/A	0.011	0.002	0.003	0.681	0.23	0.166	0.241	2.002

Problem 7	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	31	31	31	56	50	53	0	0	27
normalized size	1	1.	1.	1.81	1.61	1.71	0.	0.	0.87
time (sec)	N/A	0.04	0.016	0.034	0.753	0.247	0.	0.	5.153

Problem 8	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	57	57	55	97	59	104	0	0	51
normalized size	1	1.	0.96	1.7	1.04	1.82	0.	0.	0.89
time (sec)	N/A	0.078	0.118	0.034	0.787	0.245	0.	0.	9.92

Problem 9	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	95	95	88	151	59	181	0	0	87
normalized size	1	1.	0.93	1.59	0.62	1.91	0.	0.	0.92
time (sec)	N/A	0.126	0.112	0.043	0.789	0.239	0.	0.	17.269

Problem 10	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	128	128	99	193	59	282	0	0	119
normalized size	1	1.	0.77	1.51	0.46	2.2	0.	0.	0.93
time (sec)	N/A	0.176	0.133	0.052	0.806	0.239	0.	0.	26.501

Problem 11	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	161	161	121	235	59	405	0	0	151
normalized size	1	1.	0.75	1.46	0.37	2.52	0.	0.	0.94
time (sec)	N/A	0.234	0.147	0.066	0.789	0.248	0.	0.	37.737

Problem 12	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	141	141	100	260	417	306	350	1	139
normalized size	1	1.	0.71	1.84	2.96	2.17	2.48	0.01	0.99
time (sec)	N/A	0.218	0.033	0.019	0.746	0.235	0.612	0.345	57.049

Problem 13	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	110	110	78	165	278	198	231	1	107
normalized size	1	1.	0.71	1.5	2.53	1.8	2.1	0.01	0.97
time (sec)	N/A	0.154	0.017	0.011	0.734	0.231	0.494	0.309	36.464

Problem 14	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	79	79	56	91	166	113	133	1	75
normalized size	1	1.	0.71	1.15	2.1	1.43	1.68	0.01	0.95
time (sec)	N/A	0.083	0.015	0.012	0.734	0.229	0.395	0.273	35.713

Problem 15	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	57	57	55	97	59	104	0	0	51
normalized size	1	1.	0.96	1.7	1.04	1.82	0.	0.	0.89
time (sec)	N/A	0.075	0.02	0.052	0.783	0.241	0.	0.	25.081

Problem 16	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	95	95	88	151	59	181	0	0	87
normalized size	1	1.	0.93	1.59	0.62	1.91	0.	0.	0.92
time (sec)	N/A	0.16	0.024	0.068	0.812	0.243	0.	0.	34.87

Problem 17	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	128	128	99	193	59	282	0	0	119
normalized size	1	1.	0.77	1.51	0.46	2.2	0.	0.	0.93
time (sec)	N/A	0.227	0.027	0.094	0.844	0.24	0.	0.	54.404

Problem 18	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	161	161	121	235	59	405	0	0	151
normalized size	1	1.	0.75	1.46	0.37	2.52	0.	0.	0.94
time (sec)	N/A	0.304	0.029	0.124	0.915	0.239	0.	0.	84.485

Problem 19	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	F	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	72	72	74	0	0	92	0	0	65
normalized size	1	1.	1.03	0.	0.	1.28	0.	0.	0.9
time (sec)	N/A	0.095	0.048	0.072	0.	0.254	0.	0.	11.985

Problem 20	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	F	F	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	73	0	0	0	0	0	65
normalized size	1	1.	1.03	0.	0.	0.	0.	0.	0.92
time (sec)	N/A	0.118	0.098	0.26	0.	0.	0.	0.	36.493

Problem 21	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	F	F	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	73	0	0	0	0	0	65
normalized size	1	1.	1.03	0.	0.	0.	0.	0.	0.92
time (sec)	N/A	0.104	0.049	0.086	0.	0.	0.	0.	25.867

Problem 22	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	F	F	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	73	0	0	0	0	0	65
normalized size	1	1.	1.03	0.	0.	0.	0.	0.	0.92
time (sec)	N/A	0.098	0.047	0.138	0.	0.	0.	0.	18.494

Problem 23	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	F	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	67	67	66	0	0	88	0	0	60
normalized size	1	1.	0.99	0.	0.	1.31	0.	0.	0.9
time (sec)	N/A	0.046	0.018	0.	0.	0.269	0.	0.	6.744

Problem 24	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	F	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	69	69	68	0	0	90	0	0	60
normalized size	1	1.	0.99	0.	0.	1.3	0.	0.	0.87
time (sec)	N/A	0.048	0.049	0.065	0.	0.263	0.	0.	6.738

Problem 25	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	F	F	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	73	73	75	0	0	0	0	0	65
normalized size	1	1.	1.03	0.	0.	0.	0.	0.	0.89
time (sec)	N/A	0.098	0.046	0.119	0.	0.	0.	0.	18.702

Problem 26	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	F	F	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	73	73	75	0	0	0	0	0	65
normalized size	1	1.	1.03	0.	0.	0.	0.	0.	0.89
time (sec)	N/A	0.104	0.047	0.082	0.	0.	0.	0.	26.248

Problem 27	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	15	15	15	14	18	18	15	18	10
normalized size	1	1.	1.	0.93	1.2	1.2	1.	1.2	0.67
time (sec)	N/A	0.007	0.002	0.007	0.79	0.28	0.152	0.249	1.225

Problem 28	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	15	15	15	16	20	20	15	20	10
normalized size	1	1.	1.	1.07	1.33	1.33	1.	1.33	0.67
time (sec)	N/A	0.008	0.002	0.006	0.784	0.27	0.156	0.252	1.535

Problem 29	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	19	19	19	14	18	18	10	18	10
normalized size	1	1.	1.	0.74	0.95	0.95	0.53	0.95	0.53
time (sec)	N/A	0.011	0.004	0.033	0.788	0.275	0.152	0.259	1.049

Problem 30	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	131	131	99	99	120	119	0	130	129
normalized size	1	1.	0.76	0.76	0.92	0.91	0.	0.99	0.98
time (sec)	N/A	0.243	0.097	0.158	0.82	0.275	0.	0.257	26.922

Problem 31	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	108	108	87	87	104	103	0	113	105
normalized size	1	1.	0.81	0.81	0.96	0.95	0.	1.05	0.97
time (sec)	N/A	0.147	0.053	0.017	0.84	0.276	0.	0.261	19.77

Problem 32	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	85	85	75	75	88	86	0	97	82
normalized size	1	1.	0.88	0.88	1.04	1.01	0.	1.14	0.96
time (sec)	N/A	0.11	0.042	0.016	0.847	0.28	0.	0.254	13.634

Problem 33	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	62	62	62	66	73	74	0	81	56
normalized size	1	1.	1.	1.06	1.18	1.19	0.	1.31	0.9
time (sec)	N/A	0.075	0.032	0.014	0.822	0.276	0.	0.267	8.725

Problem 34	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	38	38	38	27	35	35	0	41	37
normalized size	1	1.	1.	0.71	0.92	0.92	0.	1.08	0.97
time (sec)	N/A	0.044	0.007	0.019	0.796	0.269	0.	0.257	5.112

Problem 35	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	54	54	54	64	32	73	0	0	53
normalized size	1	1.	1.	1.19	0.59	1.35	0.	0.	0.98
time (sec)	N/A	0.077	0.032	0.017	0.851	0.268	0.	0.	8.214

Problem 36	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	77	77	64	72	32	90	0	0	76
normalized size	1	1.	0.83	0.94	0.42	1.17	0.	0.	0.99
time (sec)	N/A	0.106	0.065	0.019	0.836	0.277	0.	0.	11.79

Problem 37	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	100	100	76	84	32	107	0	0	100
normalized size	1	1.	0.76	0.84	0.32	1.07	0.	0.	1.
time (sec)	N/A	0.139	0.08	0.02	0.836	0.27	0.	0.	15.763

Problem 38	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	123	123	92	96	32	123	0	0	124
normalized size	1	1.	0.75	0.78	0.26	1.	0.	0.	1.01
time (sec)	N/A	0.175	0.053	0.02	0.838	0.269	0.	0.	20.711

Problem 39	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	208	208	239	0	240	306	0	1	202
normalized size	1	1.	1.15	0.	1.15	1.47	0.	0.	0.97
time (sec)	N/A	0.445	0.779	0.026	0.821	0.31	0.	0.296	61.814

Problem 40	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	173	173	204	0	211	221	0	779	167
normalized size	1	1.	1.18	0.	1.22	1.28	0.	4.5	0.97
time (sec)	N/A	0.262	0.439	0.027	0.835	0.269	0.	0.264	45.037

Problem 41	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	138	138	169	0	181	157	0	408	131
normalized size	1	1.	1.22	0.	1.31	1.14	0.	2.96	0.95
time (sec)	N/A	0.198	0.333	0.026	0.816	0.27	0.	0.259	31.816

Problem 42	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	105	105	108	0	153	131	0	170	95
normalized size	1	1.	1.03	0.	1.46	1.25	0.	1.62	0.9
time (sec)	N/A	0.137	0.187	0.024	0.851	0.258	0.	0.251	20.582

Problem 43	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	72	72	70	0	70	76	0	78	70
normalized size	1	1.	0.97	0.	0.97	1.06	0.	1.08	0.97
time (sec)	N/A	0.084	0.076	0.029	0.862	0.259	0.	0.257	11.968

Problem 44	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	97	97	110	0	81	136	0	0	92
normalized size	1	1.	1.13	0.	0.84	1.4	0.	0.	0.95
time (sec)	N/A	0.146	0.15	0.026	0.887	0.259	0.	0.	19.558

Problem 45	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	130	130	140	0	81	203	0	0	126
normalized size	1	1.	1.08	0.	0.62	1.56	0.	0.	0.97
time (sec)	N/A	0.202	0.428	0.026	0.883	0.254	0.	0.	28.426

Problem 46	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	165	165	148	0	81	305	0	0	162
normalized size	1	1.	0.9	0.	0.49	1.85	0.	0.	0.98
time (sec)	N/A	0.266	0.403	0.026	0.859	0.282	0.	0.	39.261

Problem 47	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	200	200	153	0	81	428	0	0	197
normalized size	1	1.	0.76	0.	0.4	2.14	0.	0.	0.98
time (sec)	N/A	0.337	0.616	0.025	0.929	0.279	0.	0.	52.311

Problem 48	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	151	151	91	145	107	105	0	108	138
normalized size	1	1.	0.6	0.96	0.71	0.7	0.	0.72	0.91
time (sec)	N/A	0.241	0.066	0.011	0.803	0.26	0.	0.253	30.593

Problem 49	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	63	0	81	151	0	0	71
normalized size	1	1.	0.89	0.	1.14	2.13	0.	0.	1.
time (sec)	N/A	0.057	0.203	0.026	0.904	0.284	0.	0.	6.848

Problem 50	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	F	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	98	98	78	0	0	167	0	0	102
normalized size	1	1.	0.8	0.	0.	1.7	0.	0.	1.04
time (sec)	N/A	0.17	0.302	0.093	0.	0.271	0.	0.	14.81

Problem 51	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	48	48	34	38	81	51	60	1	41
normalized size	1	1.	0.71	0.79	1.69	1.06	1.25	0.02	0.85
time (sec)	N/A	0.038	0.023	0.	0.828	0.291	0.297	0.263	6.742

Problem 52	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	135	135	56	80	158	100	116	1	126
normalized size	1	1.	0.41	0.59	1.17	0.74	0.86	0.01	0.93
time (sec)	N/A	0.193	0.049	0.004	0.858	0.307	0.384	0.253	23.661

Problem 53	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	229	229	84	138	262	165	190	1	223
normalized size	1	1.	0.37	0.6	1.14	0.72	0.83	0.	0.97
time (sec)	N/A	0.35	0.078	0.006	0.822	0.268	0.487	0.289	38.517

Problem 54	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	348	348	117	212	393	246	284	1	347
normalized size	1	1.	0.34	0.61	1.13	0.71	0.82	0.	1.
time (sec)	N/A	0.57	0.097	0.009	0.835	0.272	0.606	0.329	57.089

Problem 55	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	C	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	116	116	61	334	166	170	0	0	94
normalized size	1	1.	0.53	2.88	1.43	1.47	0.	0.	0.81
time (sec)	N/A	0.29	0.1	0.13	1.181	0.271	0.	0.	25.023

Problem 56	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	397	397	121	182	265	163	236	273	371
normalized size	1	1.	0.3	0.46	0.67	0.41	0.59	0.69	0.93
time (sec)	N/A	0.841	0.08	0.007	0.818	0.257	0.521	0.258	56.65

Problem 57	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	318	318	130	143	221	138	196	220	294
normalized size	1	1.	0.41	0.45	0.69	0.43	0.62	0.69	0.92
time (sec)	N/A	0.656	0.037	0.009	0.796	0.263	0.464	0.275	47.551

Problem 58	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	184	184	96	102	178	105	148	166	168
normalized size	1	1.	0.52	0.55	0.97	0.57	0.8	0.9	0.91
time (sec)	N/A	0.397	0.031	0.007	0.8	0.248	0.398	0.241	31.567

Problem 59	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	80	80	41	68	139	77	104	117	65
normalized size	1	1.	0.51	0.85	1.74	0.96	1.3	1.46	0.81
time (sec)	N/A	0.111	0.016	0.006	0.837	0.242	0.355	0.25	11.973

Problem 60	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-2)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	102	102	52	113	93	68	0	128	92
normalized size	1	1.	0.51	1.11	0.91	0.67	0.	1.25	0.9
time (sec)	N/A	0.274	0.026	0.01	0.847	0.261	0.	0.235	23.897

Problem 61	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F(-2)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	94	94	54	92	82	76	0	124	82
normalized size	1	1.	0.57	0.98	0.87	0.81	0.	1.32	0.87
time (sec)	N/A	0.253	0.036	0.013	0.88	0.272	0.	0.263	21.576

Problem 62	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	130	130	68	112	86	95	133	169	116
normalized size	1	1.	0.52	0.86	0.66	0.73	1.02	1.3	0.89
time (sec)	N/A	0.33	0.047	0.013	0.875	0.244	22.611	0.266	23.954

Problem 63	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	198	198	81	167	85	112	194	247	180
normalized size	1	1.	0.41	0.84	0.43	0.57	0.98	1.25	0.91
time (sec)	N/A	0.46	0.08	0.012	0.855	0.253	28.621	0.265	30.665

Problem 64	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	B	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	139	139	86	433	166	217	0	0	148
normalized size	1	1.	0.62	3.12	1.19	1.56	0.	0.	1.06
time (sec)	N/A	0.489	0.142	0.13	1.042	0.29	0.	0.	29.486

Problem 65	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	414	414	159	250	443	308	323	1	449
normalized size	1	1.	0.38	0.6	1.07	0.74	0.78	0.	1.08
time (sec)	N/A	1.109	0.097	0.014	0.791	0.261	0.602	0.37	87.805

Problem 66	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	328	328	121	197	354	240	260	1	352
normalized size	1	1.	0.37	0.6	1.08	0.73	0.79	0.	1.07
time (sec)	N/A	0.864	0.089	0.014	0.822	0.263	0.546	0.341	68.991

Problem 67	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	242	242	91	144	265	178	199	1	253
normalized size	1	1.	0.38	0.6	1.1	0.74	0.82	0.	1.05
time (sec)	N/A	0.584	0.078	0.012	0.828	0.273	0.47	0.346	47.535

Problem 68	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	85	85	58	93	181	115	134	1	85
normalized size	1	1.	0.68	1.09	2.13	1.35	1.58	0.01	1.
time (sec)	N/A	0.192	0.057	0.01	0.783	0.254	0.408	0.292	18.363

Problem 69	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	96	96	54	119	117	101	0	0	94
normalized size	1	1.	0.56	1.24	1.22	1.05	0.	0.	0.98
time (sec)	N/A	0.407	0.098	0.033	0.81	0.264	0.	0.	24.085

Problem 70	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	85	85	58	129	92	112	0	0	87
normalized size	1	1.	0.68	1.52	1.08	1.32	0.	0.	1.02
time (sec)	N/A	0.43	0.109	0.047	0.824	0.271	0.	0.	20.379

Problem 71	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	136	136	76	195	100	120	0	0	146
normalized size	1	1.	0.56	1.43	0.74	0.88	0.	0.	1.07
time (sec)	N/A	0.562	0.076	0.055	0.852	0.284	0.	0.	25.395

Problem 72	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	217	217	116	275	115	185	0	0	230
normalized size	1	1.	0.53	1.27	0.53	0.85	0.	0.	1.06
time (sec)	N/A	0.721	0.134	0.061	0.889	0.258	0.	0.	36.972

Problem 73	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	F	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	321	321	156	361	126	251	0	0	337
normalized size	1	1.	0.49	1.12	0.39	0.78	0.	0.	1.05
time (sec)	N/A	0.908	0.199	0.069	0.84	0.263	0.	0.	50.17

Problem 74	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	754	754	458	1062	1207	734	1445	1	694
normalized size	1	1.	0.61	1.41	1.6	0.97	1.92	0.	0.92
time (sec)	N/A	1.522	0.265	0.014	0.901	0.271	1.792	0.257	126.016

Problem 75	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	495	495	320	640	809	478	899	910	454
normalized size	1	1.	0.65	1.29	1.63	0.97	1.82	1.84	0.92
time (sec)	N/A	1.047	0.172	0.008	0.793	0.251	1.215	0.255	83.493

Problem 76	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	271	271	191	297	464	266	447	447	246
normalized size	1	1.	0.7	1.1	1.71	0.98	1.65	1.65	0.91
time (sec)	N/A	0.559	0.088	0.009	0.895	0.249	0.746	0.26	46.035

Problem 77	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	102	102	50	108	201	112	158	178	83
normalized size	1	1.	0.49	1.06	1.97	1.1	1.55	1.75	0.81
time (sec)	N/A	0.154	0.024	0.007	0.855	0.237	0.429	0.259	16.162

Problem 78	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	F	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	277	277	175	489	0	317	0	240	238
normalized size	1	1.	0.63	1.77	0.	1.14	0.	0.87	0.86
time (sec)	N/A	0.561	0.179	0.019	0.	0.25	0.	0.258	49.252

Problem 79	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	F	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	258	258	163	406	0	477	0	0	230
normalized size	1	1.	0.63	1.57	0.	1.85	0.	0.	0.89
time (sec)	N/A	0.622	0.321	0.02	0.	0.267	0.	0.	63.1

Problem 80	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	F	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	294	294	267	418	0	743	0	1	258
normalized size	1	1.	0.91	1.42	0.	2.53	0.	0.	0.88
time (sec)	N/A	0.683	0.72	0.02	0.	0.245	0.	0.245	69.932

Problem 81	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	F	A	F(-1)	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	396	396	389	511	0	1071	0	1	347
normalized size	1	1.	0.98	1.29	0.	2.7	0.	0.	0.88
time (sec)	N/A	0.859	0.872	0.019	0.	0.272	0.	0.255	87.598

Problem 82	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	F	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	557	557	669	596	0	1463	0	0	493
normalized size	1	1.	1.2	1.07	0.	2.63	0.	0.	0.89
time (sec)	N/A	1.152	0.707	0.019	0.	0.269	0.	0.	112.574

Problem 83	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	F	A	A	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	24	24	24	0	57	43	0	0	22
normalized size	1	1.	1.	0.	2.38	1.79	0.	0.	0.92
time (sec)	N/A	0.221	0.117	0.098	0.966	0.26	0.	0.	11.118

Problem 84	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	C	A	F(-2)	F(-1)	F(-2)	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	22	22	23	198	57	0	0	0	20
normalized size	1	1.	1.05	9.	2.59	0.	0.	0.	0.91
time (sec)	N/A	0.193	0.05	0.158	0.933	0.	0.	0.	11.126

Problem 85	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	C	A	F(-2)	F(-1)	F(-2)	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	22	22	23	198	57	0	0	0	20
normalized size	1	1.	1.05	9.	2.59	0.	0.	0.	0.91
time (sec)	N/A	0.132	0.046	0.116	0.957	0.	0.	0.	8.157

Problem 86	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	C	A	F(-2)	F(-1)	F(-2)	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	20	20	21	186	51	0	0	0	19
normalized size	1	1.	1.05	9.3	2.55	0.	0.	0.	0.95
time (sec)	N/A	0.07	0.043	0.139	0.95	0.	0.	0.	7.743

Problem 87	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	C	A	F(-2)	F(-1)	F(-2)	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	19	19	20	180	49	0	0	0	17
normalized size	1	1.	1.05	9.47	2.58	0.	0.	0.	0.89
time (sec)	N/A	0.19	0.039	0.105	0.965	0.	0.	0.	15.164

Problem 88	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	C	A	F(-2)	F(-1)	F(-2)	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	22	22	23	136	53	0	0	0	19
normalized size	1	1.	1.05	6.18	2.41	0.	0.	0.	0.86
time (sec)	N/A	0.198	0.064	0.128	0.968	0.	0.	0.	11.161

Problem 89	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	C	A	F(-2)	F(-1)	F	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	22	22	23	136	53	0	0	0	20
normalized size	1	1.	1.05	6.18	2.41	0.	0.	0.	0.91
time (sec)	N/A	0.196	0.063	0.128	0.971	0.	0.	0.	11.181

Problem 90	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	91	91	45	43	81	58	51	58	85
normalized size	1	1.	0.49	0.47	0.89	0.64	0.56	0.64	0.93
time (sec)	N/A	0.213	0.014	0.006	0.751	0.247	0.23	0.236	12.855

Problem 91	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	72	72	37	35	65	47	42	47	66
normalized size	1	1.	0.51	0.49	0.9	0.65	0.58	0.65	0.92
time (sec)	N/A	0.152	0.011	0.006	0.835	0.26	0.218	0.25	9.152

Problem 92	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	53	53	29	27	49	36	34	36	48
normalized size	1	1.	0.55	0.51	0.92	0.68	0.64	0.68	0.91
time (sec)	N/A	0.097	0.009	0.006	0.778	0.249	0.2	0.239	5.879

Problem 93	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	34	34	21	19	32	26	26	26	29
normalized size	1	1.	0.62	0.56	0.94	0.76	0.76	0.76	0.85
time (sec)	N/A	0.043	0.006	0.003	0.772	0.245	0.176	0.252	3.054

Problem 94	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	A	A	A	A	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	16	16	16	14	19	19	14	19	12
normalized size	1	1.	1.	0.88	1.19	1.19	0.88	1.19	0.75
time (sec)	N/A	0.013	0.003	0.003	0.787	0.248	0.137	0.238	1.193

Problem 95	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	B	A	A	F	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	27	27	27	57	14	14	0	14	32
normalized size	1	1.	1.	2.11	0.52	0.52	0.	0.52	1.19
time (sec)	N/A	0.088	0.007	0.088	0.848	0.262	0.	0.231	5.481

Problem 96	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	B	A	A	F	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	48	48	47	116	18	39	0	39	48
normalized size	1	1.	0.98	2.42	0.38	0.81	0.	0.81	1.
time (sec)	N/A	0.134	0.019	0.033	0.848	0.25	0.	0.243	7.81

Problem 97	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	B	A	A	F	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	56	155	20	51	0	62	68
normalized size	1	1.	0.79	2.18	0.28	0.72	0.	0.87	0.96
time (sec)	N/A	0.18	0.031	0.043	0.832	0.244	0.	0.238	10.422

Problem 98	Optimal	Rubi	Mathematica	Maple	Maxima	Fricas	Sympy	Giac	Rubi in Sympy
grade	A	A	A	B	A	A	F	A	A
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	92	92	64	189	20	62	0	85	87
normalized size	1	1.	0.7	2.05	0.22	0.67	0.	0.92	0.95
time (sec)	N/A	0.234	0.039	0.046	0.831	0.235	0.	0.264	13.476

2.2 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 [0.25]

Table 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.	17	0.059
2	A	5	2	1.	17	0.118
3	A	4	2	1.	17	0.118
4	A	3	2	1.	17	0.118
5	A	2	2	1.	15	0.133
6	A	1	1	1.	9	0.111
7	A	1	1	1.	17	0.059
8	A	2	2	1.	17	0.118
9	A	3	2	1.	17	0.118
10	A	4	2	1.	17	0.118
11	A	5	2	1.	17	0.118
12	A	6	3	1.	48	0.062
13	A	5	3	1.	37	0.081
14	A	4	3	1.	26	0.115
15	A	3	3	1.	28	0.107
16	A	4	3	1.	39	0.077
17	A	5	3	1.	50	0.06
18	A	6	3	1.	61	0.049
19	A	2	2	1.	19	0.105
20	A	2	2	1.	50	0.04
21	A	2	2	1.	39	0.051
22	A	2	2	1.	28	0.071
23	A	1	1	1.	17	0.059
24	A	1	1	1.	19	0.053
25	A	2	2	1.	30	0.067
26	A	2	2	1.	41	0.049
27	A	1	1	1.	7	0.143
28	A	1	1	1.	7	0.143
29	A	1	1	1.	7	0.143
30	A	6	3	1.	13	0.231
31	A	5	3	1.	13	0.231
32	A	4	3	1.	13	0.231
33	A	3	3	1.	13	0.231

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Table 1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
34	A	2	2	1.	13	0.154
35	A	3	3	1.	13	0.231
36	A	4	3	1.	13	0.231
37	A	5	3	1.	13	0.231
38	A	6	3	1.	13	0.231
39	A	6	3	1.	19	0.158
40	A	5	3	1.	19	0.158
41	A	4	3	1.	19	0.158
42	A	3	3	1.	19	0.158
43	A	2	2	1.	19	0.105
44	A	3	3	1.	19	0.158
45	A	4	3	1.	19	0.158
46	A	5	3	1.	19	0.158
47	A	6	3	1.	19	0.158
48	A	9	3	1.	12	0.25
49	A	1	1	1.	19	0.053
50	A	2	2	1.	21	0.095
51	A	2	2	1.	15	0.133
52	A	8	3	1.	20	0.15
53	A	12	3	1.	25	0.12
54	A	17	3	1.	30	0.1
55	A	6	2	1.	21	0.095
56	A	24	3	1.	21	0.143
57	A	20	3	1.	21	0.143
58	A	11	3	1.	19	0.158
59	A	4	2	1.	18	0.111
60	A	9	4	1.	21	0.19
61	A	8	5	1.	21	0.238
62	A	9	4	1.	21	0.19
63	A	12	3	1.	21	0.143
64	A	5	2	1.	22	0.091
65	A	17	3	1.	22	0.136
66	A	14	3	1.	22	0.136
67	A	11	3	1.	20	0.15

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Table 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.	19	0.158
69	A	6	4	1.	22	0.182
70	A	6	4	1.	22	0.182
71	A	8	3	1.	22	0.136
72	A	11	3	1.	22	0.136
73	A	14	3	1.	22	0.136
74	A	28	3	1.	25	0.12
75	A	20	3	1.	25	0.12
76	A	13	3	1.	23	0.13
77	A	5	2	1.	18	0.111
78	A	13	4	1.	25	0.16
79	A	11	5	1.	25	0.2
80	A	11	5	1.	25	0.2
81	A	13	4	1.	25	0.16
82	A	17	3	1.	25	0.12
83	A	1	1	1.	39	0.026
84	A	1	1	1.	38	0.026
85	A	1	1	1.	36	0.028
86	A	1	1	1.	35	0.029
87	A	1	1	1.	35	0.029
88	A	1	1	1.	38	0.026
89	A	1	1	1.	38	0.026
90	A	5	2	1.	15	0.133
91	A	4	2	1.	15	0.133
92	A	3	2	1.	15	0.133
93	A	2	2	1.	13	0.154
94	A	1	1	1.	11	0.091
95	A	2	2	1.	15	0.133
96	A	3	3	1.	15	0.2
97	A	4	3	1.	15	0.2
98	A	5	3	1.	15	0.2

3 Listing of integrals

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

Optimal. Leaf size=67

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

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

Rubi [A] time = 0.0754702, antiderivative size = 67, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.059

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

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)*Lo
g[F])/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^m)
```

Rubi in Sympy [A] time = 6.51062, size = 60, normalized size = 0.9

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.419787, size = 66, normalized size = 0.99

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

Antiderivative was successfully verified.

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

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

Maple [F] time = 0.23, size = 0, normalized size = 0.

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

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., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.256766, size = 88, normalized size = 1.31

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

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Rubi [A] time = 0.202553, antiderivative size = 141, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118

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

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*Log[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])
```

Rubi in Sympy [A] time = 39.7458, size = 139, normalized size = 0.99

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0744396, size = 100, normalized size = 0.71

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

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)
```

Maple [A] time = 0.017, size = 260, normalized size = 1.8

$$\left(e^4x^4b^4c^4\left(\ln(F)\right)^4+4\left(\ln(F)\right)^4b^4c^4de^3x^3+6\left(\ln(F)\right)^4b^4c^4d^2e^2x^2+4\left(\ln(F)\right)^4b^4c^4d^3ex+\left(\ln(F)\right)^4b^4c^4d^4-4\left(\ln(F)\right)^3b^3c^3e$$

Verification of antiderivative is not currently implemented for this CAS.

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

Maxima [A] time = 0.715837, size = 417, normalized size = 2.96

$$\frac{F^{bcx+ac}d^4}{bc\log(F)}+\frac{4\,(F^{ac}bcx\log(F)-F^{ac})F^{bcx}d^3e}{b^2c^2\log(F)^2}+\frac{6\left(F^{ac}b^2c^2x^2\log(F)^2-2\,F^{ac}bcx\log(F)+2\,F^{ac}\right)F^{bcx}d^2e^2}{b^3c^3\log(F)^3}+\frac{4\left(F^{ac}b^3c^3x^3\log(F)^3-3\,F^{ac}b^2c^2x^2\log(F)^2+6\,F^{ac}bcx\log(F)-6\,F^{ac}\right)F^{bcx}de^3}{b^4c^4\log(F)^4}+\frac{\left(F^{ac}b^4c^4x^4\log(F)^4-4\,F^{ac}b^3c^3x^3\log(F)^3+12\,F^{ac}b^2c^2x^2\log(F)^2-24\,F^{ac}bcx\log(F)+24\,F^{ac}\right)F^{bcx}e^4}{b^5c^5\log(F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.257058, size = 306, normalized size = 2.17

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

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.604649, size = 350, normalized size = 2.48

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

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*lo
```

```
g(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*lo
g(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))
```

GIAC/XCAS [A] time = 0.355179, size = 1, normalized size = 0.01

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

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*(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])
```

Rubi [A] time = 0.134345, antiderivative size = 110, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118

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

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])
```

Rubi in Sympy [A] time = 27.0858, size = 107, normalized size = 0.97

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0610608, 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)
```

Maple [A] time = 0.012, size = 165, normalized size = 1.5

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

Verification of antiderivative is not currently implemented for this CAS.

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

Maxima [A] time = 0.703305, size = 278, normalized size = 2.53

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

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.237181, size = 198, normalized size = 1.8

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

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.494307, size = 231, normalized size = 2.1

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

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))
```

GIAC/XCAS [A] time = 0.325203, size = 1, normalized size = 0.01

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

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*(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])
```

Rubi [A] time = 0.082818, antiderivative size = 79, normalized size of antiderivative = 1., number of steps used = 3, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118

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

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])
```

Rubi in Sympy [A] time = 15.4983, size = 75, normalized size = 0.95

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0479981, 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*Log[F]^2))/(b^3*c^3*Log[F]^3)
```

Maple [A] time = 0.013, size = 91, normalized size = 1.2

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

Verification of antiderivative is not currently implemented for this CAS.

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

Maxima [A] time = 0.69733, size = 166, normalized size = 2.1

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

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.261106, size = 113, normalized size = 1.43

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

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.40011, size = 133, normalized size = 1.68

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F**(c*(b*x+a))*(e*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*log(F)**2 + b**2*c**2*e**2*x**2*log(F)**2 - 2*b*c*d*e*lo
g(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))
```

GIAC/XCAS [A] time = 0.300696, size = 1, normalized size = 0.01

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

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

Rubi [A] time = 0.0365302, antiderivative size = 48, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133

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

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])
```

Rubi in Sympy [A] time = 6.63371, size = 41, normalized size = 0.85

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0260575, 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)
```

Maple [A] time = 0.004, size = 38, normalized size = 0.8

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.691583, size = 81, normalized size = 1.69

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

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.233659, size = 51, normalized size = 1.06

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

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.293582, 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))
```

GIAC/XCAS [A] time = 0.260921, size = 1, normalized size = 0.02

$$\mathit{Done}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

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

Optimal. Leaf size=20

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

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

Rubi [A] time = 0.0109114, antiderivative size = 20, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111

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

Antiderivative was successfully verified.

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

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

Rubi in Sympy [A] time = 2.00204, size = 14, normalized size = 0.7

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.00222036, 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])
```

Maple [A] time = 0.003, size = 21, normalized size = 1.1

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.680698, size = 27, normalized size = 1.35

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.230142, size = 28, normalized size = 1.4

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Sympy [A] time = 0.165517, size = 20, normalized size = 1.

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

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))
```

GIAC/XCAS [A] time = 0.241298, size = 27, normalized size = 1.35

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

Optimal. Leaf size=31

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

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

Rubi [A] time = 0.0404631, antiderivative size = 31, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.059

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

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
```

Rubi in Sympy [A] time = 5.15295, size = 27, normalized size = 0.87

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0161601, size = 31, normalized size = 1.

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

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
```

Maple [A] time = 0.034, size = 56, normalized size = 1.8

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.752654, size = 50, normalized size = 1.61

$$-\frac{F^{ac}exp_{i}ntegral_{e}\left(1,-\frac{(ex+d)bc\log(F)}{e}\right)}{F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.247157, size = 53, normalized size = 1.71

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(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)
```

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

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

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

Optimal. Leaf size=57

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

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

Rubi [A] time = 0.0775856, antiderivative size = 57, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118

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

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))*ExpIn
tegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F])/e^2
```

Rubi in Sympy [A] time = 9.91969, size = 51, normalized size = 0.89

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.118037, size = 55, normalized size = 0.96

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

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)*Log[F])/e]*Log[F])/F^((b*c*d)/e)))/e^2
```

Maple [A] time = 0.034, size = 97, normalized size = 1.7

$$-\frac{F^{c(bx+a)}cb\ln(F)}{e^2}\left(bcx\ln(F)+\frac{\ln(F)\,bcd}{e}\right)^{-1}-\frac{cb\ln(F)}{e^2}F^{\frac{c(ea-bd)}{e}}Ei\left(1,-bcx\ln(F)-\ln(F)\,ac-\frac{-eac\ln(F)+\ln(F)\,bcd}{e}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.786934, size = 59, normalized size = 1.04

$$-\frac{F^{ac}exp_integral_e\left(2,-\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.245465, size = 104, normalized size = 1.82

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(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)
```

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

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

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

Optimal. Leaf size=95

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

```
[Out] -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)
```

Rubi [A] time = 0.125788, antiderivative size = 95, normalized size of antiderivative = 1., number of steps used = 3, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118

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

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)
```

Rubi in Sympy [A] time = 17.2691, size = 87, normalized size = 0.92

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.111919, size = 88, normalized size = 0.93

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

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)
```

Maple [A] time = 0.043, size = 151, normalized size = 1.6

$$-\frac{b^2c^2(\ln(F))^2F^{c(bx+a)}}{2e^3}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-2}-\frac{b^2c^2(\ln(F))^2F^{c(bx+a)}}{2e^3}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-1}-\frac{b^2c^2(\ln(F))^2}{2e^3}F^{\frac{c(ea-bd)}{e}}Ei\left(1,-bcx\ln(F)-\ln(F)ac-\frac{-eac\ln(F)+\ln(F)bcd}{e}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.78886, size = 59, normalized size = 0.62

$$-\frac{F^{ac}exp_integral_e\left(3,-\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)^2F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.238866, size = 181, normalized size = 1.91

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(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)*log(F))*F^(b*c*x + a*c))/(e^5*x^2 + 2*d*e^4*x +
 d^2*e^3)
```

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

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

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

Optimal. Leaf size=128

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

```
[Out] -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)
```

Rubi [A] time = 0.175513, antiderivative size = 128, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}} = 0.118$

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

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)
```

Rubi in Sympy [A] time = 26.5014, size = 119, normalized size = 0.93

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.132668, size = 99, normalized size = 0.77

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

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)
```

Maple [A] time = 0.052, size = 193, normalized size = 1.5

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.80559, size = 59, normalized size = 0.46

$$-\frac{F^{ac}exp_integral_e\left(4, -\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)^3F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.238731, size = 282, normalized size = 2.2

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Timed out
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

Optimal. Leaf size=161

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

```
[Out] -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)
```

Rubi [A] time = 0.233636, antiderivative size = 161, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 2, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.118

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

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)
```

Rubi in Sympy [A] time = 37.7373, size = 151, normalized size = 0.94

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.14671, size = 121, normalized size = 0.75

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

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)
```

Maple [A] time = 0.066, size = 235, normalized size = 1.5

$$-\frac{b^4c^4(\ln(F))^4F^{c(bx+a)}}{4e^5}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-4}-\frac{b^4c^4(\ln(F))^4F^{c(bx+a)}}{12e^5}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-3}-\frac{b^4c^4(\ln(F))^4F^{c(bx+a)}}{24e^5}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-2}-\frac{b^4c^4(\ln(F))^4F^{c(bx+a)}}{24e^5}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-1}-\frac{b^4c^4(\ln(F))^4}{24e^5}F^{\frac{c(ea-bd)}{e}}Ei\left(1,-bcx\ln(F)-\ln(F)ac-\frac{-eac\ln(F)+\ln(F)bcd}{e}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.78876, size = 59, normalized size = 0.37

$$-\frac{F^{ac}exp_integral_e\left(5,-\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)^4F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -F^(a*c)*exp_integral_e(5, -(e*x + d)*b*c*log(F)/e)/((e*x + d)^4*
F^(b*c*d/e)*e)
```

Fricas [A] time = 0.24805, size = 405, normalized size = 2.52

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Timed out
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Rubi [A] time = 0.218203, antiderivative size = 141, normalized size of antiderivative = 1., number of steps used = 6, number of rules used = 3, integrand size = 48, $\frac{\text{number of rules}}{\text{integrand size}}=0.062$

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

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*Log[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])
```

Rubi in Sympy [A] time = 57.0486, size = 139, normalized size = 0.99

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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
```

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

Mathematica [A] time = 0.0333649, size = 100, normalized size = 0.71

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

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
```

```
[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)
```

Maple [A] time = 0.019, size = 260, normalized size = 1.8

$$\left(e^4x^4b^4c^4(\ln(F))^4+4(\ln(F))^4b^4c^4de^3x^3+6(\ln(F))^4b^4c^4d^2e^2x^2+4(\ln(F))^4b^4c^4d^3ex+(\ln(F))^4b^4c^4d^4-4(\ln(F))^3b^3c^3e$$

Verification of antiderivative is not currently implemented for this CAS.

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

Maxima [A] time = 0.746451, size = 417, normalized size = 2.96

$$\frac{F^{bcx+ac}d^4}{bc\log(F)}+\frac{4\left(F^{ac}bcx\log(F)-F^{ac}\right)F^{bcx}d^3e}{b^2c^2\log(F)^2}+\frac{6\left(F^{ac}b^2c^2x^2\log(F)^2-2F^{ac}bcx\log(F)+2F^{ac}\right)F^{bcx}d^2e^2}{b^3c^3\log(F)^3}+\frac{4\left(F^{ac}b^3c^3x^3\log(F)^3-3F^{ac}b^2c^2x^2\log(F)^2+6F^{ac}bcx\log(F)-6F^{ac}\right)F^{bcx}de^3}{b^4c^4\log(F)^4}+\frac{\left(F^{ac}b^4c^4x^4\log(F)^4-4F^{ac}b^3c^3x^3\log(F)^3+12F^{ac}b^2c^2x^2\log(F)^2-24F^{ac}bcx\log(F)+24F^{ac}\right)F^{bcx}e^4}{b^5c^5\log(F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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*log(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)
```

Fricas [A] time = 0.234819, size = 306, normalized size = 2.17

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)
```

Sympy [A] time = 0.611989, size = 350, normalized size = 2.48

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

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+
```

```
[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*lo
```

```
g(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*lo
g(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))
```

GIAC/XCAS [A] time = 0.344745, size = 1, normalized size = 0.01

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

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*(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])
```

Rubi [A] time = 0.154086, antiderivative size = 110, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 3, integrand size = 37, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.081

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

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])
```

Rubi in Sympy [A] time = 36.4637, size = 107, normalized size = 0.97

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

Verification of antiderivative is not currently implemented for this CAS.

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

Mathematica [A] time = 0.0173316, 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)
```

Maple [A] time = 0.011, size = 165, normalized size = 1.5

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

Verification of antiderivative is not currently implemented for this CAS.

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

Maxima [A] time = 0.73407, size = 278, normalized size = 2.53

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)
```

Fricas [A] time = 0.230883, size = 198, normalized size = 1.8

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)
```

Sympy [A] time = 0.494138, size = 231, normalized size = 2.1

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

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))
```

GIAC/XCAS [A] time = 0.309209, size = 1, normalized size = 0.01

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

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*(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])
```

Rubi [A] time = 0.0825601, antiderivative size = 79, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 3, integrand size = 26, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.115

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

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])
```

Rubi in Sympy [A] time = 35.7132, size = 75, normalized size = 0.95

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0147851, 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*Log[F]^2))/(b^3*c^3*Log[F]^3)
```

Maple [A] time = 0.012, size = 91, normalized size = 1.2

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

Verification of antiderivative is not currently implemented for this CAS.

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

Maxima [A] time = 0.734342, size = 166, normalized size = 2.1

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

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.228519, size = 113, normalized size = 1.43

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

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.394748, size = 133, normalized size = 1.68

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

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*log(F)**2 + b**2*c**2*e**2*x**2*log(F)**2 - 2*b*c*d*e*lo
g(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))
```

GIAC/XCAS [A] time = 0.273253, size = 1, normalized size = 0.01

$$\mathit{Done}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

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

Optimal. Leaf size=57

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

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

Rubi [A] time = 0.0749378, antiderivative size = 57, normalized size of antiderivative = 1., number of steps used = 3, number of rules used = 3, integrand size = 28, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.107

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

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))*ExpIn
tegralEi[(b*c*(d + e*x)*Log[F])/e]*Log[F])/e^2
```

Rubi in Sympy [A] time = 25.0805, size = 51, normalized size = 0.89

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0200466, size = 55, normalized size = 0.96

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

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)*Log[F])/e]*Log[F])/F^((b*c*d)/e)))/e^2
```

Maple [A] time = 0.052, size = 97, normalized size = 1.7

$$-\frac{F^{c(bx+a)}cb\ln(F)}{e^2}\left(bcx\ln(F)+\frac{\ln(F)\,bcd}{e}\right)^{-1}$$
$$-\frac{cb\ln(F)}{e^2}F^{\frac{c(ea-bd)}{e}}Ei\left(1,-bcx\ln(F)-\ln(F)\,ac-\frac{-eac\ln(F)+\ln(F)\,bcd}{e}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.782976, size = 59, normalized size = 1.04

$$-\frac{F^{ac}exp_integral_e\left(2,-\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.240803, size = 104, normalized size = 1.82

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^((b*x + a)*c)/(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)
```

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

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

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^((b*x + a)*c)/(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)
```

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

Optimal. Leaf size=95

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

```
[Out] -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)
```

Rubi [A] time = 0.159986, antiderivative size = 95, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 3, integrand size = 39, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.077

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

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)
```

Rubi in Sympy [A] time = 34.8704, size = 87, normalized size = 0.92

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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] -F**(c*(a + b*x))*b*c*log(F)/(2*e**2*(d + e*x)) - F**(c*(a + b*x)
)/(2*e*(d + e*x)**2) + F**(c*(a*e - b*d)/e)*b**2*c**2*log(F)**2*E
i(b*c*(d + e*x)*log(F)/e)/(2*e**3)
```

Mathematica [A] time = 0.0240768, size = 88, normalized size = 0.93

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

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)
```

Maple [A] time = 0.068, size = 151, normalized size = 1.6

$$-\frac{b^2c^2(\ln(F))^2F^{c(bx+a)}}{2e^3}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-2}-\frac{b^2c^2(\ln(F))^2F^{c(bx+a)}}{2e^3}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-1}-\frac{b^2c^2(\ln(F))^2}{2e^3}F^{\frac{(ea-bd)c}{e}}Ei\left(1,-bcx\ln(F)-\ln(F)ac-\frac{-eac\ln(F)+\ln(F)bcd}{e}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.811642, size = 59, normalized size = 0.62

$$-\frac{F^{ac}exp_integral_e\left(3,-\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)^2F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.243352, size = 181, normalized size = 1.91

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)*log(F))*F^(b*c*x + a*c))/(e^5*x^2 + 2*d*e^4*x +
 d^2*e^3)
```

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

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

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)
```

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

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

```
[Out] -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)
```

Rubi [A] time = 0.227158, antiderivative size = 128, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 3, integrand size = 50, $\frac{\text{number of rules}}{\text{integrand size}} = 0.06$

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

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)
```

Rubi in Sympy [A] time = 54.4037, size = 119, normalized size = 0.93

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_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
```

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

Mathematica [A] time = 0.0271266, size = 99, normalized size = 0.77

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

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
```

```
[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)
```

Maple [A] time = 0.094, size = 193, normalized size = 1.5

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

Verification of antiderivative is not currently implemented for this CAS.

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

Maxima [A] time = 0.844392, size = 59, normalized size = 0.46

$$-\frac{F^{ac}exp_intgral_e\left(4,-\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)^3F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] 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^
```

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

Fricas [A] time = 0.239548, size = 282, normalized size = 2.2

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] 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^
```

```
[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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

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+
```

```
[Out] Timed out
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^((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
```

```
[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)
```

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

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

```
[Out] -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)
```

Rubi [A] time = 0.304128, antiderivative size = 161, normalized size of antiderivative = 1., number of steps used = 6, number of rules used = 3, integrand size = 61, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.049

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

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*
```

```
[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)
```

Rubi in Sympy [A] time = 84.4848, size = 151, normalized size = 0.94

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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*
```

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

Mathematica [A] time = 0.0294301, size = 121, normalized size = 0.75

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

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*
```

```
[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)
```

Maple [A] time = 0.124, size = 235, normalized size = 1.5

$$-\frac{b^4c^4(\ln(F))^4F^{c(bx+a)}}{4e^5}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-4}-\frac{b^4c^4(\ln(F))^4F^{c(bx+a)}}{12e^5}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-3}-\frac{b^4c^4(\ln(F))^4F^{c(bx+a)}}{24e^5}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-2}-\frac{b^4c^4(\ln(F))^4F^{c(bx+a)}}{24e^5}\left(bcx\ln(F)+\frac{\ln(F)bcd}{e}\right)^{-1}-\frac{b^4c^4(\ln(F))^4}{24e^5}F^{\frac{(ea-bd)c}{e}}Ei\left(1,-bcx\ln(F)-\ln(F)ac-\frac{-eac\ln(F)+\ln(F)bcd}{e}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(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
```

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

Maxima [A] time = 0.915289, size = 59, normalized size = 0.37

$$-\frac{F^{ac}exp_integral_e\left(5,-\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)^4F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] 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^
```

```
[Out] -F^(a*c)*exp_integral_e(5, -(e*x + d)*b*c*log(F)/e)/((e*x + d)^4*
F^(b*c*d/e)*e)
```

Fricas [A] time = 0.239399, size = 405, normalized size = 2.52

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] 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^
```

```
[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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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*
```

```
[Out] Timed out
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{F^{(bx+a)c}}{e^5x^5 + 5\,de^4x^4 + 10\,d^2e^3x^3 + 10\,d^3e^2x^2 + 5\,d^4ex + d^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^((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^
```

```
[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)
```

3.19 $\int F^{c(a+bx)}((d+ex)^n)^m\,dx$

Optimal. Leaf size=72

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

```
[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))
```

Rubi [A] time = 0.0947758, antiderivative size = 72, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105

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

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))
```

Rubi in Sympy [A] time = 11.9849, size = 65, normalized size = 0.9

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0484099, size = 74, normalized size = 1.03

$$-\frac{(d+ex)\left((d+ex)^n\right)^m F^{ac-\frac{bcd}{e}}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-mn-1}\text{Gamma}\left(mn+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{e}$$

Antiderivative was successfully verified.

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

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

Maple [F] time = 0.072, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.253858, size = 92, normalized size = 1.28

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

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Timed out
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

$$\frac{\left((d+ex)^4\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-4m}\text{Gamma}\left(4m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

```
[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))
```

Rubi [A] time = 0.117801, antiderivative size = 71, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 50, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.04

$$\frac{\left((d+ex)^4\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-4m}\text{Gamma}\left(4m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

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))
```

Rubi in Sympy [A] time = 36.4929, size = 65, normalized size = 0.92

$$\frac{F^{\frac{c(ae-bd)}{e}}\left(\frac{bc(-d-ex)\log(F)}{e}\right)^{-4m}\left((d+ex)^4\right)^m\left(4m+1,\frac{bc(-d-ex)\log(F)}{e}\right)}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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
```

```
[Out] F**(c*(a*e - b*d)/e)*(b*c*(-d - e*x)*log(F)/e)**(-4*m)*((d + e*x)
**4)**m*Gamma(4*m + 1, b*c*(-d - e*x)*log(F)/e)/(b*c*log(F))
```

Mathematica [A] time = 0.0976572, size = 73, normalized size = 1.03

$$-\frac{(d+ex)\left((d+ex)^4\right)^m F^{ac-\frac{bcd}{e}}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-4m-1}\text{Gamma}\left(4m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{e}$$

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^
```

```
[Out] -((F^(a*c - (b*c*d)/e)*(d + e*x)*((d + e*x)^4)^m*Gamma[1 + 4*m, -
((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d + e*x)*Log[F])/e))^(-1 - 4
*m))/e)
```

Maple [F] time = 0.26, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(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] int(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)
```

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

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((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
```

```
[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)
```

Fricas [F] time = 0., size = 0, normalized size = 0.

$$\text{integral}\left(\left(e^4x^4+4\,de^3x^3+6\,d^2e^2x^2+4\,d^3ex+d^4\right)^m F^{bcx+ac},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((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
```

```
[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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

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+
```

```
[Out] Timed out
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \left(e^{4} x^{4} + 4 \, d e^{3} x^{3} + 6 \, d^{2} e^{2} x^{2} + 4 \, d^{3} e x + d^{4}\right)^{m} F^{(b x + a) c} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] 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
```

```
[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)
```

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

$$\frac{\left((d+ex)^3\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-3m}\text{Gamma}\left(3m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

```
[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))
```

Rubi [A] time = 0.103501, antiderivative size = 71, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 39, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.051

$$\frac{\left((d+ex)^3\right)^m F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-3m}\text{Gamma}\left(3m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

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))
```

Rubi in Sympy [A] time = 25.8666, size = 65, normalized size = 0.92

$$\frac{F^{\frac{c(ae-bd)}{e}}\left(\frac{bc(-d-ex)\log(F)}{e}\right)^{-3m}\left((d+ex)^3\right)^m\left(3m+1,\frac{bc(-d-ex)\log(F)}{e}\right)}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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] F**(c*(a*e - b*d)/e)*(b*c*(-d - e*x)*log(F)/e)**(-3*m)*((d + e*x)
**3)**m*Gamma(3*m + 1, b*c*(-d - e*x)*log(F)/e)/(b*c*log(F))
```

Mathematica [A] time = 0.0488294, size = 73, normalized size = 1.03

$$-\frac{(d+ex)\left((d+ex)^3\right)^m F^{ac-\frac{bcd}{e}}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-3m-1}\text{Gamma}\left(3m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{e}$$

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^(a*c - (b*c*d)/e)*(d + e*x)*((d + e*x)^3)^m*Gamma[1 + 3*m, -
((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d + e*x)*Log[F])/e))^(-1 - 3
*m))/e)
```

Maple [F] time = 0.086, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)
```

Fricas [F] time = 0., size = 0, normalized size = 0.

$$\text{integral}\left(\left(e^3x^3+3\,de^2x^2+3\,d^2ex+d^3\right)^m F^{bcx+ac},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] 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, algorith
```

```
[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)
```

3.22 $\int F^{c(a+bx)} \left(d^2+2dex+e^2x^2\right)^m dx$

Optimal. Leaf size=71

$$\frac{\left((d+ex)^2\right)^m F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-2m} \text{Gamma}\left(2m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

```
[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))
```

Rubi [A] time = 0.097998, antiderivative size = 71, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 28, $\frac{\text{number of rules}}{\text{integrand size}} = 0.071$

$$\frac{\left((d+ex)^2\right)^m F^{c\left(a-\frac{bd}{e}\right)} \left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-2m} \text{Gamma}\left(2m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

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))
```

Rubi in Sympy [A] time = 18.4941, size = 65, normalized size = 0.92

$$\frac{F^{\frac{c(ae-bd)}{e}} \left(\frac{bc(-d-ex)\log(F)}{e}\right)^{-2m} \left((d+ex)^2\right)^m \left(2m+1,\frac{bc(-d-ex)\log(F)}{e}\right)}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F**(c*(a*e - b*d)/e)*(b*c*(-d - e*x)*log(F)/e)**(-2*m)*((d + e*x)
**2)**m*Gamma(2*m + 1, b*c*(-d - e*x)*log(F)/e)/(b*c*log(F))
```

Mathematica [A] time = 0.04669, size = 73, normalized size = 1.03

$$-\frac{(d+ex)\left((d+ex)^2\right)^m F^{ac-\frac{bcd}{e}}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{-2m-1}\text{Gamma}\left(2m+1,-\frac{bc\log(F)(d+ex)}{e}\right)}{e}$$

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^(a*c - (b*c*d)/e)*(d + e*x)*((d + e*x)^2)^m*Gamma[1 + 2*m, -
((b*c*(d + e*x)*Log[F])/e)]*(-((b*c*(d + e*x)*Log[F])/e))^(-1 - 2
*m))/e)
```

Maple [F] time = 0.138, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [F] time = 0., size = 0, normalized size = 0.

$$\text{integral}\left(\left(e^2x^2+2\,dex+d^2\right)^m F^{bcx+ac},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.23 $\int F^{c(a+bx)}(d+ex)^m\,dx$

Optimal. Leaf size=67

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

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

Rubi [A] time = 0.0455326, antiderivative size = 67, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}} = 0.059$

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

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)*Lo
g[F])/e)])/(b*c*Log[F]*(-((b*c*(d + e*x)*Log[F])/e))^m)
```

Rubi in Sympy [A] time = 6.74382, size = 60, normalized size = 0.9

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0179293, size = 66, normalized size = 0.99

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

Antiderivative was successfully verified.

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

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

Maple [F] time = 0., size = 0, normalized size = 0.

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

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., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.268747, size = 88, normalized size = 1.31

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

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.24 $\int F^{c(a+bx)}(d+ex)^{-m}\,dx$

Optimal. Leaf size=69

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

```
[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])
```

Rubi [A] time = 0.0475898, antiderivative size = 69, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.053

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

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])
```

Rubi in Sympy [A] time = 6.73844, size = 60, normalized size = 0.87

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0490428, size = 68, normalized size = 0.99

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

Antiderivative was successfully verified.

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

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

Maple [F] time = 0.065, size = 0, normalized size = 0.

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

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., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.26342, size = 90, normalized size = 1.3

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(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))
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.25 $\int F^{c(a+bx)}\left(d^2+2dex+e^2x^2\right)^{-m}\,dx$

Optimal. Leaf size=73

$$\frac{\left((d+ex)^2\right)^{-m}F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{2m}\text{Gamma}\left(1-2m,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

```
[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])
```

Rubi [A] time = 0.0980188, antiderivative size = 73, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 30, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.067

$$\frac{\left((d+ex)^2\right)^{-m}F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{2m}\text{Gamma}\left(1-2m,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

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])
```

Rubi in Sympy [A] time = 18.702, size = 65, normalized size = 0.89

$$\frac{F^{\frac{c(ae-bd)}{e}}\left(\frac{bc(-d-ex)\log{(F)}}{e}\right)^{2m}\left((d+ex)^2\right)^{-m}\left(-2m+1,\frac{bc(-d-ex)\log{(F)}}{e}\right)}{bc\log{(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F**(c*(a*e - b*d)/e)*(b*c*(-d - e*x)*log(F)/e)**(2*m)*((d + e*x)*
*2)**(-m)*Gamma(-2*m + 1, b*c*(-d - e*x)*log(F)/e)/(b*c*log(F))
```

Mathematica [A] time = 0.0455393, size = 75, normalized size = 1.03

$$-\frac{(d+ex)\left((d+ex)^2\right)^{-m}F^{ac-\frac{bcd}{e}}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{2m-1}\text{Gamma}\left(1-2m,-\frac{bc\log(F)(d+ex)}{e}\right)}{e}$$

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^(a*c - (b*c*d)/e)*(d + e*x)*Gamma[1 - 2*m, -((b*c*(d + e*x)*
Log[F])/e)]*(-((b*c*(d + e*x)*Log[F])/e))^(-1 + 2*m))/(e*((d + e*
x)^2)^m))
```

Maple [F] time = 0.119, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(F^((b*x + a)*c)/(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)
```

Fricas [F] time = 0., size = 0, normalized size = 0.

$$\text{integral}\left(\frac{F^{bcx+ac}}{(e^2x^2+2\,dex+d^2)^m},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(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)
```

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

$$\frac{\left((d+ex)^3\right)^{-m}F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3m}\text{Gamma}\left(1-3m,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

```
[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])
```

Rubi [A] time = 0.103617, antiderivative size = 73, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 41, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.049

$$\frac{\left((d+ex)^3\right)^{-m}F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3m}\text{Gamma}\left(1-3m,-\frac{bc\log(F)(d+ex)}{e}\right)}{bc\log(F)}$$

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])
```

Rubi in Sympy [A] time = 26.2484, size = 65, normalized size = 0.89

$$\frac{F^{\frac{c(ae-bd)}{e}}\left(\frac{bc(-d-ex)\log(F)}{e}\right)^{3m}\left((d+ex)^3\right)^{-m}\left(-3m+1,\frac{bc(-d-ex)\log(F)}{e}\right)}{bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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] F**(c*(a*e - b*d)/e)*(b*c*(-d - e*x)*log(F)/e)**(3*m)*((d + e*x)*
*3)**(-m)*Gamma(-3*m + 1, b*c*(-d - e*x)*log(F)/e)/(b*c*log(F))
```

Mathematica [A] time = 0.0466042, size = 75, normalized size = 1.03

$$-\frac{(d+ex)\left((d+ex)^3\right)^{-m}F^{ac-\frac{bcd}{e}}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3m-1}\text{Gamma}\left(1-3m,-\frac{bc\log(F)(d+ex)}{e}\right)}{e}$$

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^(a*c - (b*c*d)/e)*(d + e*x)*Gamma[1 - 3*m, -((b*c*(d + e*x)*
Log[F])/e)]*(-((b*c*(d + e*x)*Log[F])/e))^(-1 + 3*m))/(e*((d + e*
x)^3)^m))
```

Maple [F] time = 0.082, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] 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, algorith
```

```
[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)
```

Fricas [F] time = 0., size = 0, normalized size = 0.

$$\text{integral}\left(\frac{F^{bcx+ac}}{(e^3x^3+3\,de^2x^2+3\,d^2ex+d^3)^m},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] 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, algorith
```

```
[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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)
```

3.27 $\int F^{2+5x}\,dx$

Optimal. Leaf size=15

$$\frac{F^{5x+2}}{5\log(F)}$$

```
[Out] F^(2 + 5*x)/(5*Log[F])
```

Rubi [A] time = 0.00682172, antiderivative size = 15, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143

$$\frac{F^{5x+2}}{5\log(F)}$$

Antiderivative was successfully verified.

```
[In]  Int[F^(2 + 5*x),x]

[Out] F^(2 + 5*x)/(5*Log[F])
```

Rubi in Sympy [A] time = 1.22549, size = 10, normalized size = 0.67

$$\frac{F^{5x+2}}{5\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(2+5*x),x)

[Out] F**(5*x + 2)/(5*log(F))
```

Mathematica [A] time = 0.00246707, size = 15, normalized size = 1.

$$\frac{F^{5x+2}}{5\log(F)}$$

Antiderivative was successfully verified.

```
[In]  Integrate[F^(2 + 5*x),x]
```

```
[Out] F^(2 + 5*x)/(5*Log[F])
```

Maple [A] time = 0.007, size = 14, normalized size = 0.9

$$\frac{F^{2+5x}}{5\ln(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(F^(2+5*x),x)
```

```
[Out] 1/5*F^(2+5*x)/ln(F)
```

Maxima [A] time = 0.790209, size = 18, normalized size = 1.2

$$\frac{F^{5x+2}}{5\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^(5*x + 2),x, algorithm="maxima")
```

```
[Out] 1/5*F^(5*x + 2)/log(F)
```

Fricas [A] time = 0.279715, size = 18, normalized size = 1.2

$$\frac{F^{5x+2}}{5\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^(5*x + 2),x, algorithm="fricas")
```

```
[Out] 1/5*F^(5*x + 2)/log(F)
```

Sympy [A] time = 0.152169, size = 15, normalized size = 1.

$$\begin{cases} \frac{F^{5x+2}}{5\log(F)} & \text{for } 5\log(F) \neq 0 \\ x & \text{otherwise} \end{cases}$$

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))
```

GIAC/XCAS [A] time = 0.249213, size = 18, normalized size = 1.2

$$\frac{F^{5x+2}}{5\ln(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^(5*x + 2),x, algorithm="giac")
```

```
[Out] 1/5*F^(5*x + 2)/ln(F)
```

3.28 $\int F^{a+bx}\,dx$

Optimal. Leaf size=15

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

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

Rubi [A] time = 0.00770423, antiderivative size = 15, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143

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

Antiderivative was successfully verified.

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

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

Rubi in Sympy [A] time = 1.53537, size = 10, normalized size = 0.67

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a),x)
```

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

Mathematica [A] time = 0.00244563, size = 15, normalized size = 1.

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

Antiderivative was successfully verified.

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

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

Maple [A] time = 0.006, size = 16, normalized size = 1.1

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

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 = 0.784475, size = 20, normalized size = 1.33

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

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))
```

Fricas [A] time = 0.27023, size = 20, normalized size = 1.33

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

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))
```

Sympy [A] time = 0.156255, size = 15, normalized size = 1.

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

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))
```

GIAC/XCAS [A] time = 0.252237, size = 20, normalized size = 1.33

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

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*ln(F))
```

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))/Log[10]
```

Rubi [A] time = 0.0109146, antiderivative size = 19, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143

$$\frac{2^{5x+2}5^{5x+1}}{\log(10)}$$

Antiderivative was successfully verified.

```
[In]  Int[10^(2 + 5*x),x]

[Out] (2^(2 + 5*x)*5^(1 + 5*x))/Log[10]
```

Rubi in Sympy [A] time = 1.04926, size = 10, normalized size = 0.53

$$\frac{10^{5x+2}}{5\log{(10)}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(10**(2+5*x),x)

[Out] 10**(5*x + 2)/(5*log(10))
```

Mathematica [A] time = 0.00445384, size = 19, normalized size = 1.

$$\frac{2^{5x+2}5^{5x+1}}{\log(10)}$$

Antiderivative was successfully verified.

```
[In]  Integrate[10^(2 + 5*x),x]

[Out] (2^(2 + 5*x)*5^(1 + 5*x))/Log[10]
```

Maple [A] time = 0.033, size = 14, normalized size = 0.7

$$\frac{10^{2+5x}}{5 \ln(10)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(10^(2+5*x),x)

[Out] 1/5/ln(10)*10^(2+5*x)
```

Maxima [A] time = 0.788224, size = 18, normalized size = 0.95

$$\frac{10^{5x+2}}{5 \log(10)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(10^(5*x + 2),x, algorithm="maxima")

[Out] 1/5*10^(5*x + 2)/log(10)
```

Fricas [A] time = 0.274762, size = 18, normalized size = 0.95

$$\frac{10^{5x+2}}{5 \log(10)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(10^(5*x + 2),x, algorithm="fricas")

[Out] 1/5*10^(5*x + 2)/log(10)
```

Sympy [A] time = 0.151914, 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))
```

GIAC/XCAS [A] time = 0.25859, size = 18, normalized size = 0.95

$$\frac{10^{5x+2}}{5\ln(10)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(10^(5*x + 2),x, algorithm="giac")
```

```
[Out] 1/5*10^(5*x + 2)/ln(10)
```

3.30 $\int F^{a+bx}x^{7/2}\,dx$

Optimal. Leaf size=131

$$\frac{105\sqrt{\pi}F^a\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{16b^{9/2}\log^{\frac{9}{2}}(F)}-\frac{105\sqrt{x}F^{a+bx}}{8b^4\log^4(F)}+\frac{35x^{3/2}F^{a+bx}}{4b^3\log^3(F)}-\frac{7x^{5/2}F^{a+bx}}{2b^2\log^2(F)}+\frac{x^{7/2}F^{a+bx}}{b\log(F)}$$

```
[Out] (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])
```

Rubi [A] time = 0.242796, antiderivative size = 131, normalized size of antiderivative = 1., number of steps used = 6, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231

$$\frac{105\sqrt{\pi}F^a\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{16b^{9/2}\log^{\frac{9}{2}}(F)}-\frac{105\sqrt{x}F^{a+bx}}{8b^4\log^4(F)}+\frac{35x^{3/2}F^{a+bx}}{4b^3\log^3(F)}-\frac{7x^{5/2}F^{a+bx}}{2b^2\log^2(F)}+\frac{x^{7/2}F^{a+bx}}{b\log(F)}$$

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])
```

Rubi in Sympy [A] time = 26.9223, size = 129, normalized size = 0.98

$$\frac{105\sqrt{\pi}F^a\operatorname{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{16b^{\frac{9}{2}}\log(F)^{\frac{9}{2}}}+\frac{F^{a+bx}x^{\frac{7}{2}}}{b\log(F)}-\frac{7F^{a+bx}x^{\frac{5}{2}}}{2b^2\log(F)^2}+\frac{35F^{a+bx}x^{\frac{3}{2}}}{4b^3\log(F)^3}-\frac{105F^{a+bx}\sqrt{x}}{8b^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a)*x**(7/2),x)
```

```
[Out] 105*sqrt(pi)*F**a*erfi(sqrt(b)*sqrt(x)*sqrt(log(F)))/(16*b**(9/2)
*log(F)**(9/2)) + F**(a + b*x)*x**(7/2)/(b*log(F)) - 7*F**(a + b*
x)*x**(5/2)/(2*b**2*log(F)**2) + 35*F**(a + b*x)*x**(3/2)/(4*b**3
```

```
*log(F)**3) - 105*F**(a + b*x)*sqrt(x)/(8*b**4*log(F)**4)
```

Mathematica [A] time = 0.0971548, size = 99, normalized size = 0.76

$$\frac{F^a\left(2\sqrt{b}\sqrt{x}\sqrt{\log(F)}F^{bx}\left(8b^3x^3\log^3(F)-28b^2x^2\log^2(F)+70bx\log(F)-105\right)+105\sqrt{\pi}\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)\right)}{16b^{9/2}\log^{\frac{9}{2}}(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (F^a*(105*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]] + 2*Sqrt[b]
*F^(b*x)*Sqrt[x]*Sqrt[Log[F]]*(-105 + 70*b*x*Log[F] - 28*b^2*x^2*
Log[F]^2 + 8*b^3*x^3*Log[F]^3)))/(16*b^(9/2)*Log[F]^(9/2))
```

Maple [A] time = 0.158, size = 99, normalized size = 0.8

$$-\frac{F^a}{b}\left(-\frac{\left(-72\,b^3x^3\,(\ln(F))^3+252\,b^2x^2\,(\ln(F))^2-630\,b\ln(F)\,x+945\right)\,\mathrm{e}^{b\ln(F)x}}{72\,b^4}\sqrt{x}\,(-b)^{\frac{9}{2}}\,\sqrt{\ln(F)}+\frac{105\,\sqrt{\pi}}{16}\,(-b)^{\frac{9}{2}}\,erfi\left(\sqrt{b}\sqrt{x}\right.\right.$$

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 = 0.819579, size = 120, normalized size = 0.92

$$\frac{1}{16}F^a\left(\frac{2\left(8\,b^3x^{\frac{7}{2}}\log(F)^3-28\,b^2x^{\frac{5}{2}}\log(F)^2+70\,bx^{\frac{3}{2}}\log(F)-105\,\sqrt{x}\right)F^{bx}}{b^4\log(F)^4}+\frac{105\,\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)}{\sqrt{-b\log(F)}b^4\log(F)^4}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/16*F^a*(2*(8*b^3*x^(7/2)*log(F)^3 - 28*b^2*x^(5/2)*log(F)^2 + 7
0*b*x^(3/2)*log(F) - 105*sqrt(x))*F^(b*x)/(b^4*log(F)^4) + 105*sq
rt(pi)*erf(sqrt(-b*log(F))*sqrt(x))/(sqrt(-b*log(F))*b^4*log(F)^4
))
```

Fricas [A] time = 0.274976, size = 119, normalized size = 0.91

$$\frac{2\left(8\,b^3x^3\log\left(F\right)^3-28\,b^2x^2\log\left(F\right)^2+70\,bx\log\left(F\right)-105\right)\sqrt{-b\log\left(F\right)}F^{bx+a}\sqrt{x}+105\,\sqrt{\pi}F^a\,\mathrm{erf}\left(\sqrt{-b\log\left(F\right)}\sqrt{x}\right)}{16\,\sqrt{-b\log\left(F\right)}b^4\log\left(F\right)^4}$$

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*(2*(8*b^3*x^3*log(F)^3 - 28*b^2*x^2*log(F)^2 + 70*b*x*log(F)
 - 105)*sqrt(-b*log(F))*F^(b*x + a)*sqrt(x) + 105*sqrt(pi)*F^a*er
f(sqrt(-b*log(F))*sqrt(x)))/(sqrt(-b*log(F))*b^4*log(F)^4)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [A] time = 0.257172, size = 130, normalized size = 0.99

$$\frac{\left(8\,b^3x^{\frac{7}{2}}\ln\left(F\right)^3-28\,b^2x^{\frac{5}{2}}\ln\left(F\right)^2+70\,bx^{\frac{3}{2}}\ln\left(F\right)-105\,\sqrt{x}\right)e^{\left(bx\ln(F)+a\ln(F)\right)}}{8\,b^4\ln\left(F\right)^4}-\frac{105\,\sqrt{\pi}\,\mathrm{erf}\left(-\sqrt{-b\ln\left(F\right)}\sqrt{x}\right)e^{\left(a\ln(F)\right)}}{16\,\sqrt{-b\ln\left(F\right)}b^4\ln\left(F\right)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/8*(8*b^3*x^(7/2)*ln(F)^3 - 28*b^2*x^(5/2)*ln(F)^2 + 70*b*x^(3/2
)*ln(F) - 105*sqrt(x))*e^(b*x*ln(F) + a*ln(F))/(b^4*ln(F)^4) - 10
5/16*sqrt(pi)*erf(-sqrt(-b*ln(F))*sqrt(x))*e^(a*ln(F))/(sqrt(-b*l
n(F))*b^4*ln(F)^4)
```

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] (-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*Lo
g[F])
```

Rubi [A] time = 0.146824, antiderivative size = 108, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231

$$-\frac{15\sqrt{\pi}F^a\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{8b^{7/2}\log^{\frac{7}{2}}(F)}+\frac{15\sqrt{x}F^{a+bx}}{4b^3\log^3(F)}-\frac{5x^{3/2}F^{a+bx}}{2b^2\log^2(F)}+\frac{x^{5/2}F^{a+bx}}{b\log(F)}$$

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*Lo
g[F])
```

Rubi in Sympy [A] time = 19.7698, size = 105, normalized size = 0.97

$$-\frac{15\sqrt{\pi}F^a\,\text{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{8b^{\frac{7}{2}}\log(F)^{\frac{7}{2}}}+\frac{F^{a+bx}x^{\frac{5}{2}}}{b\log(F)}-\frac{5F^{a+bx}x^{\frac{3}{2}}}{2b^2\log(F)^2}+\frac{15F^{a+bx}\sqrt{x}}{4b^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a)*x**(5/2),x)
```

```
[Out] -15*sqrt(pi)*F**a*erfi(sqrt(b)*sqrt(x)*sqrt(log(F)))/(8*b**(7/2)*
log(F)**(7/2)) + F**(a + b*x)*x**(5/2)/(b*log(F)) - 5*F**(a + b*x
)*x**(3/2)/(2*b**2*log(F)**2) + 15*F**(a + b*x)*sqrt(x)/(4*b**3*l
```

```
og(F)**3)
```

Mathematica [A] time = 0.0530237, size = 87, normalized size = 0.81

$$\frac{F^a\left(2\sqrt{b}\sqrt{x}\sqrt{\log(F)}F^{bx}\left(4b^2x^2\log^2(F)-10bx\log(F)+15\right)-15\sqrt{\pi}\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)\right)}{8b^{7/2}\log^{\frac{7}{2}}(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (F^a*(-15*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]] + 2*Sqrt[b]
*F^(b*x)*Sqrt[x]*Sqrt[Log[F]]*(15 - 10*b*x*Log[F] + 4*b^2*x^2*Log
[F]^2)))/(8*b^(7/2)*Log[F]^(7/2))
```

Maple [A] time = 0.017, size = 87, normalized size = 0.8

$$-\frac{F^a}{b}\left(\frac{\left(28\,b^2x^2\left(\ln(F)\right)^2-70\,b\ln(F)\,x+105\right)\mathrm{e}^{b\ln(F)x}}{28\,b^3}\sqrt{x}\,(-b)^{\frac{7}{2}}\sqrt{\ln(F)}-\frac{15\sqrt{\pi}}{8}(-b)^{\frac{7}{2}}\,erfi\left(\sqrt{b}\sqrt{x}\sqrt{\ln(F)}\right)b^{-\frac{7}{2}}\right)(-b)^{-\frac{5}{2}}\,(\ln$$

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*ln(F)*x+105)/b^3*exp(b*ln(F)*x)-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 = 0.840311, size = 104, normalized size = 0.96

$$\frac{1}{8}F^a\left(\frac{2\left(4\,b^2x^{\frac{5}{2}}\log(F)^2-10\,bx^{\frac{3}{2}}\log(F)+15\sqrt{x}\right)F^{bx}}{b^3\log(F)^3}-\frac{15\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)}{\sqrt{-b\log(F)}b^3\log(F)^3}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/8*F^a*(2*(4*b^2*x^(5/2)*log(F)^2 - 10*b*x^(3/2)*log(F) + 15*sqr
t(x))*F^(b*x)/(b^3*log(F)^3) - 15*sqrt(pi)*erf(sqrt(-b*log(F))*sq
rt(x))/(sqrt(-b*log(F))*b^3*log(F)^3))
```

Fricas [A] time = 0.276042, size = 103, normalized size = 0.95

$$\frac{2\left(4\,b^2x^2\log\left(F\right)^2 - 10\,bx\log\left(F\right) + 15\right)\sqrt{-b\log\left(F\right)}F^{bx+a}\sqrt{x} - 15\,\sqrt{\pi}F^a\operatorname{erf}\left(\sqrt{-b\log\left(F\right)}\sqrt{x}\right)}{8\,\sqrt{-b\log\left(F\right)}b^3\log\left(F\right)^3}$$

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*(2*(4*b^2*x^2*log(F)^2 - 10*b*x*log(F) + 15)*sqrt(-b*log(F))*
F^(b*x + a)*sqrt(x) - 15*sqrt(pi)*F^a*erf(sqrt(-b*log(F))*sqrt(x)
))/(sqrt(-b*log(F))*b^3*log(F)^3)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [A] time = 0.261209, size = 113, normalized size = 1.05

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*(4*b^2*x^(5/2)*ln(F)^2 - 10*b*x^(3/2)*ln(F) + 15*sqrt(x))*e^(
b*x*ln(F) + a*ln(F))/(b^3*ln(F)^3) + 15/8*sqrt(pi)*erf(-sqrt(-b*l
n(F))*sqrt(x))*e^(a*ln(F))/(sqrt(-b*ln(F))*b^3*ln(F)^3)
```

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] (3*F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]])/(4*b^(5/2)*Lo
g[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])
```

Rubi [A] time = 0.10993, antiderivative size = 85, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231

$$\frac{3\sqrt{\pi}F^a\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{4b^{5/2}\log^{\frac{5}{2}}(F)}-\frac{3\sqrt{x}F^{a+bx}}{2b^2\log^2(F)}+\frac{x^{3/2}F^{a+bx}}{b\log(F)}$$

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)*Lo
g[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])
```

Rubi in Sympy [A] time = 13.6344, size = 82, normalized size = 0.96

$$\frac{3\sqrt{\pi}F^a\operatorname{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log\left(F\right)}\right)}{4b^{\frac{5}{2}}\log\left(F\right)^{\frac{5}{2}}}+\frac{F^{a+bx}x^{\frac{3}{2}}}{b\log\left(F\right)}-\frac{3F^{a+bx}\sqrt{x}}{2b^2\log\left(F\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a)*x**(3/2),x)
```

```
[Out] 3*sqrt(pi)*F**a*erfi(sqrt(b)*sqrt(x)*sqrt(log(F)))/(4*b**(5/2)*lo
g(F)**(5/2)) + F**(a + b*x)*x**(3/2)/(b*log(F)) - 3*F**(a + b*x)*
sqrt(x)/(2*b**2*log(F)**2)
```

Mathematica [A] time = 0.0424413, size = 75, normalized size = 0.88

$$\frac{F^a\left(3\sqrt{\pi}\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)+2\sqrt{b}\sqrt{x}\sqrt{\log(F)}F^{bx}(2bx\log(F)-3)\right)}{4b^{5/2}\log^{\frac{5}{2}}(F)}$$

Antiderivative was successfully verified.

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

```
[Out] (F^a*(3*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]] + 2*Sqrt[b]*F
^(b*x)*Sqrt[x]*Sqrt[Log[F]]*(-3 + 2*b*x*Log[F])))/(4*b^(5/2)*Log[
F]^(5/2))
```

Maple [A] time = 0.016, size = 75, normalized size = 0.9

$$-\frac{F^a}{b}\left(-\frac{(-10\,b\ln(F)\,x+15)\,\mathrm{e}^{b\ln(F)x}}{10\,b^2}\sqrt{x}\,(-b)^{\frac{5}{2}}\sqrt{\ln(F)}+\frac{3\sqrt{\pi}}{4}(-b)^{\frac{5}{2}}\,\mathit{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\ln(F)}\right)b^{-\frac{5}{2}}\right)(-b)^{-\frac{3}{2}}(\ln(F))^{-\frac{5}{2}}$$

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*ln(F)*x+15)/b^2*exp(b*ln(F)*x)+3/4*(-b)^(5/2)/b^(5/2)*P
i^(1/2)*erfi(b^(1/2)*x^(1/2)*ln(F)^(1/2)))
```

Maxima [A] time = 0.847287, size = 88, normalized size = 1.04

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.279634, size = 86, normalized size = 1.01

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

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*(2*(2*b*x*log(F) - 3)*sqrt(-b*log(F))*F^(b*x + a)*sqrt(x) + 3
*sqrt(pi)*F^a*erf(sqrt(-b*log(F))*sqrt(x)))/(sqrt(-b*log(F))*b^2*
log(F)^2)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Timed out
```

GIAC/XCAS [A] time = 0.254147, size = 97, normalized size = 1.14

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.33 $\int F^{a+bx}\sqrt{x}\,dx$

Optimal. Leaf size=62

$$\frac{\sqrt{x}F^{a+bx}}{b\log(F)}-\frac{\sqrt{\pi}F^a\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{2b^{3/2}\log^{\frac{3}{2}}(F)}$$

```
[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])
```

Rubi [A] time = 0.0749736, antiderivative size = 62, normalized size of antiderivative = 1., number of steps used = 3, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231

$$\frac{\sqrt{x}F^{a+bx}}{b\log(F)}-\frac{\sqrt{\pi}F^a\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{2b^{3/2}\log^{\frac{3}{2}}(F)}$$

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])
```

Rubi in Sympy [A] time = 8.72503, size = 56, normalized size = 0.9

$$-\frac{\sqrt{\pi}F^a\operatorname{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{2b^{\frac{3}{2}}\log(F)^{\frac{3}{2}}}+\frac{F^{a+bx}\sqrt{x}}{b\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a)*x**(1/2),x)
```

```
[Out] -sqrt(pi)*F**a*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))
```

Mathematica [A] time = 0.0322972, size = 62, normalized size = 1.

$$\frac{\sqrt{x}F^{a+bx}}{b\log(F)}-\frac{\sqrt{\pi}F^{a}\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{2b^{3/2}\log^{\frac{3}{2}}(F)}$$

Antiderivative was successfully verified.

```
[In]  Integrate[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])
```

Maple [A] time = 0.014, size = 66, normalized size = 1.1

$$-\frac{F^{a}}{b}\left(\frac{e^{b\ln(F)x}}{b}\sqrt{x}\,(-b)^{\frac{3}{2}}\sqrt{\ln(F)}-\frac{\sqrt{\pi}}{2}(-b)^{\frac{3}{2}}\,erfi\left(\sqrt{b}\sqrt{x}\sqrt{\ln(F)}\right)b^{-\frac{3}{2}}\right)\frac{1}{\sqrt{-b}}(\ln(F))^{-\frac{3}{2}}$$

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*e
xp(b*ln(F)*x)-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 = 0.821597, size = 73, normalized size = 1.18

$$\frac{1}{2}F^{a}\left(\frac{2F^{bx}\sqrt{x}}{b\log(F)}-\frac{\sqrt{\pi}\,\text{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)}{\sqrt{-b\log(F)}b\log(F)}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*F^a*(2*F^(b*x)*sqrt(x)/(b*log(F)) - sqrt(pi)*erf(sqrt(-b*log(
F))*sqrt(x))/(sqrt(-b*log(F))*b*log(F)))
```

Fricas [A] time = 0.276362, size = 74, normalized size = 1.19

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int F^{a+bx}\sqrt{x}\,dx$$

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)
```

GIAC/XCAS [A] time = 0.267026, size = 81, normalized size = 1.31

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

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*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]])/(Sqrt[b]*Sqrt[L
og[F]])
```

Rubi [A] time = 0.0436502, antiderivative size = 38, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154

$$\frac{\sqrt{\pi}F^a\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{\sqrt{b}\sqrt{\log(F)}}$$

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[L
og[F]])
```

Rubi in Sympy [A] time = 5.11173, size = 37, normalized size = 0.97

$$\frac{\sqrt{\pi}F^a\,\text{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log\left(F\right)}\right)}{\sqrt{b}\sqrt{\log\left(F\right)}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a)/x**(1/2),x)
```

```
[Out] sqrt(pi)*F**a*erfi(sqrt(b)*sqrt(x)*sqrt(log(F)))/(sqrt(b)*sqrt(lo
g(F)))
```

Mathematica [A] time = 0.00747896, size = 38, normalized size = 1.

$$\frac{\sqrt{\pi}F^a\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{\sqrt{b}\sqrt{\log(F)}}$$

Antiderivative was successfully verified.

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

```
[Out] (F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]])/(Sqrt[b]*Sqrt[L
og[F]])
```

Maple [A] time = 0.019, size = 27, normalized size = 0.7

$$F^a\sqrt{\pi}\,\mathit{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\ln(F)}\right)\frac{1}{\sqrt{b}}\frac{1}{\sqrt{\ln(F)}}$$

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 = 0.796128, size = 35, normalized size = 0.92

$$\frac{\sqrt{\pi}F^a\,\text{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)}{\sqrt{-b\log(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] sqrt(pi)*F^a*erf(sqrt(-b*log(F))*sqrt(x))/sqrt(-b*log(F))
```

Fricas [A] time = 0.269375, size = 35, normalized size = 0.92

$$\frac{\sqrt{\pi}F^a\,\text{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)}{\sqrt{-b\log(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] sqrt(pi)*F^a*erf(sqrt(-b*log(F))*sqrt(x))/sqrt(-b*log(F))
```

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

$$\int \frac{F^{a+bx}}{\sqrt{x}}\, dx$$

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)
```

GIAC/XCAS [A] time = 0.257126, size = 41, normalized size = 1.08

$$-\frac{\sqrt{\pi}\,\operatorname{erf}\left(-\sqrt{-b\ln(F)}\sqrt{x}\right)e^{(a\ln(F))}}{\sqrt{-b\ln(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -sqrt(pi)*erf(-sqrt(-b*ln(F))*sqrt(x))*e^(a*ln(F))/sqrt(-b*ln(F))
```

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^(a + b*x))/Sqrt[x] + 2*Sqrt[b]*F^a*Sqrt[Pi]*Erfi[Sqrt[b]*Sq
rt[x]*Sqrt[Log[F]]]*Sqrt[Log[F]]
```

Rubi [A] time = 0.0766526, antiderivative size = 54, normalized size of antiderivative = 1., number of steps used = 3, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231

$$2\sqrt{\pi}\sqrt{b}F^a\sqrt{\log(F)}\mathrm{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)-\frac{2F^{a+bx}}{\sqrt{x}}$$

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]*Sq
rt[x]*Sqrt[Log[F]]]*Sqrt[Log[F]]
```

Rubi in Sympy [A] time = 8.2138, size = 53, normalized size = 0.98

$$2\sqrt{\pi}F^a\sqrt{b}\sqrt{\log(F)}\,\mathrm{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)-\frac{2F^{a+bx}}{\sqrt{x}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a)/x**(3/2),x)
```

```
[Out] 2*sqrt(pi)*F**a*sqrt(b)*sqrt(log(F))*erfi(sqrt(b)*sqrt(x)*sqrt(lo
g(F))) - 2*F**(a + b*x)/sqrt(x)
```

Mathematica [A] time = 0.0324719, size = 54, normalized size = 1.

$$2\sqrt{\pi}\sqrt{b}F^a\sqrt{\log(F)}\mathrm{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)-\frac{2F^{a+bx}}{\sqrt{x}}$$

Antiderivative was successfully verified.

```
[In]  Integrate[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]*Sq
rt[x]*Sqrt[Log[F]]]*Sqrt[Log[F]]
```

Maple [A] time = 0.017, size = 64, normalized size = 1.2

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

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*ln(F)*x)+2/(-b)^(1/2)*b^(1/2)*Pi^(1/2)*erfi(b^(1/2)*x^(1/2)
*ln(F)^(1/2)))
```

Maxima [A] time = 0.851139, size = 32, normalized size = 0.59

$$-\frac{\sqrt{-bx\log(F)}F^{a}\left(-\frac{1}{2},-bx\log(F)\right)}{\sqrt{x}}$$

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)
```

Fricas [A] time = 0.2682, size = 73, normalized size = 1.35

$$\frac{2\left(\sqrt{\pi}F^{a}b\sqrt{x}\,\mathrm{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)\log(F)-\sqrt{-b\log(F)}F^{bx+a}\right)}{\sqrt{-b\log(F)}\sqrt{x}}$$

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)*F^a*b*sqrt(x)*erf(sqrt(-b*log(F))*sqrt(x))*log(F) - s
qrt(-b*log(F))*F^(b*x + a))/(sqrt(-b*log(F))*sqrt(x))
```

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

$$\int \frac{F^{a+bx}}{x^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{F^{bx+a}}{x^{\frac{3}{2}}}\,dx$$

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)
```

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*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]]]*L
og[F]^(3/2))/3
```

Rubi [A] time = 0.106497, antiderivative size = 77, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231

$$\frac{4}{3}\sqrt{\pi}b^{3/2}F^a\log^{\frac{3}{2}}(F)\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)-\frac{2F^{a+bx}}{3x^{3/2}}-\frac{4b\log(F)F^{a+bx}}{3\sqrt{x}}$$

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]]]*L
og[F]^(3/2))/3
```

Rubi in Sympy [A] time = 11.7905, size = 76, normalized size = 0.99

$$\frac{4\sqrt{\pi}F^a b^{\frac{3}{2}}\log(F)^{\frac{3}{2}}\operatorname{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{3}-\frac{4F^{a+bx}b\log(F)}{3\sqrt{x}}-\frac{2F^{a+bx}}{3x^{\frac{3}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a)/x**(5/2),x)
```

```
[Out] 4*sqrt(pi)*F**a*b**(3/2)*log(F)**(3/2)*erfi(sqrt(b)*sqrt(x)*sqrt(
log(F)))/3 - 4*F**(a + b*x)*b*log(F)/(3*sqrt(x)) - 2*F**(a + b*x)
/(3*x**(3/2))
```

Mathematica [A] time = 0.0651847, size = 64, normalized size = 0.83

$$\frac{2}{3}F^a\left(2\sqrt{\pi}b^{3/2}\log^{\frac{3}{2}}(F)\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)-\frac{F^{bx}(2bx\log(F)+1)}{x^{3/2}}\right)$$

Antiderivative was successfully verified.

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

```
[Out] (2*F^a*(2*b^(3/2)*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]]*Log
[F]^(3/2) - (F^(b*x)*(1 + 2*b*x*Log[F]))/x^(3/2)))/3
```

Maple [A] time = 0.019, size = 72, normalized size = 0.9

$$-\frac{F^a}{b}(-b)^{\frac{5}{2}}(\ln(F))^{\frac{3}{2}}\left(-\frac{(4b\ln(F)x+2)\,e^{b\ln(F)x}}{3}x^{-\frac{3}{2}}(-b)^{-\frac{3}{2}}(\ln(F))^{-\frac{3}{2}}+\frac{4\sqrt{\pi}}{3}b^{\frac{3}{2}}\mathit{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\ln(F)}\right)(-b)^{-\frac{3}{2}}\right)$$

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*ln(F)*x+1)*exp(b*ln(F)*x)+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 = 0.836279, size = 32, normalized size = 0.42

$$-\frac{(-bx\log(F))^{\frac{3}{2}}F^a\left(-\frac{3}{2},-bx\log(F)\right)}{x^{\frac{3}{2}}}$$

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)
```

Fricas [A] time = 0.276743, size = 90, normalized size = 1.17

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 2/3*(2*sqrt(pi)*F^a*b^2*x^(3/2)*erf(sqrt(-b*log(F))*sqrt(x))*log(
F)^2 - (2*b*x*log(F) + 1)*sqrt(-b*log(F))*F^(b*x + a))/(sqrt(-b*l
og(F))*x^(3/2))
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{F^{bx+a}}{x^{\frac{5}{2}}}\,dx$$

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)
```

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*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
```

Rubi [A] time = 0.139042, antiderivative size = 100, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231

$$\frac{8}{15}\sqrt{\pi}b^{5/2}F^a\log^{\frac{5}{2}}(F)\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)-\frac{8b^2\log^2(F)F^{a+bx}}{15\sqrt{x}}-\frac{2F^{a+bx}}{5x^{5/2}}-\frac{4b\log(F)F^{a+bx}}{15x^{3/2}}$$

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
```

Rubi in Sympy [A] time = 15.7628, size = 100, normalized size = 1.

$$\frac{8\sqrt{\pi}F^ab^{\frac{5}{2}}\log(F)^{\frac{5}{2}}\operatorname{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{15}-\frac{8F^{a+bx}b^2\log(F)^2}{15\sqrt{x}}-\frac{4F^{a+bx}b\log(F)}{15x^{\frac{3}{2}}}-\frac{2F^{a+bx}}{5x^{\frac{5}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a)/x**(7/2),x)
```

```
[Out] 8*sqrt(pi)*F**a*b**(5/2)*log(F)**(5/2)*erfi(sqrt(b)*sqrt(x)*sqrt(
log(F)))/15 - 8*F**(a + b*x)*b**2*log(F)**2/(15*sqrt(x)) - 4*F**(
a + b*x)*b*log(F)/(15*x**(3/2)) - 2*F**(a + b*x)/(5*x**(5/2))
```

Mathematica [A] time = 0.079998, size = 76, normalized size = 0.76

$$\frac{2}{15}F^a\left(4\sqrt{\pi}b^{5/2}\log^{\frac{5}{2}}(F)\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)-\frac{F^{bx}\left(4b^2x^2\log^2(F)+2bx\log(F)+3\right)}{x^{5/2}}\right)$$

Antiderivative was successfully verified.

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

```
[Out] (2*F^a*(4*b^(5/2)*Sqrt[Pi]*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Log[F]]]*Log
[F]^(5/2) - (F^(b*x)*(3 + 2*b*x*Log[F] + 4*b^2*x^2*Log[F]^2))/x^(
5/2)))/15
```

Maple [A] time = 0.02, size = 84, normalized size = 0.8

$$-\frac{F^a}{b}(-b)^{\frac{7}{2}}(\ln(F))^{\frac{5}{2}}\left(-\frac{2\,\mathrm{e}^{b\ln(F)x}}{5}\left(\frac{4\,b^2x^2(\ln(F))^2}{3}+\frac{2\,b\ln(F)\,x}{3}+1\right)x^{-\frac{5}{2}}(-b)^{-\frac{5}{2}}(\ln(F))^{-\frac{5}{2}}+\frac{8\sqrt{\pi}}{15}b^{\frac{5}{2}}\mathit{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\ln(F)}\right)(-$$

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*ln(F)*x+1)*exp(b*ln(F)*x)+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 = 0.836354, size = 32, normalized size = 0.32

$$-\frac{(-bx\log(F))^{\frac{5}{2}}F^a\left(-\frac{5}{2},-bx\log(F)\right)}{x^{\frac{5}{2}}}$$

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)
```

Fricas [A] time = 0.270217, size = 107, normalized size = 1.07

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

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 2/15*(4*sqrt(pi)*F^a*b^3*x^(5/2)*erf(sqrt(-b*log(F))*sqrt(x))*log
(F)^3 - (4*b^2*x^2*log(F)^2 + 2*b*x*log(F) + 3)*sqrt(-b*log(F))*F
^(b*x + a))/(sqrt(-b*log(F))*x^(5/2))
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{F^{bx+a}}{x^{\frac{7}{2}}}\,dx$$

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)
```

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*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[Sqr
t[b]*Sqrt[x]*Sqrt[Log[F]]]*Log[F]^(7/2))/105
```

Rubi [A] time = 0.175157, antiderivative size = 123, normalized size of antiderivative = 1., number of steps used = 6, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231

$$\frac{16}{105}\sqrt{\pi}b^{7/2}F^a\log^{\frac{7}{2}}(F)\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)-\frac{16b^3\log^3(F)F^{a+bx}}{105\sqrt{x}}-\frac{8b^2\log^2(F)F^{a+bx}}{105x^{3/2}}-\frac{2F^{a+bx}}{7x^{7/2}}-\frac{4b\log(F)F^{a+bx}}{35x^{5/2}}$$

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[Sqr
t[b]*Sqrt[x]*Sqrt[Log[F]]]*Log[F]^(7/2))/105
```

Rubi in Sympy [A] time = 20.7114, size = 124, normalized size = 1.01

$$\frac{16\sqrt{\pi}F^ab^{\frac{7}{2}}\log(F)^{\frac{7}{2}}\operatorname{erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)}{105}-\frac{16F^{a+bx}b^3\log(F)^3}{105\sqrt{x}}-\frac{8F^{a+bx}b^2\log(F)^2}{105x^{\frac{3}{2}}}-\frac{4F^{a+bx}b\log(F)}{35x^{\frac{5}{2}}}-\frac{2F^{a+bx}}{7x^{\frac{7}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(b*x+a)/x**(9/2),x)
```

```
[Out] 16*sqrt(pi)*F**a*b**(7/2)*log(F)**(7/2)*erfi(sqrt(b)*sqrt(x)*sqrt
(log(F)))/105 - 16*F**(a + b*x)*b**3*log(F)**3/(105*sqrt(x)) - 8*
F**(a + b*x)*b**2*log(F)**2/(105*x**(3/2)) - 4*F**(a + b*x)*b*log
(F)/(35*x**(5/2)) - 2*F**(a + b*x)/(7*x**(7/2))
```

Mathematica [A] time = 0.053314, size = 92, normalized size = 0.75

$$-\frac{2F^a\left(F^{bx}\left(8b^3x^3\log^3(F)+4b^2x^2\log^2(F)+6bx\log(F)+15\right)-8\sqrt{\pi}b^{7/2}x^{7/2}\log^{\frac{7}{2}}(F)\text{Erfi}\left(\sqrt{b}\sqrt{x}\sqrt{\log(F)}\right)\right)}{105x^{7/2}}$$

Antiderivative was successfully verified.

```
[In]  Integrate[F^(a + b*x)/x^(9/2),x]
```

```
[Out] (-2*F^a*(-8*b^(7/2)*Sqrt[Pi]*x^(7/2)*Erfi[Sqrt[b]*Sqrt[x]*Sqrt[Lo
g[F]]]*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))
```

Maple [A] time = 0.02, size = 96, normalized size = 0.8

$$-\frac{F^a}{b}(-b)^{\frac{9}{2}}(\ln(F))^{\frac{7}{2}}\left(-\frac{2\,e^{b\ln(F)x}}{7}\left(\frac{8\,b^3x^3(\ln(F))^3}{15}+\frac{4\,b^2x^2(\ln(F))^2}{15}+\frac{2\,b\ln(F)\,x}{5}+1\right)x^{-\frac{7}{2}}(-b)^{-\frac{7}{2}}(\ln(F))^{-\frac{7}{2}}+\frac{16\sqrt{\pi}}{105}b^{\frac{7}{2}}erfi$$

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*ln(F)*x+1)*exp
(b*ln(F)*x)+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 = 0.837909, size = 32, normalized size = 0.26

$$-\frac{(-bx\log(F))^{\frac{7}{2}}F^a\left(-\frac{7}{2},-bx\log(F)\right)}{x^{\frac{7}{2}}}$$

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)
```

Fricas [A] time = 0.269327, size = 123, normalized size = 1.

$$\frac{2\left(8\sqrt{\pi}F^{a}b^{4}x^{\frac{7}{2}}\operatorname{erf}\left(\sqrt{-b\log(F)}\sqrt{x}\right)\log(F)^{4}-\left(8b^{3}x^{3}\log(F)^{3}+4b^{2}x^{2}\log(F)^{2}+6bx\log(F)+15\right)\sqrt{-b\log(F)}F^{bx+a}\right)}{105\sqrt{-b\log(F)}x^{\frac{7}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^(b*x + a)/x^(9/2),x, algorithm="fricas")
```

```
[Out] 2/105*(8*sqrt(pi)*F^a*b^4*x^(7/2)*erf(sqrt(-b*log(F))*sqrt(x))*lo
g(F)^4 - (8*b^3*x^3*log(F)^3 + 4*b^2*x^2*log(F)^2 + 6*b*x*log(F)
+ 15)*sqrt(-b*log(F))*F^(b*x + a))/(sqrt(-b*log(F))*x^(7/2))
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{F^{bx+a}}{x^{\frac{9}{2}}}\,dx$$

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)
```

3.39 $\int F^{c(a+bx)}(d+ex)^{7/2}\,dx$

Optimal. Leaf size=208

$$\frac{105\sqrt{\pi}e^{7/2}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{16b^{9/2}c^{9/2}\log^{\frac{9}{2}}(F)}-\frac{105e^3\sqrt{d+ex}F^{c(a+bx)}}{8b^4c^4\log^4(F)}+\frac{35e^2(d+ex)^{3/2}F^{c(a+bx)}}{4b^3c^3\log^3(F)}-\frac{7e(d+ex)^{5/2}F^{c(a+bx)}}{2b^2c^2\log^2(F)}+\frac{(d+ex)^{7/2}F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] (105*e^(7/2)*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[c]*S
qrt[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])
```

Rubi [A] time = 0.445157, antiderivative size = 208, normalized size of antiderivative = 1., number of steps used = 6, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}} = 0.158$

$$\frac{105\sqrt{\pi}e^{7/2}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{16b^{9/2}c^{9/2}\log^{\frac{9}{2}}(F)}-\frac{105e^3\sqrt{d+ex}F^{c(a+bx)}}{8b^4c^4\log^4(F)}+\frac{35e^2(d+ex)^{3/2}F^{c(a+bx)}}{4b^3c^3\log^3(F)}-\frac{7e(d+ex)^{5/2}F^{c(a+bx)}}{2b^2c^2\log^2(F)}+\frac{(d+ex)^{7/2}F^{c(a+bx)}}{bc\log(F)}$$

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]*S
qrt[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])
```

Rubi in Sympy [A] time = 61.8135, size = 202, normalized size = 0.97

$$\frac{F^{c(a+bx)}(d+ex)^{\frac{7}{2}}}{bc\log(F)}-\frac{7F^{c(a+bx)}e(d+ex)^{\frac{5}{2}}}{2b^2c^2\log(F)^2}+\frac{35F^{c(a+bx)}e^2(d+ex)^{\frac{3}{2}}}{4b^3c^3\log(F)^3}-\frac{105F^{c(a+bx)}e^3\sqrt{d+ex}}{8b^4c^4\log(F)^4}+\frac{105\sqrt{\pi}F^{\frac{c(ae-bd)}{e}}e^{\frac{7}{2}}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)}{16b^{\frac{9}{2}}c^{\frac{9}{2}}\log(F)^{\frac{9}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(c*(b*x+a))*(e*x+d)**(7/2),x)
```

```
[Out] F**(c*(a + b*x))*(d + e*x)**(7/2)/(b*c*log(F)) - 7*F**(c*(a + b*x
))*e*(d + e*x)**(5/2)/(2*b**2*c**2*log(F)**2) + 35*F**(c*(a + b*x
))*e**2*(d + e*x)**(3/2)/(4*b**3*c**3*log(F)**3) - 105*F**(c*(a +
 b*x))*e**3*sqrt(d + e*x)/(8*b**4*c**4*log(F)**4) + 105*sqrt(pi)*
F**(c*(a*e - b*d)/e)*e**(7/2)*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))
```

Mathematica [A] time = 0.779436, size = 239, normalized size = 1.15

$$\frac{F^{c\left(a-\frac{bd}{e}\right)}\left(16b^4c^4\log^4(F)(d+ex)^4F^{\frac{bc(d+ex)}{e}}-56b^3c^3e\log^3(F)(d+ex)^3F^{\frac{bc(d+ex)}{e}}+140b^2c^2e^2\log^2(F)(d+ex)^2F^{\frac{bc(d+ex)}{e}}-105\sqrt{\cdots}\right.}{16b^5c^5\log^5(F)\sqrt{d+\cdots}}$$

Antiderivative was successfully verified.

```
[In]  Integrate[F^(c*(a + b*x))*(d + e*x)^(7/2),x]
```

```
[Out] (F^(c*(a - (b*d)/e))*(-210*b*c*e^3*F^((b*c*(d + e*x))/e)*(d + e*x
)*Log[F] + 140*b^2*c^2*e^2*F^((b*c*(d + e*x))/e)*(d + e*x)^2*Log[
F]^2 - 56*b^3*c^3*e*F^((b*c*(d + e*x))/e)*(d + e*x)^3*Log[F]^3 +
16*b^4*c^4*F^((b*c*(d + e*x))/e)*(d + e*x)^4*Log[F]^4 + 105*e^4*S
qrt[Pi]*Sqrt[-((b*c*(d + e*x)*Log[F])/e)] - 105*e^4*Sqrt[Pi]*Erf[
Sqrt[-((b*c*(d + e*x)*Log[F])/e)]]*Sqrt[-((b*c*(d + e*x)*Log[F])/
e)]))/(16*b^5*c^5*Sqrt[d + e*x]*Log[F]^5)
```

Maple [F] time = 0.026, size = 0, normalized size = 0.

$$\int F^{c(bx+a)}(ex+d)^{\frac{7}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(F^(c*(b*x+a))*(e*x+d)^(7/2),x)
```

```
[Out] int(F^(c*(b*x+a))*(e*x+d)^(7/2),x)
```

Maxima [A] time = 0.821356, size = 240, normalized size = 1.15

$$\frac{F^{ac}\left(\frac{105\,\sqrt{\pi}e^{4}\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{\sqrt{-\frac{bc\log(F)}{e}}F^{\frac{bcd}{e}}b^{4}c^{4}\log(F)^{4}}+\frac{2\left(8\,(ex+d)^{\frac{7}{2}}b^{3}c^{3}e\log(F)^{3}-28\,(ex+d)^{\frac{5}{2}}b^{2}c^{2}e^{2}\log(F)^{2}+70\,(ex+d)^{\frac{3}{2}}bce^{3}\log(F)-105\,\sqrt{ex+d}e^{4}\right)F^{\frac{(ex+d)bc}{e}}}{F^{\frac{bcd}{e}}b^{4}c^{4}\log(F)^{4}}\right)}{16\,e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((e*x + d)^(7/2)*F^((b*x + a)*c),x, algorithm="maxima")
```

```
[Out] 1/16*F^(a*c)*(105*sqrt(pi)*e^4*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)
/e))/(sqrt(-b*c*log(F)/e)*F^(b*c*d/e)*b^4*c^4*log(F)^4) + 2*(8*(e
*x + d)^(7/2)*b^3*c^3*e*log(F)^3 - 28*(e*x + d)^(5/2)*b^2*c^2*e^2
*log(F)^2 + 70*(e*x + d)^(3/2)*b*c*e^3*log(F) - 105*sqrt(e*x + d)
*e^4)*F^((e*x + d)*b*c/e)/(F^(b*c*d/e)*b^4*c^4*log(F)^4))/e
```

Fricas [A] time = 0.30967, size = 306, normalized size = 1.47

$$\frac{\frac{105\,\sqrt{\pi}e^{3}\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{F^{\frac{bcd-ace}{e}}}+2\left(8\left(b^{3}c^{3}e^{3}x^{3}+3\,b^{3}c^{3}de^{2}x^{2}+3\,b^{3}c^{3}d^{2}ex+b^{3}c^{3}d^{3}\right)\log\left(F\right)^{3}-105\,e^{3}-28\left(b^{2}c^{2}e^{3}x^{2}+2\,b^{2}c^{2}d\right.\right.}{16\,\sqrt{-\frac{bc\log(F)}{e}}b^{4}c^{4}\log\left(F\right)^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((e*x + d)^(7/2)*F^((b*x + a)*c),x, algorithm="fricas")
```

```
[Out] 1/16*(105*sqrt(pi)*e^3*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/e))/F^(
(b*c*d - a*c*e)/e) + 2*(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 - 105*e^3 - 28*(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 + 70*(b*
c*e^3*x + b*c*d*e^2)*log(F))*sqrt(e*x + d)*sqrt(-b*c*log(F)/e)*F^
(b*c*x + a*c))/(sqrt(-b*c*log(F)/e)*b^4*c^4*log(F)^4)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [A] time = 0.29598, size = 1, normalized size = 0.

Done

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((e*x + d)^(7/2)*F^((b*x + a)*c),x, algorithm="giac")
```

```
[Out] Done
```

3.40 $\int F^{c(a+bx)}(d+ex)^{5/2}\,dx$

Optimal. Leaf size=173

$$-\frac{15\sqrt{\pi}e^{5/2}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{8b^{7/2}c^{7/2}\log^{\frac{7}{2}}(F)}+\frac{15e^2\sqrt{d+ex}F^{c(a+bx)}}{4b^3c^3\log^3(F)}-\frac{5e(d+ex)^{3/2}F^{c(a+bx)}}{2b^2c^2\log^2(F)}+\frac{(d+ex)^{5/2}F^{c(a+bx)}}{bc\log(F)}$$

```
[Out] (-15*e^(5/2)*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[c]*S
qrt[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*Log[F])
```

Rubi [A] time = 0.262062, antiderivative size = 173, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}} = 0.158$

$$-\frac{15\sqrt{\pi}e^{5/2}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{8b^{7/2}c^{7/2}\log^{\frac{7}{2}}(F)}+\frac{15e^2\sqrt{d+ex}F^{c(a+bx)}}{4b^3c^3\log^3(F)}-\frac{5e(d+ex)^{3/2}F^{c(a+bx)}}{2b^2c^2\log^2(F)}+\frac{(d+ex)^{5/2}F^{c(a+bx)}}{bc\log(F)}$$

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]*S
qrt[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*Log[F])
```

Rubi in Sympy [A] time = 45.0367, size = 167, normalized size = 0.97

$$\frac{F^{c(a+bx)}\left(d+ex\right)^{\frac{5}{2}}}{bc\log\left(F\right)}-\frac{5F^{c(a+bx)}e\left(d+ex\right)^{\frac{3}{2}}}{2b^2c^2\log\left(F\right)^2}+\frac{15F^{c(a+bx)}e^2\sqrt{d+ex}}{4b^3c^3\log\left(F\right)^3}-\frac{15\sqrt{\pi}F^{\frac{c(ae-bd)}{e}}e^{\frac{5}{2}}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log\left(F\right)}}{\sqrt{e}}\right)}{8b^{\frac{7}{2}}c^{\frac{7}{2}}\log\left(F\right)^{\frac{7}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(c*(b*x+a))*(e*x+d)**(5/2),x)
```

```
[Out] F**(c*(a + b*x))*(d + e*x)**(5/2)/(b*c*log(F)) - 5*F**(c*(a + b*x
))*e*(d + e*x)**(3/2)/(2*b**2*c**2*log(F)**2) + 15*F**(c*(a + b*x
))*e**2*sqrt(d + e*x)/(4*b**3*c**3*log(F)**3) - 15*sqrt(pi)*F**(c
*(a*e - b*d)/e)*e**(5/2)*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))
```

Mathematica [A] time = 0.438615, size = 204, normalized size = 1.18

$$\frac{F^{c\left(a-\frac{bd}{e}\right)}\left(8b^3c^3\log^3(F)(d+ex)^3F^{\frac{bc(d+ex)}{e}}-20b^2c^2e\log^2(F)(d+ex)^2F^{\frac{bc(d+ex)}{e}}+15\sqrt{\pi}e^3\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\text{Erf}\left(\sqrt{-\frac{bc\log(F)(d+\cdots}{e}}\right.\right.}{8b^4c^4\log^4(F)\sqrt{d+ex}}$$

Antiderivative was successfully verified.

```
[In]  Integrate[F^(c*(a + b*x))*(d + e*x)^(5/2),x]
```

```
[Out] (F^(c*(a - (b*d)/e))*(30*b*c*e^2*F^((b*c*(d + e*x))/e)*(d + e*x)*
Log[F] - 20*b^2*c^2*e*F^((b*c*(d + e*x))/e)*(d + e*x)^2*Log[F]^2
+ 8*b^3*c^3*F^((b*c*(d + e*x))/e)*(d + e*x)^3*Log[F]^3 - 15*e^3*S
qrt[Pi]*Sqrt[-((b*c*(d + e*x)*Log[F])/e)] + 15*e^3*Sqrt[Pi]*Erf[S
qrt[-((b*c*(d + e*x)*Log[F])/e)]]*Sqrt[-((b*c*(d + e*x)*Log[F])/e
)]))/(8*b^4*c^4*Sqrt[d + e*x]*Log[F]^4)
```

Maple [F] time = 0.027, size = 0, normalized size = 0.

$$\int F^{c(bx+a)}\,(ex+d)^{\frac{5}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(F^(c*(b*x+a))*(e*x+d)^(5/2),x)
```

```
[Out] int(F^(c*(b*x+a))*(e*x+d)^(5/2),x)
```

Maxima [A] time = 0.834722, size = 211, normalized size = 1.22

$$-\frac{F^{ac}\left(\frac{15\sqrt{\pi}e^3\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{\sqrt{-\frac{bc\log(F)}{e}}F^{\frac{bcd}{e}}b^3c^3\log(F)^3}-\frac{2\left(4\,(ex+d)^{\frac{5}{2}}b^2c^2e\log(F)^2-10\,(ex+d)^{\frac{3}{2}}bce^2\log(F)+15\sqrt{ex+d}e^3\right)F^{\frac{(ex+d)bc}{e}}}{F^{\frac{bcd}{e}}b^3c^3\log(F)^3}\right)}{8\,e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((e*x + d)^(5/2)*F^((b*x + a)*c),x, algorithm="maxima")
```

```
[Out] -1/8*F^(a*c)*(15*sqrt(pi)*e^3*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/
e))/(sqrt(-b*c*log(F)/e)*F^(b*c*d/e)*b^3*c^3*log(F)^3) - 2*(4*(e*
x + d)^(5/2)*b^2*c^2*e*log(F)^2 - 10*(e*x + d)^(3/2)*b*c*e^2*log(
F) + 15*sqrt(e*x + d)*e^3)*F^((e*x + d)*b*c/e)/(F^(b*c*d/e)*b^3*c
^3*log(F)^3))/e
```

Fricas [A] time = 0.268556, size = 221, normalized size = 1.28

$$\frac{2\left(4\left(b^2c^2e^2x^2+2\,b^2c^2dex+b^2c^2d^2\right)\log\left(F\right)^2+15\,e^2-10\left(bce^2x+bcde\right)\log\left(F\right)\right)\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}F^{bcx+ac}-\frac{15\sqrt{\pi}e^2\operatorname{erf}\left(\sqrt{\cdots}\right)}{F^{\frac{b\cdots}{\cdots}}}}{8\sqrt{-\frac{bc\log(F)}{e}}b^3c^3\log\left(F\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((e*x + d)^(5/2)*F^((b*x + a)*c),x, algorithm="fricas")
```

```
[Out] 1/8*(2*(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 + 15*e^2 - 10*(b*c*e^2*x + b*c*d*e)*log(F))*sqrt(e*x + d)*sqr
t(-b*c*log(F)/e)*F^(b*c*x + a*c) - 15*sqrt(pi)*e^2*erf(sqrt(e*x +
 d)*sqrt(-b*c*log(F)/e))/F^((b*c*d - a*c*e)/e))/(sqrt(-b*c*log(F)
/e)*b^3*c^3*log(F)^3)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [A] time = 0.264259, size = 779, normalized size = 4.5

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((e*x + d)^(5/2)*F^((b*x + a)*c),x, algorithm="giac")
```

```
[Out] 1/8*(4*d^2*(sqrt(pi)*erf(-sqrt(-b*c*e*ln(F))*sqrt(x*e + d)*e^(-1)
)*e^(-(b*c*d*ln(F) - a*c*e*ln(F))*e^(-1) + 2)/(sqrt(-b*c*e*ln(F))
*b*c*ln(F)) + 2*sqrt(x*e + d)*e^(((x*e + d)*b*c*ln(F) - b*c*d*ln(
F) + a*c*e*ln(F))*e^(-1) + 1)/(b*c*ln(F))) - 4*d*(sqrt(pi)*(2*b*c
*d*e*ln(F) + 3*e^2)*erf(-sqrt(-b*c*e*ln(F))*sqrt(x*e + d)*e^(-1))
*e^(-(b*c*d*ln(F) - a*c*e*ln(F))*e^(-1) + 1)/(sqrt(-b*c*e*ln(F))*
b^2*c^2*ln(F)^2) - 2*(2*(x*e + d)^(3/2)*b*c*e*ln(F) - 2*sqrt(x*e
+ d)*b*c*d*e*ln(F) - 3*sqrt(x*e + d)*e^2)*e^(((x*e + d)*b*c*ln(F)
 - b*c*d*ln(F) + a*c*e*ln(F))*e^(-1))/(b^2*c^2*ln(F)^2)) + (sqrt(
pi)*(4*b^2*c^2*d^2*e*ln(F)^2 + 12*b*c*d*e^2*ln(F) + 15*e^3)*erf(-
sqrt(-b*c*e*ln(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*c*d*ln(F) - a*c*e
*ln(F) + 2*e)*e^(-1) + 1)/(sqrt(-b*c*e*ln(F))*b^3*c^3*ln(F)^3) +
2*(4*(x*e + d)^(5/2)*b^2*c^2*e*ln(F)^2 - 8*(x*e + d)^(3/2)*b^2*c^
2*d*e*ln(F)^2 + 4*sqrt(x*e + d)*b^2*c^2*d^2*e*ln(F)^2 - 10*(x*e +
 d)^(3/2)*b*c*e^2*ln(F) + 12*sqrt(x*e + d)*b*c*d*e^2*ln(F) + 15*s
qrt(x*e + d)*e^3)*e^(((x*e + d)*b*c*ln(F) - b*c*d*ln(F) + a*c*e*l
n(F) - 2*e)*e^(-1))/(b^3*c^3*ln(F)^3))*e^2)*e^(-1)
```

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] (3*e^(3/2)*F^(c*(a - (b*d)/e))*Sqrt[Pi]*Erfi[(Sqrt[b]*Sqrt[c]*Sqr
t[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])
```

Rubi [A] time = 0.19832, antiderivative size = 138, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158

$$\frac{3\sqrt{\pi}e^{3/2}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{4b^{5/2}c^{5/2}\log^{\frac{5}{2}}(F)}-\frac{3e\sqrt{d+ex}F^{c(a+bx)}}{2b^2c^2\log^2(F)}+\frac{(d+ex)^{3/2}F^{c(a+bx)}}{bc\log(F)}$$

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]*Sqr
t[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])
```

Rubi in Sympy [A] time = 31.8156, size = 131, normalized size = 0.95

$$\frac{F^{c(a+bx)}\left(d+ex\right)^{\frac{3}{2}}}{bc\log\left(F\right)}-\frac{3F^{c(a+bx)}e\sqrt{d+ex}}{2b^2c^2\log\left(F\right)^2}+\frac{3\sqrt{\pi}F^{\frac{c(ae-bd)}{e}}e^{\frac{3}{2}}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log\left(F\right)}}{\sqrt{e}}\right)}{4b^{\frac{5}{2}}c^{\frac{5}{2}}\log\left(F\right)^{\frac{5}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

```
e - b*d)/e)*e**(3/2)*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))
```

Mathematica [A] time = 0.332962, size = 169, normalized size = 1.22

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

Antiderivative was successfully verified.

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

```
[Out] (F^(c*(a - (b*d)/e))*(-6*b*c*e*F^((b*c*(d + e*x))/e)*(d + e*x)*Lo
g[F] + 4*b^2*c^2*F^((b*c*(d + e*x))/e)*(d + e*x)^2*Log[F]^2 + 3*e
^2*Sqrt[Pi]*Sqrt[-((b*c*(d + e*x)*Log[F])/e)] - 3*e^2*Sqrt[Pi]*Er
f[Sqrt[-((b*c*(d + e*x)*Log[F])/e)]]*Sqrt[-((b*c*(d + e*x)*Log[F]
)/e)]))/(4*b^3*c^3*Sqrt[d + e*x]*Log[F]^3)
```

Maple [F] time = 0.026, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.816172, size = 181, normalized size = 1.31

$$\frac{F^{ac}\left(\frac{3\sqrt{\pi}e^2\,\text{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{\sqrt{-\frac{bc\log(F)}{e}}F^{\frac{bcd}{e}}b^2c^2\log(F)^2}+\frac{2\left(2(ex+d)^{\frac{3}{2}}bce\log(F)-3\sqrt{ex+d}e^2\right)F^{\frac{(ex+d)bc}{e}}}{F^{\frac{bcd}{e}}b^2c^2\log(F)^2}\right)}{4e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*F^(a*c)*(3*sqrt(pi)*e^2*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/e)
)/(sqrt(-b*c*log(F)/e)*F^(b*c*d/e)*b^2*c^2*log(F)^2) + 2*(2*(e*x
+ d)^(3/2)*b*c*e*log(F) - 3*sqrt(e*x + d)*e^2)*F^((e*x + d)*b*c/e
)/(F^(b*c*d/e)*b^2*c^2*log(F)^2))/e
```

Fricas [A] time = 0.269744, size = 157, normalized size = 1.14

$$\frac{2\sqrt{ex+d}(2\,(bcex+bcd)\log\left(F\right)-3\,e)\sqrt{-\frac{bc\log(F)}{e}}F^{bcx+ac}+\frac{3\sqrt{\pi}e\,\mathrm{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{F^{\frac{bcd-ace}{e}}}}{4\sqrt{-\frac{bc\log(F)}{e}}b^2c^2\log\left(F\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/4*(2*sqrt(e*x + d)*(2*(b*c*e*x + b*c*d)*log(F) - 3*e)*sqrt(-b*c
*log(F)/e)*F^(b*c*x + a*c) + 3*sqrt(pi)*e*erf(sqrt(e*x + d)*sqrt(
-b*c*log(F)/e))/F^((b*c*d - a*c*e)/e))/(sqrt(-b*c*log(F)/e)*b^2*c
^2*log(F)^2)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Timed out
```

GIAC/XCAS [A] time = 0.259327, size = 408, normalized size = 2.96

$$\frac{1}{4}\left(2\,d\left(\frac{\sqrt{\pi}\,\mathrm{erf}\left(-\sqrt{-bce\ln\left(F\right)}\sqrt{xe+d}e^{(-1)}\right)e^{\left(-(bcd\ln(F)-ace\ln(F))e^{(-1)}+2\right)}}{\sqrt{-bce\ln\left(F\right)}bc\ln\left(F\right)}+\frac{2\sqrt{xe+d}e^{\left(((xe+d)bc\ln(F)-bcd\ln(F)+ace\ln(F))e^{(-1)}+1\right)}}{bc\ln\left(F\right)}\right)\right.$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.42 $\int F^{c(a+bx)}\sqrt{d+ex}\,dx$

Optimal. Leaf size=105

$$\frac{\sqrt{d+ex}F^{c(a+bx)}}{bc\log(F)}-\frac{\sqrt{\pi}\sqrt{e}F^{c\left(a-\frac{bd}{e}\right)}\,\mathrm{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{2b^{3/2}c^{3/2}\log^{\frac{3}{2}}(F)}$$

```
[Out] -(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])
```

Rubi [A] time = 0.137317, antiderivative size = 105, normalized size of antiderivative = 1., number of steps used = 3, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158

$$\frac{\sqrt{d+ex}F^{c(a+bx)}}{bc\log(F)}-\frac{\sqrt{\pi}\sqrt{e}F^{c\left(a-\frac{bd}{e}\right)}\,\mathrm{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{2b^{3/2}c^{3/2}\log^{\frac{3}{2}}(F)}$$

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])
```

Rubi in Sympy [A] time = 20.5824, size = 95, normalized size = 0.9

$$\frac{F^{c(a+bx)}\sqrt{d+ex}}{bc\log(F)}-\frac{\sqrt{\pi}F^{\frac{c(ae-bd)}{e}}\sqrt{e}\,\mathrm{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)}{2b^{\frac{3}{2}}c^{\frac{3}{2}}\log(F)^{\frac{3}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(c*(b*x+a))*(e*x+d)**(1/2),x)
```

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

Mathematica [A] time = 0.18703, size = 108, normalized size = 1.03

$$-\frac{(d+ex)^{3/2}F^{c\left(a-\frac{bd}{e}\right)}\left(F^{\frac{bc(d+ex)}{e}}\sqrt{-\frac{bc\log(F)(d+ex)}{e}}-\frac{1}{2}\sqrt{\pi}\left(\mathrm{Erf}\left(\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\right)-1\right)\right)}{e\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3/2}}$$

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)*(-(Sqrt[Pi]*(-1 + Erf[Sqrt
[-((b*c*(d + e*x)*Log[F])/e)]]))/2 + F^((b*c*(d + e*x))/e)*Sqrt[-
((b*c*(d + e*x)*Log[F])/e)]))/(e*(-((b*c*(d + e*x)*Log[F])/e))^(3
/2)))
```

Maple [F] time = 0.024, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.85139, size = 153, normalized size = 1.46

$$\frac{F^{ac}\left(\frac{2\sqrt{ex+d}F^{\frac{(ex+d)bc}{e}}e}{F^{\frac{bcd}{e}}bc\log(F)}-\frac{\sqrt{\pi}e\,\mathrm{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{\sqrt{-\frac{bc\log(F)}{e}}F^{\frac{bcd}{e}}bc\log(F)}\right)}{2e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*F^(a*c)*(2*sqrt(e*x + d)*F^((e*x + d)*b*c/e)*e/(F^(b*c*d/e)*b
*c*log(F)) - sqrt(pi)*e*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/e))/(s
```

```
qrt(-b*c*log(F)/e)*F^(b*c*d/e)*b*c*log(F)))/e
```

Fricas [A] time = 0.258327, size = 131, normalized size = 1.25

$$\frac{2\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}F^{bcx+ac}-\frac{\sqrt{\pi}\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{F^{\frac{bcd-ace}{e}}}}{2\sqrt{-\frac{bc\log(F)}{e}}bc\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/2*(2*sqrt(e*x + d)*sqrt(-b*c*log(F)/e)*F^(b*c*x + a*c) - sqrt(p
i)*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/e))/F^((b*c*d - a*c*e)/e))/
(sqrt(-b*c*log(F)/e)*b*c*log(F))
```

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

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

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)
```

GIAC/XCAS [A] time = 0.251082, size = 170, normalized size = 1.62

$$\frac{1}{2}\left(\frac{\sqrt{\pi}\operatorname{erf}\left(-\sqrt{-bce\ln(F)}\sqrt{xe+d}e^{(-1)}\right)e^{\left(-(bcd\ln(F)-ace\ln(F))e^{(-1)}+2\right)}}{\sqrt{-bce\ln(F)}bc\ln(F)}+\frac{2\sqrt{xe+d}e^{\left(((xe+d)bc\ln(F)-bcd\ln(F)+ace\ln(F))e^{(-1)}+1\right)}}{bc\ln(F)}\right)e^{(-1)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.43 $\int \frac{F^{c(a+bx)}}{\sqrt{d+ex}}\,dx$

Optimal. Leaf size=72

$$\frac{\sqrt{\pi}F^{c\left(a-\frac{bd}{e}\right)}\text{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{\sqrt{b}\sqrt{c}\sqrt{e}\sqrt{\log(F)}}$$

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

Rubi [A] time = 0.0838435, antiderivative size = 72, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.105

$$\frac{\sqrt{\pi}F^{c\left(a-\frac{bd}{e}\right)}\text{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{\sqrt{b}\sqrt{c}\sqrt{e}\sqrt{\log(F)}}$$

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]])
```

Rubi in Sympy [A] time = 11.9678, size = 70, normalized size = 0.97

$$\frac{\sqrt{\pi}F^{\frac{c(ae-bd)}{e}}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)}{\sqrt{b}\sqrt{c}\sqrt{e}\sqrt{\log(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(c*(b*x+a))/(e*x+d)**(1/2),x)
```

```
[Out] sqrt(pi)*F**(c*(a*e - b*d)/e)*erfi(sqrt(b)*sqrt(c)*sqrt(d + e*x)*
sqrt(log(F))/sqrt(e))/(sqrt(b)*sqrt(c)*sqrt(e)*sqrt(log(F)))
```

Mathematica [A] time = 0.0762999, size = 70, normalized size = 0.97

$$\frac{\sqrt{\pi}\sqrt{d+ex}F^{c\left(a-\frac{bd}{e}\right)}\left(\operatorname{Erf}\left(\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\right)-1\right)}{e\sqrt{-\frac{bc\log(F)(d+ex)}{e}}}$$

Antiderivative was successfully verified.

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

```
[Out] (F^(c*(a - (b*d)/e))*Sqrt[Pi]*Sqrt[d + e*x]*(-1 + Erf[Sqrt[-((b*c
*(d + e*x)*Log[F])/e)]]))/(e*Sqrt[-((b*c*(d + e*x)*Log[F])/e)])
```

Maple [F] time = 0.029, size = 0, normalized size = 0.

$$\int F^{c(bx+a)}\frac{1}{\sqrt{ex+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.861878, size = 70, normalized size = 0.97

$$\frac{\sqrt{\pi}F^{ac-\frac{bcd}{e}}\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{\sqrt{-\frac{bc\log(F)}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.258981, size = 76, normalized size = 1.06

$$\frac{\sqrt{\pi}\operatorname{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)}{\sqrt{-\frac{bc\log(F)}{e}}F^{\frac{bcd-ace}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

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

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)
```

GIAC/XCAS [A] time = 0.25674, size = 78, normalized size = 1.08

$$-\frac{\sqrt{\pi}\operatorname{erf}\left(-\sqrt{-bce\ln(F)}\sqrt{xe+d}e^{(-1)}\right)e^{\left(-(bcd\ln(F)-ace\ln(F))e^{(-1)}\right)}}{\sqrt{-bce\ln(F)}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -sqrt(pi)*erf(-sqrt(-b*c*e*ln(F))*sqrt(x*e + d)*e^(-1))*e^(-(b*c*
d*ln(F) - a*c*e*ln(F))*e^(-1))/sqrt(-b*c*e*ln(F))
```

3.44 $\int \frac{F^{c(a+bx)}}{(d+ex)^{3/2}}\,dx$

Optimal. Leaf size=97

$$\frac{2\sqrt{\pi}\sqrt{b}\sqrt{c}\sqrt{\log(F)}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{e^{3/2}}-\frac{2F^{c(a+bx)}}{e\sqrt{d+ex}}$$

```
[Out] (-2*F^(c*(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]]*Sqrt[Log[F]])/e^(3/2)
```

Rubi [A] time = 0.146311, antiderivative size = 97, normalized size of antiderivative = 1., number of steps used = 3, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158

$$\frac{2\sqrt{\pi}\sqrt{b}\sqrt{c}\sqrt{\log(F)}F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{e^{3/2}}-\frac{2F^{c(a+bx)}}{e\sqrt{d+ex}}$$

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]]*Sqrt[Log[F]])/e^(3/2)
```

Rubi in Sympy [A] time = 19.558, size = 92, normalized size = 0.95

$$-\frac{2F^{c(a+bx)}}{e\sqrt{d+ex}}+\frac{2\sqrt{\pi}F^{\frac{c(ae-bd)}{e}}\sqrt{b}\sqrt{c}\sqrt{\log\left(F\right)}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log\left(F\right)}}{\sqrt{e}}\right)}{e^{\frac{3}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.150211, size = 110, normalized size = 1.13

$$-\frac{F^{ac-\frac{bcd}{e}}\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\left(\frac{2F^{\frac{bc(d+ex)}{e}}}{\sqrt{-\frac{bc\log(F)(d+ex)}{e}}}-2\sqrt{\pi}\left(1-\operatorname{Erf}\left(\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\right)\right)\right)}{e\sqrt{d+ex}}$$

Antiderivative was successfully verified.

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

```
[Out] -((F^(a*c - (b*c*d)/e)*Sqrt[-((b*c*(d + e*x)*Log[F])/e)]*(-2*Sqrt
[Pi]*(1 - Erf[Sqrt[-((b*c*(d + e*x)*Log[F])/e)]]) + (2*F^((b*c*(d
 + e*x))/e))/Sqrt[-((b*c*(d + e*x)*Log[F])/e)]))/(e*Sqrt[d + e*x]
))
```

Maple [F] time = 0.026, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.886623, size = 81, normalized size = 0.84

$$-\frac{\sqrt{-\frac{(ex+d)bc\log(F)}{e}}F^{ac}\left(-\frac{1}{2},-\frac{(ex+d)bc\log(F)}{e}\right)}{\sqrt{ex+d}F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.259238, size = 136, normalized size = 1.4

$$\frac{2\left(\frac{\sqrt{\pi}\sqrt{ex+d}bc\,\mathrm{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)\log(F)}{F^{\frac{bcd-ace}{e}}}-\sqrt{-\frac{bc\log(F)}{e}}F^{bcx+ac}e\right)}{\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}e^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

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

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.45 $\int \frac{F^{c(a+bx)}}{(d+ex)^{5/2}}\,dx$

Optimal. Leaf size=130

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

```
[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]*Erfi[(Sqrt[b]*Sqrt[c]*Sqrt[d + e*x]*Sqrt[Log[F]
])/Sqrt[e]]*Log[F]^(3/2))/(3*e^(5/2))
```

Rubi [A] time = 0.201524, antiderivative size = 130, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158

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

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]*Erfi[(Sqrt[b]*Sqrt[c]*Sqrt[d + e*x]*Sqrt[Log[F]
])/Sqrt[e]]*Log[F]^(3/2))/(3*e^(5/2))
```

Rubi in Sympy [A] time = 28.4258, size = 126, normalized size = 0.97

$$-\frac{4F^{c(a+bx)}bc\log(F)}{3e^2\sqrt{d+ex}}-\frac{2F^{c(a+bx)}}{3e\,(d+ex)^{\frac{3}{2}}}+\frac{4\sqrt{\pi}F^{\frac{c(ae-bd)}{e}}b^{\frac{3}{2}}c^{\frac{3}{2}}\log(F)^{\frac{3}{2}}\,\text{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)}{3e^{\frac{5}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(c*(b*x+a))/(e*x+d)**(5/2),x)
```

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

```
)*b**(3/2)*c**(3/2)*log(F)**(3/2)*erfi(sqrt(b)*sqrt(c)*sqrt(d + e
*x)*sqrt(log(F))/sqrt(e))/(3*e**(5/2))
```

Mathematica [A] time = 0.428486, size = 140, normalized size = 1.08

$$-\frac{2F^{c\left(a-\frac{bd}{e}\right)}\left(-2\sqrt{\pi}e\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{3/2}\mathrm{Erf}\left(\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\right)+eF^{\frac{bc(d+ex)}{e}}+2bc\log(F)(d+ex)\left(F^{\frac{bc(d+ex)}{e}}-\sqrt{\pi}\sqrt{-\frac{bc\log}{}}\right.\right.}{3e^2(d+ex)^{3/2}}$$

Antiderivative was successfully verified.

```
[In]  Integrate[F^(c*(a + b*x))/(d + e*x)^(5/2),x]
```

```
[Out] (-2*F^(c*(a - (b*d)/e))*(e*F^((b*c*(d + e*x))/e) - 2*e*Sqrt[Pi]*E
rf[Sqrt[-((b*c*(d + e*x)*Log[F])/e)]]*(-((b*c*(d + e*x)*Log[F])/e
))^(3/2) + 2*b*c*(d + e*x)*Log[F]*(F^((b*c*(d + e*x))/e) - Sqrt[P
i]*Sqrt[-((b*c*(d + e*x)*Log[F])/e)])))/(3*e^2*(d + e*x)^(3/2))
```

Maple [F] time = 0.026, size = 0, normalized size = 0.

$$\int F^{c(bx+a)}\,(ex+d)^{-\frac{5}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(F^(c*(b*x+a))/(e*x+d)^(5/2),x)
```

```
[Out] int(F^(c*(b*x+a))/(e*x+d)^(5/2),x)
```

Maxima [A] time = 0.883238, size = 81, normalized size = 0.62

$$-\frac{\left(-\frac{(ex+d)bc\log(F)}{e}\right)^{\frac{3}{2}}F^{ac}\left(-\frac{3}{2},-\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)^{\frac{3}{2}}F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(e*x + d)^(5/2),x, algorithm="maxima")
```

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

Fricas [A] time = 0.254141, size = 203, normalized size = 1.56

$$\frac{2\left(\frac{2\sqrt{\pi}\left(b^2c^2ex+b^2c^2d\right)\sqrt{ex+d}\,\mathrm{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)\log(F)^2}{F^{\frac{bcd-ace}{e}}}-\left(e^2+2\left(bce^2x+bcde\right)\log(F)\right)\sqrt{-\frac{bc\log(F)}{e}}F^{bcx+ac}\right)}{3\left(e^4x+de^3\right)\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(e*x + d)^(5/2),x, algorithm="fricas")
```

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

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(e*x + d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(5/2), x)
```

3.46 $\int \frac{F^{c(a+bx)}}{(d+ex)^{7/2}}\,dx$

Optimal. Leaf size=165

$$\frac{8\sqrt{\pi}b^{5/2}c^{5/2}\log^{\frac{5}{2}}(F)F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{15e^{7/2}} - \frac{8b^2c^2\log^2(F)F^{c(a+bx)}}{15e^3\sqrt{d+ex}} - \frac{4bc\log(F)F^{c(a+bx)}}{15e^2(d+ex)^{3/2}} - \frac{2F^{c(a+bx)}}{5e(d+ex)^{5/2}}$$

```
[Out] (-2*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*Sqrt[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))
```

Rubi [A] time = 0.265655, antiderivative size = 165, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}} = 0.158$

$$\frac{8\sqrt{\pi}b^{5/2}c^{5/2}\log^{\frac{5}{2}}(F)F^{c\left(a-\frac{bd}{e}\right)}\operatorname{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{15e^{7/2}} - \frac{8b^2c^2\log^2(F)F^{c(a+bx)}}{15e^3\sqrt{d+ex}} - \frac{4bc\log(F)F^{c(a+bx)}}{15e^2(d+ex)^{3/2}} - \frac{2F^{c(a+bx)}}{5e(d+ex)^{5/2}}$$

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*Sqrt[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))
```

Rubi in Sympy [A] time = 39.2612, size = 162, normalized size = 0.98

$$-\frac{8F^{c(a+bx)}b^2c^2\log(F)^2}{15e^3\sqrt{d+ex}} - \frac{4F^{c(a+bx)}bc\log(F)}{15e^2(d+ex)^{\frac{3}{2}}} - \frac{2F^{c(a+bx)}}{5e(d+ex)^{\frac{5}{2}}} + \frac{8\sqrt{\pi}F^{\frac{c(ae-bd)}{e}}b^{\frac{5}{2}}c^{\frac{5}{2}}\log(F)^{\frac{5}{2}}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)}{15e^{\frac{7}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(c*(b*x+a))/(e*x+d)**(7/2),x)
```

```
[Out] -8*F**(c*(a + b*x))*b**2*c**2*log(F)**2/(15*e**3*sqrt(d + e*x)) -
 4*F**(c*(a + b*x))*b*c*log(F)/(15*e**2*(d + e*x)**(3/2)) - 2*F**
(c*(a + b*x))/(5*e*(d + e*x)**(5/2)) + 8*sqrt(pi)*F**(c*(a*e - b*
d)/e)*b**(5/2)*c**(5/2)*log(F)**(5/2)*erfi(sqrt(b)*sqrt(c)*sqrt(d
 + e*x)*sqrt(log(F))/sqrt(e))/(15*e**(7/2))
```

Mathematica [A] time = 0.402877, size = 148, normalized size = 0.9

$$-\frac{2F^{c\left(a-\frac{bd}{e}\right)}\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{5/2}\left(\frac{F^{\frac{bc(d+ex)}{e}}\left(4b^2c^2\log^2(F)(d+ex)^2+2bce\log(F)(d+ex)+3e^2\right)}{e^2\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{5/2}}+4\sqrt{\pi}\left(\text{Erf}\left(\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\right)-1\right)\right)}{15e(d+ex)^{5/2}}$$

Antiderivative was successfully verified.

```
[In]  Integrate[F^(c*(a + b*x))/(d + e*x)^(7/2),x]
```

```
[Out] (-2*F^(c*(a - (b*d)/e))*(-((b*c*(d + e*x)*Log[F])/e))^(5/2)*(4*Sq
rt[Pi]*(-1 + Erf[Sqrt[-((b*c*(d + e*x)*Log[F])/e)]]) + (F^((b*c*(
d + e*x))/e)*(3*e^2 + 2*b*c*e*(d + e*x)*Log[F] + 4*b^2*c^2*(d + e
*x)^2*Log[F]^2))/(e^2*(-((b*c*(d + e*x)*Log[F])/e))^(5/2))))/(15*
e*(d + e*x)^(5/2))
```

Maple [F] time = 0.026, size = 0, normalized size = 0.

$$\int F^{c(bx+a)}\left(ex+d\right)^{-\frac{7}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(F^(c*(b*x+a))/(e*x+d)^(7/2),x)
```

```
[Out] int(F^(c*(b*x+a))/(e*x+d)^(7/2),x)
```

Maxima [A] time = 0.858685, size = 81, normalized size = 0.49

$$-\frac{\left(-\frac{(ex+d)bc\log(F)}{e}\right)^{\frac{5}{2}} F^{ac} \left(-\frac{5}{2}, -\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)^{\frac{5}{2}} F^{\frac{bcd}{e}} e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(e*x + d)^(7/2),x, algorithm="maxima")
```

```
[Out] -(-(e*x + d)*b*c*log(F)/e)^(5/2)*F^(a*c)*gamma(-5/2, -(e*x + d)*b
*c*log(F)/e)/((e*x + d)^(5/2)*F^(b*c*d/e)*e)
```

Fricas [A] time = 0.282329, size = 305, normalized size = 1.85

$$\frac{2\left(\frac{4\sqrt{\pi}\left(b^3c^3e^2x^2+2\,b^3c^3dex+b^3c^3d^2\right)\sqrt{ex+d}\,\mathrm{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)\log(F)^3}{F^{\frac{bcd-ace}{e}}} - \left(3\,e^3 + 4\left(b^2c^2e^3x^2 + 2\,b^2c^2de^2x + b^2c^2d^2e\right)\log(F)^2 + 2\,(b\right.\right.}{15\left(e^6x^2 + 2\,de^5x + d^2e^4\right)\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(e*x + d)^(7/2),x, algorithm="fricas")
```

```
[Out] 2/15*(4*sqrt(pi)*(b^3*c^3*e^2*x^2 + 2*b^3*c^3*d*e*x + b^3*c^3*d^2
)*sqrt(e*x + d)*erf(sqrt(e*x + d)*sqrt(-b*c*log(F)/e))*log(F)^3/F
^((b*c*d - a*c*e)/e) - (3*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 + 2*(b*c*e^3*x + b*c*d*e^2)*log(F
))*sqrt(-b*c*log(F)/e)*F^(b*c*x + a*c))/((e^6*x^2 + 2*d*e^5*x + d
^2*e^4)*sqrt(e*x + d)*sqrt(-b*c*log(F)/e))
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(e*x + d)^(7/2),x, algorithm="giac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(7/2), x)
```

3.47 $\int \frac{F^{c(a+bx)}}{(d+ex)^{9/2}}\,dx$

Optimal. Leaf size=200

$$\frac{16\sqrt{\pi}b^{7/2}c^{7/2}\log^{\frac{7}{2}}(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{105e^{9/2}}-\frac{16b^3c^3\log^3(F)F^{c(a+bx)}}{105e^4\sqrt{d+ex}}-\frac{8b^2c^2\log^2(F)F^{c(a+bx)}}{105e^3(d+ex)^{3/2}}-\frac{4bc\log(F)F^{c(a+bx)}}{35e^2(d+ex)^{5/2}}-\frac{2F^{c(a+bx)}}{7e(d+ex)^{7/2}}$$

```
[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))
```

Rubi [A] time = 0.336812, antiderivative size = 200, normalized size of antiderivative = 1., number of steps used = 6, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158

$$\frac{16\sqrt{\pi}b^{7/2}c^{7/2}\log^{\frac{7}{2}}(F)F^{c\left(a-\frac{bd}{e}\right)}\text{Erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{\log(F)}\sqrt{d+ex}}{\sqrt{e}}\right)}{105e^{9/2}}-\frac{16b^3c^3\log^3(F)F^{c(a+bx)}}{105e^4\sqrt{d+ex}}-\frac{8b^2c^2\log^2(F)F^{c(a+bx)}}{105e^3(d+ex)^{3/2}}-\frac{4bc\log(F)F^{c(a+bx)}}{35e^2(d+ex)^{5/2}}-\frac{2F^{c(a+bx)}}{7e(d+ex)^{7/2}}$$

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))
```

Rubi in Sympy [A] time = 52.3113, size = 197, normalized size = 0.98

$$-\frac{16F^{c(a+bx)}b^3c^3\log(F)^3}{105e^4\sqrt{d+ex}}-\frac{8F^{c(a+bx)}b^2c^2\log(F)^2}{105e^3(d+ex)^{\frac{3}{2}}}-\frac{4F^{c(a+bx)}bc\log(F)}{35e^2(d+ex)^{\frac{5}{2}}}-\frac{2F^{c(a+bx)}}{7e(d+ex)^{\frac{7}{2}}}+\frac{16\sqrt{\pi}F^{\frac{c(ae-bd)}{e}}b^{\frac{7}{2}}c^{\frac{7}{2}}\log(F)^{\frac{7}{2}}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{c}\sqrt{d+ex}\sqrt{\log(F)}}{\sqrt{e}}\right)}{105e^{\frac{9}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(c*(b*x+a))/(e*x+d)**(9/2),x)
```

```
[Out] -16*F**(c*(a + b*x))*b**3*c**3*log(F)**3/(105*e**4*sqrt(d + e*x))
 - 8*F**(c*(a + b*x))*b**2*c**2*log(F)**2/(105*e**3*(d + e*x)**(3
/2)) - 4*F**(c*(a + b*x))*b*c*log(F)/(35*e**2*(d + e*x)**(5/2)) -
 2*F**(c*(a + b*x))/(7*e*(d + e*x)**(7/2)) + 16*sqrt(pi)*F**(c*(a
*e - b*d)/e)*b**(7/2)*c**(7/2)*log(F)**(7/2)*erfi(sqrt(b)*sqrt(c)
*sqrt(d + e*x)*sqrt(log(F))/sqrt(e))/(105*e**(9/2))
```

Mathematica [A] time = 0.616143, size = 153, normalized size = 0.76

$$\frac{2F^{c\left(a-\frac{bd}{e}\right)}\left(8\sqrt{\pi}e^3\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{7/2}\left(\operatorname{Erf}\left(\sqrt{-\frac{bc\log(F)(d+ex)}{e}}\right)-1\right)-F^{\frac{bc(d+ex)}{e}}\left(8b^3c^3\log^3(F)(d+ex)^3+4b^2c^2e\log^2(F)(d\right.\right.}{105e^4(d+ex)^{7/2}}$$

Antiderivative was successfully verified.

```
[In]  Integrate[F^(c*(a + b*x))/(d + e*x)^(9/2),x]
```

```
[Out] (2*F^(c*(a - (b*d)/e))*(8*e^3*Sqrt[Pi]*(-1 + Erf[Sqrt[-((b*c*(d +
 e*x)*Log[F])/e)]])*(-((b*c*(d + e*x)*Log[F])/e))^(7/2) - F^((b*c
*(d + e*x))/e)*(15*e^3 + 6*b*c*e^2*(d + e*x)*Log[F] + 4*b^2*c^2*e
*(d + e*x)^2*Log[F]^2 + 8*b^3*c^3*(d + e*x)^3*Log[F]^3)))/(105*e^
4*(d + e*x)^(7/2))
```

Maple [F] time = 0.025, size = 0, normalized size = 0.

$$\int F^{c(bx+a)}(ex+d)^{-\frac{9}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(F^(c*(b*x+a))/(e*x+d)^(9/2),x)
```

```
[Out] int(F^(c*(b*x+a))/(e*x+d)^(9/2),x)
```

Maxima [A] time = 0.929283, size = 81, normalized size = 0.4

$$-\frac{\left(-\frac{(ex+d)bc\log(F)}{e}\right)^{\frac{7}{2}}F^{ac}\left(-\frac{7}{2},-\frac{(ex+d)bc\log(F)}{e}\right)}{(ex+d)^{\frac{7}{2}}F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(e*x + d)^(9/2),x, algorithm="maxima")
```

```
[Out] -(-(e*x + d)*b*c*log(F)/e)^(7/2)*F^(a*c)*gamma(-7/2, -(e*x + d)*b
*c*log(F)/e)/((e*x + d)^(7/2)*F^(b*c*d/e)*e)
```

Fricas [A] time = 0.279162, size = 428, normalized size = 2.14

$$\frac{2\left(\frac{8\sqrt{\pi}\left(b^4c^4e^3x^3+3b^4c^4de^2x^2+3b^4c^4d^2ex+b^4c^4d^3\right)\sqrt{ex+d}\,\mathrm{erf}\left(\sqrt{ex+d}\sqrt{-\frac{bc\log(F)}{e}}\right)\log(F)^4}{F^{\frac{bcd-ace}{e}}}-\left(15e^4+8\left(b^3c^3e^4x^3+3b^3c^3de^3x^2+3b^3c^3d^2e^2\right.\right.}{105\left(e^8x^3+3de^7x^2+3d^2e^6x+\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(e*x + d)^(9/2),x, algorithm="fricas")
```

```
[Out] 2/105*(8*sqrt(pi)*(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)*sqrt(e*x + d)*erf(sqrt(e*x + d)*sqrt(-
b*c*log(F)/e))*log(F)^4/F^((b*c*d - a*c*e)/e) - (15*e^4 + 8*(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 + 4*(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 + 6*(b*c*e^4*x + b*c*d*e^3)*log(F))*sqrt(-b*
c*log(F)/e)*F^(b*c*x + a*c))/((e^8*x^3 + 3*d*e^7*x^2 + 3*d^2*e^6*
x + d^3*e^5)*sqrt(e*x + d)*sqrt(-b*c*log(F)/e))
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{F^{(bx+a)c}}{(ex+d)^{\frac{9}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(F^((b*x + a)*c)/(e*x + d)^(9/2),x, algorithm="giac")
```

```
[Out] integrate(F^((b*x + a)*c)/(e*x + d)^(9/2), x)
```

3.48 $\int e^{-bx}x^{13/2}\,dx$

Optimal. Leaf size=151

$$\frac{135135\sqrt{\pi}\text{Erf}\left(\sqrt{b}\sqrt{x}\right)}{128b^{15/2}}-\frac{135135\sqrt{x}e^{-bx}}{64b^7}-\frac{45045x^{3/2}e^{-bx}}{32b^6}-\frac{9009x^{5/2}e^{-bx}}{16b^5}-\frac{1287x^{7/2}e^{-bx}}{8b^4}-\frac{143x^{9/2}e^{-bx}}{4b^3}-\frac{13x^{11/2}e^{-bx}}{2b^2}-\frac{x^{13/2}e^{-bx}}{b}$$

```
[Out] (-135135*Sqrt[x])/(64*b^7*E^(b*x)) - (45045*x^(3/2))/(32*b^6*E^(b
*x)) - (9009*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))
```

Rubi [A] time = 0.24062, antiderivative size = 151, normalized size of antiderivative = 1., number of steps used = 9, number of rules used = 3, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.25

$$\frac{135135\sqrt{\pi}\text{Erf}\left(\sqrt{b}\sqrt{x}\right)}{128b^{15/2}}-\frac{135135\sqrt{x}e^{-bx}}{64b^7}-\frac{45045x^{3/2}e^{-bx}}{32b^6}-\frac{9009x^{5/2}e^{-bx}}{16b^5}-\frac{1287x^{7/2}e^{-bx}}{8b^4}-\frac{143x^{9/2}e^{-bx}}{4b^3}-\frac{13x^{11/2}e^{-bx}}{2b^2}-\frac{x^{13/2}e^{-bx}}{b}$$

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)) - (9009*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))
```

Rubi in Sympy [A] time = 30.5925, size = 138, normalized size = 0.91

$$-\frac{x^{\frac{13}{2}}e^{-bx}}{b}-\frac{13x^{\frac{11}{2}}e^{-bx}}{2b^2}-\frac{143x^{\frac{9}{2}}e^{-bx}}{4b^3}-\frac{1287x^{\frac{7}{2}}e^{-bx}}{8b^4}-\frac{9009x^{\frac{5}{2}}e^{-bx}}{16b^5}-\frac{45045x^{\frac{3}{2}}e^{-bx}}{32b^6}-\frac{135135\sqrt{x}e^{-bx}}{64b^7}+\frac{135135\sqrt{\pi}\operatorname{erf}\left(\sqrt{b}\sqrt{x}\right)}{128b^{\frac{15}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(x**(13/2)/exp(b*x),x)
```

```
[Out] -x**(13/2)*exp(-b*x)/b - 13*x**(11/2)*exp(-b*x)/(2*b**2) - 143*x*
*(9/2)*exp(-b*x)/(4*b**3) - 1287*x**(7/2)*exp(-b*x)/(8*b**4) - 90
09*x**(5/2)*exp(-b*x)/(16*b**5) - 45045*x**(3/2)*exp(-b*x)/(32*b*
*6) - 135135*sqrt(x)*exp(-b*x)/(64*b**7) + 135135*sqrt(pi)*erf(sq
rt(b)*sqrt(x))/(128*b**(15/2))
```

Mathematica [A] time = 0.0656602, size = 91, normalized size = 0.6

$$\frac{135135\sqrt{\pi}\text{Erf}\left(\sqrt{b}\sqrt{x}\right)}{128b^{15/2}} - \frac{\sqrt{x}e^{-bx}\left(64b^6x^6+416b^5x^5+2288b^4x^4+10296b^3x^3+36036b^2x^2+90090bx+135135\right)}{64b^7}$$

Antiderivative was successfully verified.

```
[In]  Integrate[x^(13/2)/E^(b*x),x]
```

```
[Out] -(Sqrt[x]*(135135 + 90090*b*x + 36036*b^2*x^2 + 10296*b^3*x^3 + 2
288*b^4*x^4 + 416*b^5*x^5 + 64*b^6*x^6))/(64*b^7*E^(b*x)) + (1351
35*Sqrt[Pi]*Erf[Sqrt[b]*Sqrt[x]])/(128*b^(15/2))
```

Maple [A] time = 0.011, size = 145, normalized size = 1.

$$-\frac{e^{-bx}}{b}x^{\frac{13}{2}} + 13\frac{1}{b}\left(-1/2\frac{x^{11/2}e^{-bx}}{b} + 11/2\frac{1}{b}\left(-1/2\frac{x^{9/2}e^{-bx}}{b} + 9/2\frac{1}{b}\left(-1/2\frac{x^{7/2}e^{-bx}}{b} + 7/2\frac{1}{b}\left(-1/2\frac{x^{5/2}e^{-bx}}{b} + 5/2\frac{1}{b}\left(-1/2\frac{x^{3/2}e^{-bx}}{b}\right.\right.\right.\right.\right.$$

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 = 0.803118, size = 107, normalized size = 0.71

$$-\frac{\left(64\,b^6x^{\frac{13}{2}}+416\,b^5x^{\frac{11}{2}}+2288\,b^4x^{\frac{9}{2}}+10296\,b^3x^{\frac{7}{2}}+36036\,b^2x^{\frac{5}{2}}+90090\,bx^{\frac{3}{2}}+135135\,\sqrt{x}\right)e^{(-bx)}}{64\,b^7}+\frac{135135\,\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{b}\sqrt{x}\right)}{128\,b^{\frac{15}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(x^(13/2)*e^(-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) + 10
296*b^3*x^(7/2) + 36036*b^2*x^(5/2) + 90090*b*x^(3/2) + 135135*sq
rt(x))*e^(-b*x)/b^7 + 135135/128*sqrt(pi)*erf(sqrt(b)*sqrt(x))/b^
(15/2)
```

Fricas [A] time = 0.260485, size = 105, normalized size = 0.7

$$-\frac{2\left(64\,b^6x^6+416\,b^5x^5+2288\,b^4x^4+10296\,b^3x^3+36036\,b^2x^2+90090\,bx+135135\right)\sqrt{b}\sqrt{x}e^{(-bx)}-135135\,\sqrt{\pi}\,\mathrm{erf}\left(\sqrt{b}\sqrt{x}\right)}{128\,b^{\frac{15}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(x^(13/2)*e^(-b*x),x, algorithm="fricas")
```

```
[Out] -1/128*(2*(64*b^6*x^6 + 416*b^5*x^5 + 2288*b^4*x^4 + 10296*b^3*x^
3 + 36036*b^2*x^2 + 90090*b*x + 135135)*sqrt(b)*sqrt(x)*e^(-b*x)
- 135135*sqrt(pi)*erf(sqrt(b)*sqrt(x)))/b^(15/2)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(x**(13/2)/exp(b*x),x)
```

```
[Out] Timed out
```

GIAC/XCAS [A] time = 0.252752, size = 108, normalized size = 0.72

$$-\frac{\left(64\,b^{6}x^{\frac{13}{2}} + 416\,b^{5}x^{\frac{11}{2}} + 2288\,b^{4}x^{\frac{9}{2}} + 10296\,b^{3}x^{\frac{7}{2}} + 36036\,b^{2}x^{\frac{5}{2}} + 90090\,bx^{\frac{3}{2}} + 135135\,\sqrt{x}\right)e^{(-bx)}}{64\,b^{7}} - \frac{135135\,\sqrt{\pi}\,\mathrm{erf}\left(-\sqrt{b}\sqrt{x}\right)}{128\,b^{\frac{15}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(x^(13/2)*e^(-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) + 10
296*b^3*x^(7/2) + 36036*b^2*x^(5/2) + 90090*b*x^(3/2) + 135135*sq
rt(x))*e^(-b*x)/b^7 - 135135/128*sqrt(pi)*erf(-sqrt(b)*sqrt(x))/b
^(15/2)
```

3.49 $\int F^{c(a+bx)}(d+ex)^{4/3}\,dx$

Optimal. Leaf size=71

$$-\frac{e\sqrt[3]{d+ex}F^{c\left(a-\frac{bd}{e}\right)}\text{Gamma}\left(\frac{7}{3},-\frac{bc\log(F)(d+ex)}{e}\right)}{b^2c^2\log^2(F)\sqrt[3]{-\frac{bc\log(F)(d+ex)}{e}}}$$

```
[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)))
```

Rubi [A] time = 0.057213, antiderivative size = 71, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.053

$$-\frac{e\sqrt[3]{d+ex}F^{c\left(a-\frac{bd}{e}\right)}\text{Gamma}\left(\frac{7}{3},-\frac{bc\log(F)(d+ex)}{e}\right)}{b^2c^2\log^2(F)\sqrt[3]{-\frac{bc\log(F)(d+ex)}{e}}}$$

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)))
```

Rubi in Sympy [A] time = 6.84765, size = 71, normalized size = 1.

$$-\frac{F^{\frac{c(ae-bd)}{e}}e\sqrt[3]{d+ex}\left(\frac{7}{3},\frac{bc(-d-ex)\log(F)}{e}\right)}{b^2c^2\sqrt[3]{\frac{bc(-d-ex)\log(F)}{e}}\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(c*(b*x+a))*(e*x+d)**(4/3),x)
```

```
[Out] -F**(c*(a*e - b*d)/e)*e*(d + e*x)**(1/3)*Gamma(7/3, b*c*(-d - e*x
)*log(F)/e)/(b**2*c**2*(b*c*(-d - e*x)*log(F)/e)**(1/3)*log(F)**2
```

)

Mathematica [A] time = 0.203369, size = 63, normalized size = 0.89

$$-\frac{(d+ex)^{7/3}F^{c\left(a-\frac{bd}{e}\right)}\text{Gamma}\left(\frac{7}{3},-\frac{bc\log(F)(d+ex)}{e}\right)}{e\left(-\frac{bc\log(F)(d+ex)}{e}\right)^{7/3}}$$

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)))
```

Maple [F] time = 0.026, size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.904104, size = 81, normalized size = 1.14

$$-\frac{(ex+d)^{\frac{7}{3}}F^{ac}\left(\frac{7}{3},-\frac{(ex+d)bc\log(F)}{e}\right)}{\left(-\frac{(ex+d)bc\log(F)}{e}\right)^{\frac{7}{3}}F^{\frac{bcd}{e}}e}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -(e*x + d)^(7/3)*F^(a*c)*gamma(7/3, -(e*x + d)*b*c*log(F)/e)/((-(
e*x + d)*b*c*log(F)/e)^(7/3)*F^(b*c*d/e)*e)
```

Fricas [A] time = 0.283813, size = 151, normalized size = 2.13

$$\frac{3\,(ex+d)^{\frac{1}{3}}(3\,(bcex+bcd)\log(F)-4\,e)\left(-\frac{bc\log(F)}{e}\right)^{\frac{1}{3}}F^{bcx+ac}-\frac{4\,e\Gamma\left(\frac{1}{3},-\frac{(bcex+bcd)\log(F)}{e}\right)}{F^{\frac{bcd-ace}{e}}}}{9\left(-\frac{bc\log(F)}{e}\right)^{\frac{1}{3}}b^2c^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/9*(3*(e*x + d)^(1/3)*(3*(b*c*e*x + b*c*d)*log(F) - 4*e)*(-b*c*l
og(F)/e)^(1/3)*F^(b*c*x + a*c) - 4*e*gamma(1/3, -(b*c*e*x + b*c*d
)*log(F)/e)/F^((b*c*d - a*c*e)/e))/((-b*c*log(F)/e)^(1/3)*b^2*c^2
*log(F)^2)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.50 $\int \left(F^{c(a+bx)}\right)^n (d+ex)^{4/3}\,dx$

Optimal. Leaf size=98

$$-\frac{e\sqrt[3]{d+ex}\left(F^{c(a+bx)}\right)^n F^{cn\left(a-\frac{bd}{e}\right)-cn(a+bx)}\text{Gamma}\left(\frac{7}{3},-\frac{bcn\log(F)(d+ex)}{e}\right)}{b^2c^2n^2\log^2(F)\sqrt[3]{-\frac{bcn\log(F)(d+ex)}{e}}}$$

```
[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)))
```

Rubi [A] time = 0.169855, antiderivative size = 98, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.095

$$-\frac{e\sqrt[3]{d+ex}\left(F^{c(a+bx)}\right)^n F^{cn\left(a-\frac{bd}{e}\right)-cn(a+bx)}\text{Gamma}\left(\frac{7}{3},-\frac{bcn\log(F)(d+ex)}{e}\right)}{b^2c^2n^2\log^2(F)\sqrt[3]{-\frac{bcn\log(F)(d+ex)}{e}}}$$

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)))
```

Rubi in Sympy [A] time = 14.8097, size = 102, normalized size = 1.04

$$-\frac{F^{cn(-a-bx)}F^{\frac{cn(ae-bd)}{e}}e\sqrt[3]{d+ex}\left(F^{c(a+bx)}\right)^n\left(\frac{7}{3},\frac{bcn(-d-ex)\log(F)}{e}\right)}{b^2c^2n^2\sqrt[3]{\frac{bcn(-d-ex)\log(F)}{e}}\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate((F**(c*(b*x+a)))**n*(e*x+d)**(4/3),x)
```

```
[Out] -F**(c*n*(-a - b*x))*F**(c*n*(a*e - b*d)/e)*e*(d + e*x)**(1/3)*(F
**(c*(a + b*x)))**n*Gamma(7/3, b*c*n*(-d - e*x)*log(F)/e)/(b**2*c
```

```
**2*n**2*(b*c*n*(-d - e*x)*log(F)/e)**(1/3)*log(F)**2)
```

Mathematica [A] time = 0.30187, size = 78, normalized size = 0.8

$$-\frac{(d+ex)^{7/3}\left(F^{c(a+bx)}\right)^n F^{-\frac{bcn(d+ex)}{e}}\mathrm{Gamma}\left(\frac{7}{3},-\frac{bcn\log(F)(d+ex)}{e}\right)}{e\left(-\frac{bcn\log(F)(d+ex)}{e}\right)^{7/3}}$$

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)*L
og[F])/e))^(7/3)))
```

Maple [F] time = 0.093, size = 0, normalized size = 0.

$$\int \left(F^{c(bx+a)}\right)^n (ex+d)^{\frac{4}{3}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int (ex+d)^{\frac{4}{3}}\left(F^{(bx+a)c}\right)^n dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.271391, size = 167, normalized size = 1.7

$$\frac{3\left(-\frac{bcn\log(F)}{e}\right)^{\frac{1}{3}}(ex+d)^{\frac{1}{3}}(3\,(bcenx+bcdn)\log(F)-4\,e)F^{bcnx+acn}-\frac{4\,e\left(\frac{1}{3},-\frac{(bcenx+bcdn)\log(F)}{e}\right)}{F^{\frac{(bcd-ace)n}{e}}}}{9\left(-\frac{bcn\log(F)}{e}\right)^{\frac{1}{3}}b^2c^2n^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 1/9*(3*(-b*c*n*log(F)/e)^(1/3)*(e*x + d)^(1/3)*(3*(b*c*e*n*x + b*
c*d*n)*log(F) - 4*e)*F^(b*c*n*x + a*c*n) - 4*e*gamma(1/3, -(b*c*e
*n*x + b*c*d*n)*log(F)/e)/F^((b*c*d - a*c*e)*n/e))/((-b*c*n*log(F
)/e)^(1/3)*b^2*c^2*n^2*log(F)^2)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int (ex+d)^{\frac{4}{3}}\left(F^{(bx+a)c}\right)^n dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

Rubi [A] time = 0.0375814, antiderivative size = 48, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133

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

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])
```

Rubi in Sympy [A] time = 6.74217, size = 41, normalized size = 0.85

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0228125, 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)
```

Maple [A] time = 0., size = 38, normalized size = 0.8

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.828278, size = 81, normalized size = 1.69

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

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.290821, size = 51, normalized size = 1.06

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

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.296504, 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))
```

GIAC/XCAS [A] time = 0.262767, size = 1, normalized size = 0.02

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

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*(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])
```

Rubi [A] time = 0.193089, antiderivative size = 135, normalized size of antiderivative = 1., number of steps used = 8, number of rules used = 3, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.15

$$\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{exF^{c(a+bx)}}{bc\log(F)}+\frac{fx^2F^{c(a+bx)}}{bc\log(F)}$$

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])
```

Rubi in Sympy [A] time = 23.661, size = 126, normalized size = 0.93

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0492556, 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)
```

Maple [A] time = 0.004, size = 80, normalized size = 0.6

$$\frac{\left(fx^2c^2b^2\left(\ln\left(F\right)\right)^2+\left(\ln\left(F\right)\right)^2b^2c^2ex+c^2b^2\left(\ln\left(F\right)\right)^2d-2\ln\left(F\right)bcfx-\ln\left(F\right)bce+2f\right)F^{c(bx+a)}}{b^3c^3\left(\ln\left(F\right)\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.858383, size = 158, normalized size = 1.17

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

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.307395, size = 100, normalized size = 0.74

$$\frac{\left(\left(b^2c^2fx^2 + b^2c^2ex + b^2c^2d\right)\log\left(F\right)^2 - \left(2\,bcfx + bce\right)\log\left(F\right) + 2\,f\right)F^{bcx+ac}}{b^3c^3\log\left(F\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.38363, size = 116, normalized size = 0.86

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^2c^2d\log\left(F\right)^2+b^2c^2ex\log\left(F\right)^2+b^2c^2fx^2\log\left(F\right)^2-bce\log\left(F\right)-2bcfx\log\left(F\right)+2f\right)}{b^3c^3\log\left(F\right)^3} & \text{for}\ b^3c^3\log\left(F\right)^3 \neq 0 \\ dx + \frac{ex^2}{2} + \frac{fx^3}{3} & \text{otherwise} \end{cases}$$

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))
```

GIAC/XCAS [A] time = 0.25308, size = 1, normalized size = 0.01

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

3.53 $\int F^{c(a+bx)}\left(d+ex+fx^2+gx^3\right)\,dx$

Optimal. Leaf size=229

$$-\frac{6gF^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{6gxF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{3gx^2F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{exF^{c(a+bx)}}{bc\log(F)}+\frac{fx^2F^{c(a+bx)}}{bc\log(F)}+\frac{gx^3F^{c(a+bx)}}{bc\log(F)}$$

```
[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])
```

Rubi [A] time = 0.349668, antiderivative size = 229, normalized size of antiderivative = 1., number of steps used = 12, number of rules used = 3, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}} = 0.12$

$$-\frac{6gF^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{6gxF^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{3gx^2F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{exF^{c(a+bx)}}{bc\log(F)}+\frac{fx^2F^{c(a+bx)}}{bc\log(F)}+\frac{gx^3F^{c(a+bx)}}{bc\log(F)}$$

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])
```

Rubi in Sympy [A] time = 38.5173, size = 223, normalized size = 0.97

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0777437, 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)
```

Maple [A] time = 0.006, size = 138, normalized size = 0.6

$$\frac{\left(gx^3c^3b^3 (\ln (F))^3 + (\ln (F))^3 b^3c^3fx^2 + (\ln (F))^3 b^3c^3ex + c^3b^3 (\ln (F))^3 d - 3 (\ln (F))^2 b^2c^2gx^2 - 2 (\ln (F))^2 b^2c^2fx - c^2b^2 (\ln}{b^4c^4 (\ln (F))^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.822496, size = 262, normalized size = 1.14

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

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.268497, size = 165, normalized size = 0.72

$$\frac{\left(\left(b^3c^3gx^3 + b^3c^3fx^2 + b^3c^3ex + b^3c^3d\right)\log(F)^3 - \left(3\,b^2c^2gx^2 + 2\,b^2c^2fx + b^2c^2e\right)\log(F)^2 + 2\,(3\,bcgx + bcf)\log(F) - 6\,g\right)F}{b^4c^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((g*x^3 + f*x^2 + e*x + d)*F^((b*x + a)*c),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)*log(F) - 6*g)*F^(b*c*x + a*c)/(b^4*c^4*log(F)^
4)
```

Sympy [A] time = 0.486682, size = 190, normalized size = 0.83

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^3c^3d\log(F)^3+b^3c^3ex\log(F)^3+b^3c^3fx^2\log(F)^3+b^3c^3gx^3\log(F)^3-b^2c^2e\log(F)^2-2b^2c^2fx\log(F)^2-3b^2c^2gx^2\log(F)^2+2bcf\log(F)+6bcgx\log(\right.}{b^4c^4\log(F)^4} \\ dx + \frac{ex^2}{2} + \frac{fx^3}{3} + \frac{gx^4}{4} \end{cases}$$

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*log(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))
```

GIAC/XCAS [A] time = 0.289291, size = 1, normalized size = 0.

$$\mathit{Done}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

3.54 $\int F^{c(a+bx)}\left(d+ex+fx^2+gx^3+hx^4\right)\,dx$

Optimal. Leaf size=348

$$\frac{24hF^{c(a+bx)}}{b^5c^5\log^5(F)}-\frac{6gF^{c(a+bx)}}{b^4c^4\log^4(F)}-\frac{24hxF^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{6gxF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{12hx^2F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{3gx^2F^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{4hx^3F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{exF^{c(a+bx)}}{bc\log(F)}+\frac{fx^2F^{c(a+bx)}}{bc\log(F)}+\frac{gx^3F^{c(a+bx)}}{bc\log(F)}+\frac{hx^4F^{c(a+bx)}}{bc\log(F)}$$

```
[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*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) - (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])
```

Rubi [A] time = 0.570169, antiderivative size = 348, normalized size of antiderivative = 1., number of steps used = 17, number of rules used = 3, integrand size = 30, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.1

$$\frac{24hF^{c(a+bx)}}{b^5c^5\log^5(F)}-\frac{6gF^{c(a+bx)}}{b^4c^4\log^4(F)}-\frac{24hxF^{c(a+bx)}}{b^4c^4\log^4(F)}+\frac{2fF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{6gxF^{c(a+bx)}}{b^3c^3\log^3(F)}+\frac{12hx^2F^{c(a+bx)}}{b^3c^3\log^3(F)}-\frac{eF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{2fxF^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{3gx^2F^{c(a+bx)}}{b^2c^2\log^2(F)}-\frac{4hx^3F^{c(a+bx)}}{b^2c^2\log^2(F)}+\frac{dF^{c(a+bx)}}{bc\log(F)}+\frac{exF^{c(a+bx)}}{bc\log(F)}+\frac{fx^2F^{c(a+bx)}}{bc\log(F)}+\frac{gx^3F^{c(a+bx)}}{bc\log(F)}+\frac{hx^4F^{c(a+bx)}}{bc\log(F)}$$

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*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) - (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])
```

Rubi in Sympy [A] time = 57.0893, size = 347, normalized size = 1.

$$\frac{F^{c(a+bx)}d}{bc\log(F)}+\frac{F^{c(a+bx)}ex}{bc\log(F)}+\frac{F^{c(a+bx)}fx^2}{bc\log(F)}+\frac{F^{c(a+bx)}gx^3}{bc\log(F)}+\frac{F^{c(a+bx)}hx^4}{bc\log(F)}-\frac{F^{c(a+bx)}e}{b^2c^2\log(F)^2}-\frac{2F^{c(a+bx)}fx}{b^2c^2\log(F)^2}-\frac{3F^{c(a+bx)}gx^2}{b^2c^2\log(F)^2}-\frac{4F^{c(a+bx)}hx^3}{b^2c^2\log(F)^2}+\frac{2F^{c(a+bx)}f}{b^3c^3\log(F)^3}+\frac{6F^{c(a+bx)}gx}{b^3c^3\log(F)^3}+\frac{12F^{c(a+bx)}hx^2}{b^3c^3\log(F)^3}-\frac{6F^{c(a+bx)}g}{b^4c^4\log(F)^4}-\frac{24F^{c(a+bx)}hx}{b^4c^4\log(F)^4}+\frac{24F^{c(a+bx)}h}{b^5c^5\log(F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(c*(b*x+a))*(h*x**4+g*x**3+f*x**2+e*x+d),x)
```

```
[Out] F**(c*(a + b*x))*d/(b*c*log(F)) + F**(c*(a + b*x))*e*x/(b*c*log(F
)) + F**(c*(a + b*x))*f*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)) - F**(c*(a
 + b*x))*e/(b**2*c**2*log(F)**2) - 2*F**(c*(a + b*x))*f*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) + 2*F**(c*(a +
b*x))*f/(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) -
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) + 24*F**(c*(a + b*x))*h/(b**5*c**5*log(
F)**5)
```

Mathematica [A] time = 0.0972457, size = 117, normalized size = 0.34

$$\frac{F^{c(a+bx)}\left(b^4c^4\log^4(F)(d+x(e+x(f+x(g+hx))))-b^3c^3\log^3(F)\left(e+x\left(2f+3gx+4hx^2\right)\right)+2b^2c^2\log^2(F)(f+3x(g+2hx)}{b^5c^5\log^5(F)}$$

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)
```

Maple [A] time = 0.009, size = 212, normalized size = 0.6

$$\frac{\left(hx^4b^4c^4 (\ln (F))^4 + (\ln (F))^4 b^4c^4gx^3 + (\ln (F))^4 b^4c^4 f x^2 + (\ln (F))^4 b^4c^4ex + (\ln (F))^4 b^4c^4d - 4 (\ln (F))^3 b^3c^3hx^3 - 3 (\ln (F))^3\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(F^(c*(b*x+a))*(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*c^2*b^2*ln(F)^2*f-
24*ln(F)*b*c*h*x-6*g*c*b*ln(F)+24*h)*F^(c*(b*x+a))/b^5/c^5/ln(F)^
5
```

Maxima [A] time = 0.835463, size = 393, normalized size = 1.13

$$\frac{F^{bcx+ac}d}{bc\log(F)} + \frac{(F^{ac}bcx\log(F) - F^{ac})F^{bcx}e}{b^2c^2\log(F)^2} + \frac{\left(F^{ac}b^2c^2x^2\log(F)^2 - 2F^{ac}bcx\log(F) + 2F^{ac}\right)F^{bcx}f}{b^3c^3\log(F)^3} + \frac{\left(F^{ac}b^3c^3x^3\log(F)^3 - 3F^{ac}b^2c^2x^2\log(F)^2 + 6F^{ac}bcx\log(F) - 6F^{ac}\right)F^{bcx}g}{b^4c^4\log(F)^4} + \frac{\left(F^{ac}b^4c^4x^4\log(F)^4 - 4F^{ac}b^3c^3x^3\log(F)^3 + 12F^{ac}b^2c^2x^2\log(F)^2 - 24F^{ac}bcx\log(F) + 24F^{ac}\right)F^{bcx}h}{b^5c^5\log(F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((h*x^4 + g*x^3 + f*x^2 + e*x + d)*F^((b*x + a)*c),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*lo
g(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)
```

Fricas [A] time = 0.271756, size = 246, normalized size = 0.71

$$\frac{\left(\left(b^4c^4hx^4 + b^4c^4gx^3 + b^4c^4fx^2 + b^4c^4ex + b^4c^4d\right)\log(F)^4 - \left(4b^3c^3hx^3 + 3b^3c^3gx^2 + 2b^3c^3fx + b^3c^3e\right)\log(F)^3 + 2\left(6b^2c^2\right.\right.}{b^5c^5\log(F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.605992, size = 284, normalized size = 0.82

$$\begin{cases} \frac{F^{c(a+bx)}\left(b^4c^4d\log(F)^4+b^4c^4ex\log(F)^4+b^4c^4fx^2\log(F)^4+b^4c^4gx^3\log(F)^4+b^4c^4hx^4\log(F)^4-b^3c^3e\log(F)^3-2b^3c^3fx\log(F)^3-3b^3c^3gx^2\log(F)^3-4b^3c^3h\right.}{b^5c^5\log(F)^5} \\ dx+\frac{ex^2}{2}+\frac{fx^3}{3}+\frac{gx^4}{4}+\frac{hx^5}{5} \end{cases}$$

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*log(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))
```

GIAC/XCAS [A] time = 0.32889, size = 1, normalized size = 0.

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

3.55 $\int e^{-a-bx}x^m(a+bx)^3\,dx$

Optimal. Leaf size=116

$$-\frac{a^3e^{-a}x^m(bx)^{-m}\text{Gamma}(m+1,bx)}{b}-\frac{3a^2e^{-a}x^m(bx)^{-m}\text{Gamma}(m+2,bx)}{b}-\frac{3ae^{-a}x^m(bx)^{-m}\text{Gamma}(m+3,bx)}{b}-\frac{e^{-a}x^m(bx)^{-m}\text{Gamma}(m+4,bx)}{b}$$

```
[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*Gamma[4 + m, b*x])/(b*E^a*(b*x)^m)
```

Rubi [A] time = 0.290434, antiderivative size = 116, normalized size of antiderivative = 1., number of steps used = 6, number of rules used = 2, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.095

$$-\frac{a^3e^{-a}x^m(bx)^{-m}\text{Gamma}(m+1,bx)}{b}-\frac{3a^2e^{-a}x^m(bx)^{-m}\text{Gamma}(m+2,bx)}{b}-\frac{3ae^{-a}x^m(bx)^{-m}\text{Gamma}(m+3,bx)}{b}-\frac{e^{-a}x^m(bx)^{-m}\text{Gamma}(m+4,bx)}{b}$$

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*Gamma[4 + m, b*x])/(b*E^a*(b*x)^m)
```

Rubi in Sympy [A] time = 25.0225, size = 94, normalized size = 0.81

$$-\frac{a^3x^m\,(bx)^{-m}\,(m+1,bx)e^{-a}}{b}-\frac{3a^2x^m\,(bx)^{-m}\,(m+2,bx)e^{-a}}{b}-\frac{3ax^m\,(bx)^{-m}\,(m+3,bx)e^{-a}}{b}-\frac{x^m\,(bx)^{-m}\,(m+4,bx)e^{-a}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*x**m*(b*x+a)**3,x)
```

```
[Out] -a**3*x**m*(b*x)**(-m)*Gamma(m + 1, b*x)*exp(-a)/b - 3*a**2*x**m*
(b*x)**(-m)*Gamma(m + 2, b*x)*exp(-a)/b - 3*a*x**m*(b*x)**(-m)*Ga
```

```
mma(m + 3, b*x)*exp(-a)/b - x**m*(b*x)**(-m)*Gamma(m + 4, b*x)*ex
p(-a)/b
```

Mathematica [A] time = 0.0998593, size = 61, normalized size = 0.53

$$-\frac{e^{-a}x^m(bx)^{-m}\left(a^3\text{Gamma}(m+1,bx)+3a^2\text{Gamma}(m+2,bx)+3a\text{Gamma}(m+3,bx)+\text{Gamma}(m+4,bx)\right)}{b}$$

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*Gam
ma[3 + m, b*x] + Gamma[4 + m, b*x]))/(b*E^a*(b*x)^m))
```

Maple [C] time = 0.13, size = 334, normalized size = 2.9

$$b^{-m-1}e^{-a}\left(x^m b^m\left(m^2+5m+6\right)(bx)^{-\frac{m}{2}}e^{-\frac{bx}{2}}M_{\frac{m}{2},\frac{m}{2}+\frac{1}{2}}(bx)\right.$$
$$\left.-x^m b^m\left(b^2x^2+bmx+3bx+m^2+5m+6\right)(bx)^{-\frac{m}{2}}e^{-\frac{bx}{2}}M_{\frac{m}{2}+1,\frac{m}{2}+\frac{1}{2}}(bx)\right)$$
$$+3b^{-m-1}e^{-a}a\left(x^m b^m(2+m)(bx)^{-m/2}e^{-1/2\,bx}M_{m/2,\,m/2+1/2}(bx)\right.$$
$$\left.-x^m b^m(bx+m+2)(bx)^{-m/2}e^{-1/2\,bx}M_{m/2+1,\,m/2+1/2}(bx)\right)+3b^{-m-1}e^{-a}a^2\left(x^m b^m(bx)^{-m/2}e^{-1/2\,bx}M_{m/2,\,m/2+1/2}(bx)+\frac{x^m b}{}\right.$$

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
)*WhittakerM(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)*WhittakerM(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/(
1+m)*x^m*(b*x)^(-1/2*m)*WhittakerM(1/2*m,1/2*m+1/2,b*x)
```

Maxima [A] time = 1.18104, size = 166, normalized size = 1.43

$$-(bx)^{-m-4}\,b^3x^{m+4}e^{(-a)}\,(m+4,bx)-3\,(bx)^{-m-3}\,ab^2x^{m+3}e^{(-a)}\,(m+3,bx)\\ -3\,(bx)^{-m-2}\,a^2bx^{m+2}e^{(-a)}\,(m+2,bx)-(bx)^{-m-1}\,a^3x^{m+1}e^{(-a)}\,(m+1,bx)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x^m*e^(-b*x - a),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)
```

Fricas [A] time = 0.271189, size = 170, normalized size = 1.47

$$-\frac{\left(b^3x^3+\left(3\,(a+1)b^2+b^2m\right)x^2+\left((3\,a+5)bm+bm^2+3\,\left(a^2+2\,a+2\right)b\right)x\right)x^m e^{(-bx-a)}+\left(a^3+3\,(a+2)m^2+m^3+3\,a^2+(3\right.}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x^m*e^(-b*x - a),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
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(exp(-b*x-a)*x**m*(b*x+a)**3,x)
```

```
[Out] Timed out
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int (bx+a)^3x^m e^{(-bx-a)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

[Out] integrate((b*x + a)^3*x^m*e^(-b*x - a), x)
```

3.56 $\int e^{-a-bx} x^3 (a+bx)^3 \, dx$

Optimal. Leaf size=397

$$-\frac{6a^3e^{-a-bx}}{b^4}-\frac{6a^3xe^{-a-bx}}{b^3}-\frac{3a^3x^2e^{-a-bx}}{b^2}-\frac{a^3x^3e^{-a-bx}}{b}-\frac{72a^2e^{-a-bx}}{b^4}-\frac{72a^2xe^{-a-bx}}{b^3}-\frac{36a^2x^2e^{-a-bx}}{b^2}-3a^2x^4e^{-a-bx}-\frac{12a^2x^3e^{-a-bx}}{b}-\frac{360ae^{-a-bx}}{b^4}-\frac{720e^{-a-bx}}{b^4}-\frac{360axe^{-a-bx}}{b^3}-\frac{720xe^{-a-bx}}{b^3}-b^2x^6e^{-a-bx}-\frac{180ax^2e^{-a-bx}}{b^2}-\frac{360x^2e^{-a-bx}}{b^2}-3abx^5e^{-a-bx}-6bx^5e^{-a-bx}-15ax^4e^{-a-bx}-30x^4e^{-a-bx}-\frac{60ax^3e^{-a-bx}}{b}-\frac{120x^3e^{-a-bx}}{b}$$

```
[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 - (360*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 - (60*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
```

Rubi [A] time = 0.840858, antiderivative size = 397, normalized size of antiderivative = 1., number of steps used = 24, number of rules used = 3, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}} = 0.143$

$$-\frac{6a^3e^{-a-bx}}{b^4}-\frac{6a^3xe^{-a-bx}}{b^3}-\frac{3a^3x^2e^{-a-bx}}{b^2}-\frac{a^3x^3e^{-a-bx}}{b}-\frac{72a^2e^{-a-bx}}{b^4}-\frac{72a^2xe^{-a-bx}}{b^3}-\frac{36a^2x^2e^{-a-bx}}{b^2}-3a^2x^4e^{-a-bx}-\frac{12a^2x^3e^{-a-bx}}{b}-\frac{360ae^{-a-bx}}{b^4}-\frac{720e^{-a-bx}}{b^4}-\frac{360axe^{-a-bx}}{b^3}-\frac{720xe^{-a-bx}}{b^3}-b^2x^6e^{-a-bx}-\frac{180ax^2e^{-a-bx}}{b^2}-\frac{360x^2e^{-a-bx}}{b^2}-3abx^5e^{-a-bx}-6bx^5e^{-a-bx}-15ax^4e^{-a-bx}-30x^4e^{-a-bx}-\frac{60ax^3e^{-a-bx}}{b}-\frac{120x^3e^{-a-bx}}{b}$$

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 - (360*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 - (60*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
```

Rubi in Sympy [A] time = 56.6496, size = 371, normalized size = 0.93

$$-\frac{a^3x^3e^{-a-bx}}{b}-\frac{3a^3x^2e^{-a-bx}}{b^2}-\frac{6a^3xe^{-a-bx}}{b^3}-\frac{6a^3e^{-a-bx}}{b^4}-3a^2x^4e^{-a-bx}-\frac{12a^2x^3e^{-a-bx}}{b}-\frac{36a^2x^2e^{-a-bx}}{b^2}-\frac{72a^2xe^{-a-bx}}{b^3}-\frac{72a^2e^{-a-bx}}{b^4}-3abx^5e^{-a-bx}-15ax^4e^{-a-bx}-\frac{60ax^3e^{-a-bx}}{b}-\frac{180ax^2e^{-a-bx}}{b^2}-\frac{360axe^{-a-bx}}{b^3}-\frac{360ae^{-a-bx}}{b^4}-b^2x^6e^{-a-bx}-6bx^5e^{-a-bx}-30x^4e^{-a-bx}-\frac{120x^3e^{-a-bx}}{b}-\frac{360x^2e^{-a-bx}}{b^2}-\frac{720xe^{-a-bx}}{b^3}-\frac{720e^{-a-bx}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*x**3*(b*x+a)**3,x)
```

```
[Out] -a**3*x**3*exp(-a - b*x)/b - 3*a**3*x**2*exp(-a - b*x)/b**2 - 6*a
**3*x*exp(-a - b*x)/b**3 - 6*a**3*exp(-a - b*x)/b**4 - 3*a**2*x**
4*exp(-a - b*x) - 12*a**2*x**3*exp(-a - b*x)/b - 36*a**2*x**2*exp
(-a - b*x)/b**2 - 72*a**2*x*exp(-a - b*x)/b**3 - 72*a**2*exp(-a -
 b*x)/b**4 - 3*a*b*x**5*exp(-a - b*x) - 15*a*x**4*exp(-a - b*x) -
 60*a*x**3*exp(-a - b*x)/b - 180*a*x**2*exp(-a - b*x)/b**2 - 360*
a*x*exp(-a - b*x)/b**3 - 360*a*exp(-a - b*x)/b**4 - b**2*x**6*exp
(-a - b*x) - 6*b*x**5*exp(-a - b*x) - 30*x**4*exp(-a - b*x) - 120
*x**3*exp(-a - b*x)/b - 360*x**2*exp(-a - b*x)/b**2 - 720*x*exp(-
a - b*x)/b**3 - 720*exp(-a - b*x)/b**4
```

Mathematica [A] time = 0.0804031, size = 121, normalized size = 0.3

$$e^{-a-bx}\left(-3\left(a^2+5a+10\right)x^4-\frac{6\left(a^3+12a^2+60a+120\right)}{b^4}-\frac{6\left(a^3+12a^2+60a+120\right)x}{b^3}-\frac{3\left(a^3+12a^2+60a+120\right)x^2}{b^2}-\frac{\left(a^3+12a^2+60a+120\right)x^3}{b}-3(a+2)bx^5-b^2x^6\right)$$

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)
```

Maple [A] time = 0.007, size = 182, normalized size = 0.5

$$-\frac{\left(b^6x^6 + 3\,b^5x^5a + 3\,a^2b^4x^4 + 6\,b^5x^5 + a^3b^3x^3 + 15\,ab^4x^4 + 12\,a^2b^3x^3 + 30\,x^4b^4 + 3\,a^3b^2x^2 + 60\,ab^3x^3 + 36\,a^2b^2x^2 + 120\,x^3}{b^4}$$

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 = 0.818402, size = 265, normalized size = 0.67

$$-\frac{\left(b^3x^3 + 3\,b^2x^2 + 6\,bx + 6\right)a^3e^{(-bx-a)}}{b^4} - \frac{3\left(b^4x^4 + 4\,b^3x^3 + 12\,b^2x^2 + 24\,bx + 24\right)a^2e^{(-bx-a)}}{b^4} - \frac{3\left(b^5x^5 + 5\,b^4x^4 + 20\,b^3x^3 + 60\,b^2x^2 + 120\,bx + 120\right)ae^{(-bx-a)}}{b^4} - \frac{\left(b^6x^6 + 6\,b^5x^5 + 30\,b^4x^4 + 120\,b^3x^3 + 360\,b^2x^2 + 720\,bx + 720\right)e^{(-bx-a)}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x^3*e^(-b*x - a),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 + 12
0)*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
```

Fricas [A] time = 0.256882, size = 163, normalized size = 0.41

$$-\frac{\left(b^6x^6 + 3\,(a+2)b^5x^5 + 3\left(a^2 + 5\,a + 10\right)b^4x^4 + \left(a^3 + 12\,a^2 + 60\,a + 120\right)b^3x^3 + 3\left(a^3 + 12\,a^2 + 60\,a + 120\right)b^2x^2 + 6\,a^3 + 6\,(}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x^3*e^(-b*x - a),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
```

Sympy [A] time = 0.520658, size = 236, normalized size = 0.59

$$\begin{cases} \frac{(-a^3b^3x^3-3a^3b^2x^2-6a^3bx-6a^3-3a^2b^4x^4-12a^2b^3x^3-36a^2b^2x^2-72a^2bx-72a^2-3ab^5x^5-15ab^4x^4-60ab^3x^3-180ab^2x^2-360abx-360a-b^6x^6-6b^5x^5-30b^4}{b^4} \\ \frac{a^3x^4}{4} + \frac{3a^2bx^5}{5} + \frac{ab^2x^6}{2} + \frac{b^3x^7}{7} \end{cases}$$

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 - 360*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))
```

GIAC/XCAS [A] time = 0.258431, size = 273, normalized size = 0.69

$$-\frac{(b^9x^6 + 3\,ab^8x^5 + 3\,a^2b^7x^4 + 6\,b^8x^5 + a^3b^6x^3 + 15\,ab^7x^4 + 12\,a^2b^6x^3 + 30\,b^7x^4 + 3\,a^3b^5x^2 + 60\,ab^6x^3 + 36\,a^2b^5x^2 + 120\,b^6}{b^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x^3*e^(-b*x - a),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 + 6
0*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
```

3.57 $\int e^{-a-bx}x^2(a+bx)^3\,dx$

Optimal. Leaf size=318

$$-\frac{2a^3e^{-a-bx}}{b^3}-\frac{2a^3xe^{-a-bx}}{b^2}-\frac{a^3x^2e^{-a-bx}}{b}-\frac{18a^2e^{-a-bx}}{b^3}-\frac{18a^2xe^{-a-bx}}{b^2}-3a^2x^3e^{-a-bx}-\frac{9a^2x^2e^{-a-bx}}{b}-\frac{72ae^{-a-bx}}{b^3}-\frac{120e^{-a-bx}}{b^3}-b^2x^5e^{-a-bx}-\frac{72axe^{-a-bx}}{b^2}-\frac{120xe^{-a-bx}}{b^2}-3abx^4e^{-a-bx}-5bx^4e^{-a-bx}-12ax^3e^{-a-bx}-20x^3e^{-a-bx}-\frac{36ax^2e^{-a-bx}}{b}-\frac{60x^2e^{-a-bx}}{b}$$

```
[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
```

Rubi [A] time = 0.656106, antiderivative size = 318, normalized size of antiderivative = 1., number of steps used = 20, number of rules used = 3, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143

$$-\frac{2a^3e^{-a-bx}}{b^3}-\frac{2a^3xe^{-a-bx}}{b^2}-\frac{a^3x^2e^{-a-bx}}{b}-\frac{18a^2e^{-a-bx}}{b^3}-\frac{18a^2xe^{-a-bx}}{b^2}-3a^2x^3e^{-a-bx}-\frac{9a^2x^2e^{-a-bx}}{b}-\frac{72ae^{-a-bx}}{b^3}-\frac{120e^{-a-bx}}{b^3}-b^2x^5e^{-a-bx}-\frac{72axe^{-a-bx}}{b^2}-\frac{120xe^{-a-bx}}{b^2}-3abx^4e^{-a-bx}-5bx^4e^{-a-bx}-12ax^3e^{-a-bx}-20x^3e^{-a-bx}-\frac{36ax^2e^{-a-bx}}{b}-\frac{60x^2e^{-a-bx}}{b}$$

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
```

Rubi in Sympy [A] time = 47.5512, size = 294, normalized size = 0.92

$$-\frac{a^3x^2e^{-a-bx}}{b}-\frac{2a^3xe^{-a-bx}}{b^2}-\frac{2a^3e^{-a-bx}}{b^3}-3a^2x^3e^{-a-bx}-\frac{9a^2x^2e^{-a-bx}}{b}-\frac{18a^2xe^{-a-bx}}{b^2}-\frac{18a^2e^{-a-bx}}{b^3}-3abx^4e^{-a-bx}-12ax^3e^{-a-bx}-\frac{36ax^2e^{-a-bx}}{b}-\frac{72axe^{-a-bx}}{b^2}-\frac{72ae^{-a-bx}}{b^3}-b^2x^5e^{-a-bx}-5bx^4e^{-a-bx}-20x^3e^{-a-bx}-\frac{60x^2e^{-a-bx}}{b}-\frac{120xe^{-a-bx}}{b^2}-\frac{120e^{-a-bx}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*x**2*(b*x+a)**3,x)
```

```
[Out] -a**3*x**2*exp(-a - b*x)/b - 2*a**3*x*exp(-a - b*x)/b**2 - 2*a**3
*exp(-a - b*x)/b**3 - 3*a**2*x**3*exp(-a - b*x) - 9*a**2*x**2*exp
(-a - b*x)/b - 18*a**2*x*exp(-a - b*x)/b**2 - 18*a**2*exp(-a - b*
x)/b**3 - 3*a*b*x**4*exp(-a - b*x) - 12*a*x**3*exp(-a - b*x) - 36
*a*x**2*exp(-a - b*x)/b - 72*a*x*exp(-a - b*x)/b**2 - 72*a*exp(-a
 - b*x)/b**3 - b**2*x**5*exp(-a - b*x) - 5*b*x**4*exp(-a - b*x) -
 20*x**3*exp(-a - b*x) - 60*x**2*exp(-a - b*x)/b - 120*x*exp(-a -
 b*x)/b**2 - 120*exp(-a - b*x)/b**3
```

Mathematica [A] time = 0.0369308, size = 130, normalized size = 0.41

$$e^{-bx}\left(-\left(3a^2+12a+20\right)e^{-a}x^3-\frac{2\left(a^3+9a^2+36a+60\right)e^{-a}}{b^3}-\frac{2\left(a^3+9a^2+36a+60\right)e^{-a}x}{b^2}-\frac{\left(a^3+9a^2+36a+60\right)e^{-a}x^2}{b}+e^{-a}\left(-b^2\right)x^5-(3a+5)e^{-a}bx^4\right)$$

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)
```

Maple [A] time = 0.009, size = 143, normalized size = 0.5

$$-\frac{\left(b^5x^5+3\,b^4x^4a+3\,a^2b^3x^3+5\,b^4x^4+a^3b^2x^2+12\,ab^3x^3+9\,a^2b^2x^2+20\,x^3b^3+2\,a^3bx+36\,ab^2x^2+18\,a^2bx+60\,b^2x^2+2}{b^3}$$

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 = 0.796095, size = 221, normalized size = 0.69

$$-\frac{\left(b^{2} x^{2} + 2 \, b x + 2\right) a^{3} e^{\left(-b x - a\right)}}{b^{3}} - \frac{3 \, \left(b^{3} x^{3} + 3 \, b^{2} x^{2} + 6 \, b x + 6\right) a^{2} e^{\left(-b x - a\right)}}{b^{3}} - \frac{3 \, \left(b^{4} x^{4} + 4 \, b^{3} x^{3} + 12 \, b^{2} x^{2} + 24 \, b x + 24\right) a e^{\left(-b x - a\right)}}{b^{3}} - \frac{\left(b^{5} x^{5} + 5 \, b^{4} x^{4} + 20 \, b^{3} x^{3} + 60 \, b^{2} x^{2} + 120 \, b x + 120\right) e^{\left(-b x - a\right)}}{b^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x^2*e^(-b*x - a),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
```

Fricas [A] time = 0.263225, size = 138, normalized size = 0.43

$$-\frac{\left(b^{5} x^{5} + (3 \, a + 5) b^{4} x^{4} + \left(3 \, a^{2} + 12 \, a + 20\right) b^{3} x^{3} + \left(a^{3} + 9 \, a^{2} + 36 \, a + 60\right) b^{2} x^{2} + 2 \, a^{3} + 2 \, \left(a^{3} + 9 \, a^{2} + 36 \, a + 60\right) b x + 18 \, a^{2} + 7}{b^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x^2*e^(-b*x - a),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 + 72*a + 120)*e^(-b*x - a)/b^3
```

Sympy [A] time = 0.463942, size = 196, normalized size = 0.62

$$\begin{cases} \frac{(-a^3b^2x^2-2a^3bx-2a^3-3a^2b^3x^3-9a^2b^2x^2-18a^2bx-18a^2-3ab^4x^4-12ab^3x^3-36ab^2x^2-72abx-72a-b^5x^5-5b^4x^4-20b^3x^3-60b^2x^2-120bx-120)e^{-a-bx}}{b^3} \\ \frac{a^3x^3}{3}+\frac{3a^2bx^4}{4}+\frac{3ab^2x^5}{5}+\frac{b^3x^6}{6} \end{cases}$$

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))
```

GIAC/XCAS [A] time = 0.275369, size = 220, normalized size = 0.69

$$-\frac{(b^8x^5+3\,ab^7x^4+3\,a^2b^6x^3+5\,b^7x^4+a^3b^5x^2+12\,ab^6x^3+9\,a^2b^5x^2+20\,b^6x^3+2\,a^3b^4x+36\,ab^5x^2+18\,a^2b^4x+60\,b^5x^2+}{b^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x^2*e^(-b*x - a),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 + 1
8*a^2*b^3 + 120*b^4*x + 72*a*b^3 + 120*b^3)*e^(-b*x - a)/b^6
```

3.58 $\int e^{-a-bx}x(a+bx)^3\,dx$

Optimal. Leaf size=184

$$-\frac{e^{-a-bx}(a+bx)^4}{b^2}+\frac{ae^{-a-bx}(a+bx)^3}{b^2}-\frac{4e^{-a-bx}(a+bx)^3}{b^2}+\frac{3ae^{-a-bx}(a+bx)^2}{b^2}-\frac{12e^{-a-bx}(a+bx)^2}{b^2}+\frac{6ae^{-a-bx}(a+bx)}{b^2}-\frac{24e^{-a-bx}(a+bx)}{b^2}+\frac{6ae^{-a-bx}}{b^2}-\frac{24e^{-a-bx}}{b^2}$$

```
[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
```

Rubi [A] time = 0.396527, antiderivative size = 184, normalized size of antiderivative = 1., number of steps used = 11, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}} = 0.158$

$$-\frac{e^{-a-bx}(a+bx)^4}{b^2}+\frac{ae^{-a-bx}(a+bx)^3}{b^2}-\frac{4e^{-a-bx}(a+bx)^3}{b^2}+\frac{3ae^{-a-bx}(a+bx)^2}{b^2}-\frac{12e^{-a-bx}(a+bx)^2}{b^2}+\frac{6ae^{-a-bx}(a+bx)}{b^2}-\frac{24e^{-a-bx}(a+bx)}{b^2}+\frac{6ae^{-a-bx}}{b^2}-\frac{24e^{-a-bx}}{b^2}$$

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
```

Rubi in Sympy [A] time = 31.5669, size = 168, normalized size = 0.91

$$\frac{a\,(a+bx)^3\,e^{-a-bx}}{b^2}+\frac{3a\,(a+bx)^2\,e^{-a-bx}}{b^2}+\frac{6a\,(a+bx)\,e^{-a-bx}}{b^2}+\frac{6ae^{-a-bx}}{b^2}-\frac{(a+bx)^4\,e^{-a-bx}}{b^2}-\frac{4\,(a+bx)^3\,e^{-a-bx}}{b^2}-\frac{12\,(a+bx)^2\,e^{-a-bx}}{b^2}-\frac{24\,(a+bx)\,e^{-a-bx}}{b^2}-\frac{24e^{-a-bx}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*x*(b*x+a)**3,x)
```

```
[Out] a*(a + b*x)**3*exp(-a - b*x)/b**2 + 3*a*(a + b*x)**2*exp(-a - b*x
)/b**2 + 6*a*(a + b*x)*exp(-a - b*x)/b**2 + 6*a*exp(-a - b*x)/b**
2 - (a + b*x)**4*exp(-a - b*x)/b**2 - 4*(a + b*x)**3*exp(-a - b*x
)/b**2 - 12*(a + b*x)**2*exp(-a - b*x)/b**2 - 24*(a + b*x)*exp(-a
 - b*x)/b**2 - 24*exp(-a - b*x)/b**2
```

Mathematica [A] time = 0.0312783, 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
```

Maple [A] time = 0.007, size = 102, normalized size = 0.6

$$-\frac{\left(b^4x^4+3\,b^3x^3a+3\,a^2b^2x^2+4\,b^3x^3+a^3bx+9\,ab^2x^2+6\,a^2bx+12\,b^2x^2+a^3+18\,abx+6\,a^2+24\,bx+18\,a+24\right)\mathrm{e}^{-bx-a}}{b^2}$$

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 = 0.799639, size = 178, normalized size = 0.97

$$-\frac{(bx+1)a^3e^{(-bx-a)}}{b^2}-\frac{3\left(b^2x^2+2\,bx+2\right)a^2e^{(-bx-a)}}{b^2}-\frac{3\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)ae^{(-bx-a)}}{b^2}-\frac{\left(b^4x^4+4\,b^3x^3+12\,b^2x^2+24\,bx+24\right)e^{(-bx-a)}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x*e^(-b*x - a),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
```

Fricas [A] time = 0.248376, size = 105, normalized size = 0.57

$$-\frac{\left(b^4x^4 + (3\,a + 4)b^3x^3 + 3\,\left(a^2 + 3\,a + 4\right)b^2x^2 + a^3 + \left(a^3 + 6\,a^2 + 18\,a + 24\right)bx + 6\,a^2 + 18\,a + 24\right)e^{(-bx-a)}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x*e^(-b*x - a),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
```

Sympy [A] time = 0.39774, size = 148, normalized size = 0.8

$$\begin{cases} \frac{\left(-a^3bx-a^3-3a^2b^2x^2-6a^2bx-6a^2-3ab^3x^3-9ab^2x^2-18abx-18a-b^4x^4-4b^3x^3-12b^2x^2-24bx-24\right)e^{-a-bx}}{b^2} & \text{for } b^2 \neq 0 \\ \frac{a^3x^2}{2} + a^2bx^3 + \frac{3ab^2x^4}{4} + \frac{b^3x^5}{5} & \text{otherwise} \end{cases}$$

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))
```

GIAC/XCAS [A] time = 0.24142, size = 166, normalized size = 0.9

$$-\frac{\left(b^7x^4 + 3\,ab^6x^3 + 3\,a^2b^5x^2 + 4\,b^6x^3 + a^3b^4x + 9\,ab^5x^2 + 6\,a^2b^4x + 12\,b^5x^2 + a^3b^3 + 18\,ab^4x + 6\,a^2b^3 + 24\,b^4x + 18\,ab^3 + 2\right.}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*x*e^(-b*x - a),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
```

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*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
```

Rubi [A] time = 0.110551, antiderivative size = 80, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 2, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}} = 0.111$

$$-\frac{e^{-a-bx}(a+bx)^3}{b}-\frac{3e^{-a-bx}(a+bx)^2}{b}-\frac{6e^{-a-bx}(a+bx)}{b}-\frac{6e^{-a-bx}}{b}$$

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
```

Rubi in Sympy [A] time = 11.9732, size = 65, normalized size = 0.81

$$-\frac{(a+bx)^3\,e^{-a-bx}}{b}-\frac{3\,(a+bx)^2\,e^{-a-bx}}{b}-\frac{6\,(a+bx)\,e^{-a-bx}}{b}-\frac{6e^{-a-bx}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**3,x)
```

```
[Out] -(a + b*x)**3*exp(-a - b*x)/b - 3*(a + b*x)**2*exp(-a - b*x)/b -
6*(a + b*x)*exp(-a - b*x)/b - 6*exp(-a - b*x)/b
```

Mathematica [A] time = 0.0164372, 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
```

Maple [A] time = 0.006, size = 68, normalized size = 0.9

$$-\frac{\left(b^3x^3+3\,b^2x^2a+3\,a^2bx+3\,b^2x^2+a^3+6\,abx+3\,a^2+6\,bx+6\,a+6\right)\,\mathrm{e}^{-bx-a}}{b}$$

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)*exp(-b*x-a)/b
```

Maxima [A] time = 0.837064, size = 139, normalized size = 1.74

$$-\frac{3\,(bx+1)a^2e^{(-bx-a)}}{b}-\frac{a^3e^{(-bx-a)}}{b}-\frac{3\,\left(b^2x^2+2\,bx+2\right)ae^{(-bx-a)}}{b}-\frac{\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)e^{(-bx-a)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a),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
```

Fricas [A] time = 0.241586, size = 77, normalized size = 0.96

$$-\frac{\left(b^3x^3+3\,(a+1)b^2x^2+a^3+3\,\left(a^2+2\,a+2\right)bx+3\,a^2+6\,a+6\right)e^{(-bx-a)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a),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
```

Sympy [A] time = 0.355251, size = 104, normalized size = 1.3

$$\begin{cases} \frac{\left(-a^{3}-3a^{2}bx-3a^{2}-3ab^{2}x^{2}-6abx-6a-b^{3}x^{3}-3b^{2}x^{2}-6bx-6\right)e^{-a-bx}}{b} & \text{for}\: b \neq 0 \\ a^{3}x+\frac{3a^{2}bx^{2}}{2}+ab^{2}x^{3}+\frac{b^{3}x^{4}}{4} & \text{otherwise} \end{cases}$$

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, T
rue))
```

GIAC/XCAS [A] time = 0.250249, size = 117, normalized size = 1.46

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a),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
```

3.60 $\int \frac{e^{-a-bx}(a+bx)^3}{x} \, dx$

Optimal. Leaf size=102

$$e^{-a}a^3\text{ExpIntegralEi}(-bx) - 3a^2e^{-a-bx} - b^2x^2e^{-a-bx} - 3ae^{-a-bx} - 3abxe^{-a-bx} - 2e^{-a-bx} - 2bxe^{-a-bx}$$

```
[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
```

Rubi [A] time = 0.27418, antiderivative size = 102, normalized size of antiderivative = 1., number of steps used = 9, number of rules used = 4, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.19

$$e^{-a}a^3\text{ExpIntegralEi}(-bx) - 3a^2e^{-a-bx} - b^2x^2e^{-a-bx} - 3ae^{-a-bx} - 3abxe^{-a-bx} - 2e^{-a-bx} - 2bxe^{-a-bx}$$

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
```

Rubi in Sympy [A] time = 23.8974, size = 92, normalized size = 0.9

$$a^3e^{-a}\,\text{Ei}\,(-bx) - 3a^2e^{-a-bx} - 3abxe^{-a-bx} - 3ae^{-a-bx} - b^2x^2e^{-a-bx} - 2bxe^{-a-bx} - 2e^{-a-bx}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**3/x,x)
```

```
[Out] a**3*exp(-a)*Ei(-b*x) - 3*a**2*exp(-a - b*x) - 3*a*b*x*exp(-a - b
*x) - 3*a*exp(-a - b*x) - b**2*x**2*exp(-a - b*x) - 2*b*x*exp(-a
- b*x) - 2*exp(-a - b*x)
```

Mathematica [A] time = 0.0258284, size = 52, normalized size = 0.51

$$e^{-a-bx}\left(a^3e^{bx}\text{ExpIntegralEi}(-bx) - 3a^2 - 3a(bx+1) - b^2x^2 - 2bx - 2\right)$$

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)*ExpIntegralEi[-(b*x)])
```

Maple [A] time = 0.01, size = 113, normalized size = 1.1

$$-(-bx-a)^2 \mathrm{e}^{-bx-a} + 2\,(-bx-a)\,\mathrm{e}^{-bx-a} - 2\,\mathrm{e}^{-bx-a} + a\left((-bx-a)\,\mathrm{e}^{-bx-a} - \mathrm{e}^{-bx-a}\right) - a^2\mathrm{e}^{-bx-a} - a^3\mathrm{e}^{-a}Ei\,(1,bx)$$

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)*exp(-b*x-a)-exp(-b*x-a))-a^2*exp(-b*x-a)-a^3*exp(-a)*Ei(1
,b*x)
```

Maxima [A] time = 0.847263, size = 93, normalized size = 0.91

$$a^3\mathrm{Ei}\,(-bx)\,e^{(-a)} - 3\,(bx+1)ae^{(-bx-a)} - 3\,a^2e^{(-bx-a)} - \left(b^2x^2 + 2\,bx + 2\right)e^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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)
```

Fricas [A] time = 0.260952, size = 68, normalized size = 0.67

$$a^3\mathrm{Ei}\,(-bx)\,e^{(-a)} - \left(b^2x^2 + (3\,a+2)bx + 3\,a^2 + 3\,a + 2\right)e^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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)
```

Sympy [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(-b*x-a)*(b*x+a)**3/x,x)
```

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

GIAC/XCAS [A] time = 0.234979, size = 128, normalized size = 1.25

$$-b^2x^2e^{(-bx-a)} + a^3\text{Ei}\left(-bx\right)e^{(-a)} - 3\,abxe^{(-bx-a)} - 3\,a^2e^{(-bx-a)} - 2\,bxe^{(-bx-a)} - 3\,ae^{(-bx-a)} - 2\,e^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^3*e^(-b*x - a)/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)
```

3.61 $\int \frac{e^{-a-bx}(a+bx)^3}{x^2}\,dx$

Optimal. Leaf size=94

$$e^{-a}a^3(-b)\text{ExpIntegralEi}(-bx)-\frac{a^3e^{-a-bx}}{x}+3e^{-a}a^2b\text{ExpIntegralEi}(-bx)-b^2xe^{-a-bx}-3abe^{-a-bx}-be^{-a-bx}$$

```
[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
```

Rubi [A] time = 0.253028, antiderivative size = 94, normalized size of antiderivative = 1., number of steps used = 8, number of rules used = 5, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.238

$$e^{-a}a^3(-b)\text{ExpIntegralEi}(-bx)-\frac{a^3e^{-a-bx}}{x}+3e^{-a}a^2b\text{ExpIntegralEi}(-bx)-b^2xe^{-a-bx}-3abe^{-a-bx}-be^{-a-bx}$$

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
```

Rubi in Sympy [A] time = 21.576, size = 82, normalized size = 0.87

$$-a^3be^{-a}\,\text{Ei}\,(-bx)-\frac{a^3e^{-a-bx}}{x}+3a^2be^{-a}\,\text{Ei}\,(-bx)-3abe^{-a-bx}-b^2xe^{-a-bx}-be^{-a-bx}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**3/x**2,x)
```

```
[Out] -a**3*b*exp(-a)*Ei(-b*x) - a**3*exp(-a - b*x)/x + 3*a**2*b*exp(-a
)*Ei(-b*x) - 3*a*b*exp(-a - b*x) - b**2*x*exp(-a - b*x) - b*exp(-
a - b*x)
```

Mathematica [A] time = 0.0359424, size = 54, normalized size = 0.57

$$\frac{e^{-a-bx}\left(-a^3-(a-3)a^2bxe^{bx}\text{ExpIntegralEi}(-bx)-3abx-bx(bx+1)\right)}{x}$$

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*ExpIntegralEi[-(b*x)]))/x
```

Maple [A] time = 0.013, size = 92, normalized size = 1.

$$b\left((-bx-a)\,\mathrm{e}^{-bx-a}-\mathrm{e}^{-bx-a}-2\,a\mathrm{e}^{-bx-a}-3\,a^2\mathrm{e}^{-a}Ei\,(1,bx)-a^3\left(\frac{\mathrm{e}^{-bx-a}}{bx}-\mathrm{e}^{-a}Ei\,(1,bx)\right)\right)$$

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)-3*a^2*exp(-a)
*Ei(1,b*x)-a^3*(exp(-b*x-a)/b/x-exp(-a)*Ei(1,b*x)))
```

Maxima [A] time = 0.879935, size = 82, normalized size = 0.87

$$-a^3be^{(-a)}\,(-1,bx)+3\,a^2b\text{Ei}\,(-bx)\,e^{(-a)}-(bx+1)be^{(-bx-a)}-3\,abe^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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)
```

Fricas [A] time = 0.272056, size = 76, normalized size = 0.81

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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
```

Sympy [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: AttributeError

Verification of antiderivative is not currently implemented for this CAS.

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

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

GIAC/XCAS [A] time = 0.263195, size = 124, normalized size = 1.32

$$-\frac{a^{3} b x \mathrm{Ei}\left(-b x\right) e^{\left(-a\right)} - 3 \, a^{2} b x \mathrm{Ei}\left(-b x\right) e^{\left(-a\right)} + b^{2} x^{2} e^{\left(-b x - a\right)} + a^{3} e^{\left(-b x - a\right)} + 3 \, a b x e^{\left(-b x - a\right)} + b x e^{\left(-b x - a\right)}}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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
```

3.62 $\int \frac{e^{-a-bx}(a+bx)^3}{x^3}\,dx$

Optimal. Leaf size=130

$$\frac{1}{2}e^{-a}a^3b^2\text{ExpIntegralEi}(-bx)-\frac{a^3e^{-a-bx}}{2x^2}+\frac{a^3be^{-a-bx}}{2x}-3e^{-a}a^2b^2\text{ExpIntegralEi}(-bx)-\frac{3a^2be^{-a-bx}}{x}+3e^{-a}ab^2\text{ExpIntegralEi}(-bx)-b^2e^{-a-bx}$$

```
[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*E
xpIntegralEi[-(b*x)])/(2*E^a)
```

Rubi [A] time = 0.329603, antiderivative size = 130, normalized size of antiderivative = 1., number of steps used = 9, number of rules used = 4, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.19

$$\frac{1}{2}e^{-a}a^3b^2\text{ExpIntegralEi}(-bx)-\frac{a^3e^{-a-bx}}{2x^2}+\frac{a^3be^{-a-bx}}{2x}-3e^{-a}a^2b^2\text{ExpIntegralEi}(-bx)-\frac{3a^2be^{-a-bx}}{x}+3e^{-a}ab^2\text{ExpIntegralEi}(-bx)-b^2e^{-a-bx}$$

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*E
xpIntegralEi[-(b*x)])/(2*E^a)
```

Rubi in Sympy [A] time = 23.9543, size = 116, normalized size = 0.89

$$\frac{a^3b^2e^{-a}\,\text{Ei}\,(-bx)}{2}+\frac{a^3be^{-a-bx}}{2x}-\frac{a^3e^{-a-bx}}{2x^2}-3a^2b^2e^{-a}\,\text{Ei}\,(-bx)-\frac{3a^2be^{-a-bx}}{x}+3ab^2e^{-a}\,\text{Ei}\,(-bx)-b^2e^{-a-bx}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**3/x**3,x)
```

```
[Out] a**3*b**2*exp(-a)*Ei(-b*x)/2 + a**3*b*exp(-a - b*x)/(2*x) - a**3*
exp(-a - b*x)/(2*x**2) - 3*a**2*b**2*exp(-a)*Ei(-b*x) - 3*a**2*b*
```

```
exp(-a - b*x)/x + 3*a*b**2*exp(-a)*Ei(-b*x) - b**2*exp(-a - b*x)
```

Mathematica [A] time = 0.04669, size = 68, normalized size = 0.52

$$\frac{e^{-a-bx}\left(a^3(bx-1)+\left(a^2-6a+6\right)ab^2x^2e^{bx}\text{ExpIntegralEi}(-bx)-6a^2bx-2b^2x^2\right)}{2x^2}$$

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)
```

Maple [A] time = 0.013, size = 112, normalized size = 0.9

$$-b^2\left(\mathrm{e}^{-bx-a}+3\,a\mathrm{e}^{-a}Ei\,(1,bx)-a^3\left(-\frac{\mathrm{e}^{-bx-a}}{2\,b^2x^2}+\frac{\mathrm{e}^{-bx-a}}{2\,bx}-\frac{\mathrm{e}^{-a}Ei\,(1,bx)}{2}\right)+3\,a^2\left(\frac{\mathrm{e}^{-bx-a}}{bx}-\mathrm{e}^{-a}Ei\,(1,bx)\right)\right)$$

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*exp(-a)*Ei(1,b*x)-a^3*(-1/2*exp(-b*x-a)/b^2
/x^2+1/2*exp(-b*x-a)/b/x-1/2*exp(-a)*Ei(1,b*x))+3*a^2*(exp(-b*x-a
)/b/x-exp(-a)*Ei(1,b*x)))
```

Maxima [A] time = 0.875049, size = 86, normalized size = 0.66

$$-a^3b^2e^{(-a)}\,(-2,bx)-3\,a^2b^2e^{(-a)}\,(-1,bx)+3\,ab^2\text{Ei}\,(-bx)\,e^{(-a)}-b^2e^{(-bx-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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)
```

Fricas [A] time = 0.243611, size = 95, normalized size = 0.73

$$\frac{\left(a^{3}-6\,a^{2}+6\,a\right)b^{2}x^{2}\mathrm{Ei}\left(-bx\right)e^{(-a)}-\left(2\,b^{2}x^{2}+a^{3}-\left(a^{3}-6\,a^{2}\right)bx\right)e^{(-bx-a)}}{2\,x^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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
```

Sympy [A] time = 22.6113, size = 133, normalized size = 1.02

$$\frac{a^{3}b^{2}e^{-a}\operatorname{Ei}\left(bxe^{i\pi}\right)}{2}+\frac{a^{3}be^{-a}e^{-bx}}{2x}-\frac{a^{3}e^{-a}e^{-bx}}{2x^{2}}-3a^{2}b^{2}e^{-a}\operatorname{Ei}\left(bxe^{i\pi}\right)-\frac{3a^{2}be^{-a}e^{-bx}}{x}+3ab^{2}e^{-a}\operatorname{Ei}\left(bxe^{i\pi}\right)+b^{3}\left(\begin{cases}x & \text{for}\ b=0\\ -\frac{e^{-bx}}{b} & \text{otherwise}\end{cases}\right)e^{-a}$$

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*b**2*exp(-a)*Ei(b*x*exp_polar(I*pi))/2 + a**3*b*exp(-a)*exp(
-b*x)/(2*x) - a**3*exp(-a)*exp(-b*x)/(2*x**2) - 3*a**2*b**2*exp(-
a)*Ei(b*x*exp_polar(I*pi)) - 3*a**2*b*exp(-a)*exp(-b*x)/x + 3*a*b
**2*exp(-a)*Ei(b*x*exp_polar(I*pi)) + b**3*Piecewise((x, Eq(b, 0)
), (-exp(-b*x)/b, True))*exp(-a)
```

GIAC/XCAS [A] time = 0.266126, size = 169, normalized size = 1.3

$$\frac{a^{3}b^{2}x^{2}\mathrm{Ei}\left(-bx\right)e^{(-a)}-6\,a^{2}b^{2}x^{2}\mathrm{Ei}\left(-bx\right)e^{(-a)}+6\,ab^{2}x^{2}\mathrm{Ei}\left(-bx\right)e^{(-a)}+a^{3}bxe^{(-bx-a)}-6\,a^{2}bxe^{(-bx-a)}-2\,b^{2}x^{2}e^{(-bx-a)}-a^{3}}{2\,x^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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
```

3.63 $\int \frac{e^{-a-bx}(a+bx)^3}{x^4}\,dx$

Optimal. Leaf size=198

$$-\frac{1}{6}e^{-a}a^3b^3\text{ExpIntegralEi}(-bx)-\frac{a^3b^2e^{-a-bx}}{6x}-\frac{a^3e^{-a-bx}}{3x^3}+\frac{a^3be^{-a-bx}}{6x^2}+\frac{3}{2}e^{-a}a^2b^3\text{ExpIntegralEi}(-bx)+\frac{3a^2b^2e^{-a-bx}}{2x}-\frac{3a^2be^{-a-bx}}{2x^2}-3e^{-a}ab^3\text{ExpIntegralEi}(-bx)+e^{-a}b^3\text{ExpIntegralEi}(-bx)-\frac{3ab^2e^{-a-bx}}{x}$$

```
[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*ExpIn
tegralEi[-(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)
```

Rubi [A] time = 0.460272, antiderivative size = 198, normalized size of antiderivative = 1., number of steps used = 12, number of rules used = 3, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143

$$-\frac{1}{6}e^{-a}a^3b^3\text{ExpIntegralEi}(-bx)-\frac{a^3b^2e^{-a-bx}}{6x}-\frac{a^3e^{-a-bx}}{3x^3}+\frac{a^3be^{-a-bx}}{6x^2}+\frac{3}{2}e^{-a}a^2b^3\text{ExpIntegralEi}(-bx)+\frac{3a^2b^2e^{-a-bx}}{2x}-\frac{3a^2be^{-a-bx}}{2x^2}-3e^{-a}ab^3\text{ExpIntegralEi}(-bx)+e^{-a}b^3\text{ExpIntegralEi}(-bx)-\frac{3ab^2e^{-a-bx}}{x}$$

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*ExpIn
tegralEi[-(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)
```

Rubi in Sympy [A] time = 30.6649, size = 180, normalized size = 0.91

$$-\frac{a^3b^3e^{-a}\operatorname{Ei}(-bx)}{6}-\frac{a^3b^2e^{-a-bx}}{6x}+\frac{a^3be^{-a-bx}}{6x^2}-\frac{a^3e^{-a-bx}}{3x^3}+\frac{3a^2b^3e^{-a}\operatorname{Ei}(-bx)}{2}+\frac{3a^2b^2e^{-a-bx}}{2x}-\frac{3a^2be^{-a-bx}}{2x^2}-3ab^3e^{-a}\operatorname{Ei}(-bx)-\frac{3ab^2e^{-a-bx}}{x}+b^3e^{-a}\operatorname{Ei}(-bx)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**3/x**4,x)
```

```
[Out] -a**3*b**3*exp(-a)*Ei(-b*x)/6 - a**3*b**2*exp(-a - b*x)/(6*x) + a
**3*b*exp(-a - b*x)/(6*x**2) - a**3*exp(-a - b*x)/(3*x**3) + 3*a*
*2*b**3*exp(-a)*Ei(-b*x)/2 + 3*a**2*b**2*exp(-a - b*x)/(2*x) - 3*
a**2*b*exp(-a - b*x)/(2*x**2) - 3*a*b**3*exp(-a)*Ei(-b*x) - 3*a*b
**2*exp(-a - b*x)/x + b**3*exp(-a)*Ei(-b*x)
```

Mathematica [A] time = 0.0800223, size = 81, normalized size = 0.41

$$\frac{1}{6}e^{-a}\left(-\frac{ae^{-bx}\left(a^2\left(b^2x^2-bx+2\right)-9abx(bx-1)+18b^2x^2\right)}{x^3}-\left(a^3-9a^2+18a-6\right)b^3\text{ExpIntegralEi}(-bx)\right)$$

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)
```

Maple [A] time = 0.012, size = 167, normalized size = 0.8

$$b^3\left(-e^{-a}Ei(1,bx)+3a^2\left(-1/2\frac{e^{-bx-a}}{b^2x^2}+1/2\frac{e^{-bx-a}}{bx}-1/2e^{-a}Ei(1,bx)\right)-3a\left(\frac{e^{-bx-a}}{bx}-e^{-a}Ei(1,bx)\right)-a^3\left(\frac{e^{-bx-a}}{3b^3x^3}-\frac{e^{-bx-a}}{6b^2x^2}+\frac{e^{-bx-a}}{6bx}-\frac{e^{-a}Ei(}{6}\right.\right.$$

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*(-exp(-a)*Ei(1,b*x)+3*a^2*(-1/2*exp(-b*x-a)/b^2/x^2+1/2*exp(-
b*x-a)/b/x-1/2*exp(-a)*Ei(1,b*x))-3*a*(exp(-b*x-a)/b/x-exp(-a)*Ei
(1,b*x))-a^3*(1/3*exp(-b*x-a)/b^3/x^3-1/6*exp(-b*x-a)/b^2/x^2+1/6
*exp(-b*x-a)/b/x-1/6*exp(-a)*Ei(1,b*x)))
```

Maxima [A] time = 0.854917, size = 85, normalized size = 0.43

$$-a^3b^3e^{(-a)}(-3,bx) - 3\,a^2b^3e^{(-a)}(-2,bx) - 3\,ab^3e^{(-a)}(-1,bx) + b^3\text{Ei}(-bx)\,e^{(-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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)
```

Fricas [A] time = 0.253225, size = 112, normalized size = 0.57

$$-\frac{\left(a^3-9\,a^2+18\,a-6\right)b^3x^3\text{Ei}(-bx)\,e^{(-a)}+\left(\left(a^3-9\,a^2+18\,a\right)b^2x^2+2\,a^3-\left(a^3-9\,a^2\right)bx\right)e^{(-bx-a)}}{6\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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
```

Sympy [A] time = 28.6214, size = 194, normalized size = 0.98

$$-\frac{a^3b^3e^{-a}\operatorname{Ei}\left(bxe^{i\pi}\right)}{6}-\frac{a^3b^2e^{-a}e^{-bx}}{6x}+\frac{a^3be^{-a}e^{-bx}}{6x^2}-\frac{a^3e^{-a}e^{-bx}}{3x^3}+\frac{3a^2b^3e^{-a}\operatorname{Ei}\left(bxe^{i\pi}\right)}{2}+\frac{3a^2b^2e^{-a}e^{-bx}}{2x}-\frac{3a^2be^{-a}e^{-bx}}{2x^2}-3ab^3e^{-a}\operatorname{Ei}\left(bxe^{i\pi}\right)-\frac{3ab^2e^{-a}e^{-bx}}{x}+b^3e^{-a}\operatorname{Ei}\left(bxe^{i\pi}\right)$$

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*b**3*exp(-a)*Ei(b*x*exp_polar(I*pi))/6 - a**3*b**2*exp(-a)*
exp(-b*x)/(6*x) + a**3*b*exp(-a)*exp(-b*x)/(6*x**2) - a**3*exp(-a
)*exp(-b*x)/(3*x**3) + 3*a**2*b**3*exp(-a)*Ei(b*x*exp_polar(I*pi)
)/2 + 3*a**2*b**2*exp(-a)*exp(-b*x)/(2*x) - 3*a**2*b*exp(-a)*exp(
-b*x)/(2*x**2) - 3*a*b**3*exp(-a)*Ei(b*x*exp_polar(I*pi)) - 3*a*b
**2*exp(-a)*exp(-b*x)/x + b**3*exp(-a)*Ei(b*x*exp_polar(I*pi))
```

GIAC/XCAS [A] time = 0.264831, size = 247, normalized size = 1.25

$$-\frac{a^3b^3x^3\text{Ei}\left(-bx\right)e^{(-a)} - 9\,a^2b^3x^3\text{Ei}\left(-bx\right)e^{(-a)} + 18\,ab^3x^3\text{Ei}\left(-bx\right)e^{(-a)} + a^3b^2x^2e^{(-bx-a)} - 6\,b^3x^3\text{Ei}\left(-bx\right)e^{(-a)} - 9\,a^2b^2x^2e}{6\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^3*e^(-b*x - a)/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
```

3.64 $\int F^{a+b(c+dx)}x^m(e+fx)^2\,dx$

Optimal. Leaf size=139

$$\frac{f^2x^mF^{a+bc}(-bdx\log(F))^{-m}\text{Gamma}(m+3,-bdx\log(F))}{b^3d^3\log^3(F)} - \frac{2efx^mF^{a+bc}(-bdx\log(F))^{-m}\text{Gamma}(m+2,-bdx\log(F))}{b^2d^2\log^2(F)} + \frac{e^2x^mF^{a+bc}(-bdx\log(F))^{-m}\text{Gamma}(m+1,-bdx\log(F))}{bd\log(F)}$$

```
[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)
```

Rubi [A] time = 0.488747, antiderivative size = 139, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 2, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}} = 0.091$

$$\frac{f^2x^mF^{a+bc}(-bdx\log(F))^{-m}\text{Gamma}(m+3,-bdx\log(F))}{b^3d^3\log^3(F)} - \frac{2efx^mF^{a+bc}(-bdx\log(F))^{-m}\text{Gamma}(m+2,-bdx\log(F))}{b^2d^2\log^2(F)} + \frac{e^2x^mF^{a+bc}(-bdx\log(F))^{-m}\text{Gamma}(m+1,-bdx\log(F))}{bd\log(F)}$$

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)
```

Rubi in Sympy [A] time = 29.4857, size = 148, normalized size = 1.06

$$\frac{F^{a+bc}e^2x^m\left(-bdx\log\left(F\right)\right)^{-m}\left(m+1,-bdx\log\left(F\right)\right)}{bd\log\left(F\right)} - \frac{2F^{a+bc}efx^m\left(-bdx\log\left(F\right)\right)^{-m}\left(m+2,-bdx\log\left(F\right)\right)}{b^2d^2\log\left(F\right)^2} + \frac{F^{a+bc}f^2x^m\left(-bdx\log\left(F\right)\right)^{-m}\left(m+3,-bdx\log\left(F\right)\right)}{b^3d^3\log\left(F\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F**(a + b*c)*e**2*x**m*(-b*d*x*log(F))**(-m)*Gamma(m + 1, -b*d*x*
log(F))/(b*d*log(F)) - 2*F**(a + b*c)*e*f*x**m*(-b*d*x*log(F))**(
-m)*Gamma(m + 2, -b*d*x*log(F))/(b**2*d**2*log(F)**2) + F**(a + b
*c)*f**2*x**m*(-b*d*x*log(F))**(-m)*Gamma(m + 3, -b*d*x*log(F))/(
b**3*d**3*log(F)**3)
```

Mathematica [A] time = 0.141658, size = 86, normalized size = 0.62

$$\frac{x^mF^{a+bc}(-bdx\log(F))^{-m}\left(bde\log(F)(bde\log(F)\text{Gamma}(m+1,-bdx\log(F))-2f\text{Gamma}(m+2,-bdx\log(F)))+f^2\text{Gamm}\right.}{b^3d^3\log^3(F)}$$

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*Gamma[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)
```

Maple [B] time = 0.13, size = 433, normalized size = 3.1

$$-\frac{(\ln(F))^{-3-m}(-bd)^{-m}F^{cb+a}f^2\left(x^m(-bd)^m(\ln(F))^m m\left(m^2+3m+2\right)(m)(-bdx\ln(F))^{-m}-x^m(-bd)^m(\ln(F))^m\left(b^2d^2x^2\right.\right.}{}$$
$$+2\frac{(\ln(F))^{-2-m}(-bd)^{-m}F^{cb+a}fe\left(x^m(-bd)^m(\ln(F))^m(1+m)m(m)(-bdx\ln(F))^{-m}+x^m(-bd)^m(\ln(F))^m(bdx\ln(F)-1\right.}{b^2d^2}$$
$$-\frac{F^{cb+a}(-bd)^{-m}(\ln(F))^{-m-1}e^2\left(x^m(-bd)^m(\ln(F))^m m(m)(-bdx\ln(F))^{-m}-x^m(-bd)^m(\ln(F))^m e^{bdx\ln(F)}-x^m(-bd)^m\right.}{bd}$$

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] -1/b^3/d^3*ln(F)^(-3-m)*(-b*d)^(-m)*F^(b*c+a)*f^2*(x^m*(-b*d)^m*l
n(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*ln(F)^m*m*(m^2+3*m+2)*(-b*d*x*ln(F
))^(-m)*GAMMA(m,-b*d*x*ln(F)))+2/b^2/d^2*ln(F)^(-2-m)*(-b*d)^(-m)
*F^(b*c+a)*f*e*(x^m*(-b*d)^m*ln(F)^m*(1+m)*m*GAMMA(m)*(-b*d*x*ln(
F))^(-m)+x^m*(-b*d)^m*ln(F)^m*(b*d*x*ln(F)-1-m)*exp(b*d*x*ln(F))-
x^m*(-b*d)^m*ln(F)^m*(1+m)*m*(-b*d*x*ln(F))^(-m)*GAMMA(m,-b*d*x*l
n(F)))-F^(b*c+a)*(-b*d)^(-m)*ln(F)^(-m-1)*e^2/b/d*(x^m*(-b*d)^m*l
n(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 = 1.04178, size = 166, normalized size = 1.19

$$\begin{aligned} &-(-bdx\log(F))^{-m-3}F^{bc+a}f^2x^{m+3}(m+3,-bdx\log(F)) \\ &\quad -2\,(-bdx\log(F))^{-m-2}F^{bc+a}efx^{m+2}(m+2,-bdx\log(F)) \\ &\quad -(-bdx\log(F))^{-m-1}F^{bc+a}e^2x^{m+1}(m+1,-bdx\log(F)) \end{aligned}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.289515, size = 217, normalized size = 1.56

$$-\frac{\left(\left(bdf^2m+2\,bdf^2\right)x\log(F)-\left(b^2d^2f^2x^2+2\,b^2d^2efx\right)\log(F)^2\right)F^{bdx+bc+a}x^m-\left(b^2d^2e^2\log(F)^2+f^2m^2+3\,f^2m+2\,f^2-\right.}{b^3d^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

Timed out

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] Timed out
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.65 $\int F^{a+b(c+dx)}x^3(e+fx)^2\,dx$

Optimal. Leaf size=414

$$-\frac{120f^2F^{a+bc+bdx}}{b^6d^6\log^6(F)}+\frac{48efF^{a+bc+bdx}}{b^5d^5\log^5(F)}+\frac{120f^2xF^{a+bc+bdx}}{b^5d^5\log^5(F)}-\frac{6e^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{48efxF^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{60f^2x^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{6e^2xF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{24efx^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{20f^2x^3F^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{3e^2x^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{8efx^3F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{5f^2x^4F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{e^2x^3F^{a+bc+bdx}}{bd\log(F)}+\frac{2efx^4F^{a+bc+bdx}}{bd\log(F)}+\frac{f^2x^5F^{a+bc+bdx}}{bd\log(F)}$$

```
[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*Log[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])
```

Rubi [A] time = 1.10882, antiderivative size = 414, normalized size of antiderivative = 1., number of steps used = 17, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}} = 0.136$

$$-\frac{120f^2F^{a+bc+bdx}}{b^6d^6\log^6(F)}+\frac{48efF^{a+bc+bdx}}{b^5d^5\log^5(F)}+\frac{120f^2xF^{a+bc+bdx}}{b^5d^5\log^5(F)}-\frac{6e^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{48efxF^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{60f^2x^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{6e^2xF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{24efx^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{20f^2x^3F^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{3e^2x^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{8efx^3F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{5f^2x^4F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{e^2x^3F^{a+bc+bdx}}{bd\log(F)}+\frac{2efx^4F^{a+bc+bdx}}{bd\log(F)}+\frac{f^2x^5F^{a+bc+bdx}}{bd\log(F)}$$

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*Log[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])
```

Rubi in Sympy [A] time = 87.8046, size = 449, normalized size = 1.08

$$\frac{F^{a+bc+bdx}e^2x^3}{bd\log(F)}+\frac{2F^{a+bc+bdx}efx^4}{bd\log(F)}+\frac{F^{a+bc+bdx}f^2x^5}{bd\log(F)}-\frac{3F^{a+bc+bdx}e^2x^2}{b^2d^2\log(F)^2}-\frac{8F^{a+bc+bdx}efx^3}{b^2d^2\log(F)^2}-\frac{5F^{a+bc+bdx}f^2x^4}{b^2d^2\log(F)^2}+\frac{6F^{a+bc+bdx}e^2x}{b^3d^3\log(F)^3}+\frac{24F^{a+bc+bdx}efx^2}{b^3d^3\log(F)^3}+\frac{20F^{a+bc+bdx}f^2x^3}{b^3d^3\log(F)^3}-\frac{6F^{a+bc+bdx}e^2}{b^4d^4\log(F)^4}-\frac{48F^{a+bc+bdx}efx}{b^4d^4\log(F)^4}-\frac{60F^{a+bc+bdx}f^2x^2}{b^4d^4\log(F)^4}+\frac{48F^{a+bc+bdx}ef}{b^5d^5\log(F)^5}+\frac{120F^{a+bc+bdx}f^2x}{b^5d^5\log(F)^5}-\frac{120F^{a+bc+bdx}f^2}{b^6d^6\log(F)^6}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] F**(a + b*c + b*d*x)*e**2*x**3/(b*d*log(F)) + 2*F**(a + b*c + b*d
*x)*e*f*x**4/(b*d*log(F)) + F**(a + b*c + b*d*x)*f**2*x**5/(b*d*l
og(F)) - 3*F**(a + b*c + b*d*x)*e**2*x**2/(b**2*d**2*log(F)**2) -
 8*F**(a + b*c + b*d*x)*e*f*x**3/(b**2*d**2*log(F)**2) - 5*F**(a
+ b*c + b*d*x)*f**2*x**4/(b**2*d**2*log(F)**2) + 6*F**(a + b*c +
b*d*x)*e**2*x/(b**3*d**3*log(F)**3) + 24*F**(a + b*c + b*d*x)*e*f
*x**2/(b**3*d**3*log(F)**3) + 20*F**(a + b*c + b*d*x)*f**2*x**3/(
b**3*d**3*log(F)**3) - 6*F**(a + b*c + b*d*x)*e**2/(b**4*d**4*log
(F)**4) - 48*F**(a + b*c + b*d*x)*e*f*x/(b**4*d**4*log(F)**4) - 6
0*F**(a + b*c + b*d*x)*f**2*x**2/(b**4*d**4*log(F)**4) + 48*F**(a
 + b*c + b*d*x)*e*f/(b**5*d**5*log(F)**5) + 120*F**(a + b*c + b*d
*x)*f**2*x/(b**5*d**5*log(F)**5) - 120*F**(a + b*c + b*d*x)*f**2/
(b**6*d**6*log(F)**6)
```

Mathematica [A] time = 0.097239, size = 159, normalized size = 0.38

$$\frac{F^{a+b(c+dx)}\left(b^5d^5x^3\log^5(F)(e+fx)^2-b^4d^4x^2\log^4(F)\left(3e^2+8efx+5f^2x^2\right)+2b^3d^3x\log^3(F)\left(3e^2+12efx+10f^2x^2\right)-6b^2\right.}{b^6d^6\log^6(F)}$$

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)
```

Maple [A] time = 0.014, size = 250, normalized size = 0.6

$$\frac{\left(f^2x^5\left(\ln\left(F\right)\right)^5b^5d^5+2\left(\ln\left(F\right)\right)^5b^5d^5efx^4+\left(\ln\left(F\right)\right)^5b^5d^5e^2x^3-5\left(\ln\left(F\right)\right)^4b^4d^4f^2x^4-8\left(\ln\left(F\right)\right)^4b^4d^4efx^3-3\left(\ln\left(F\right)\right)^4b^4\right.}{}$$

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*l
n(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 = 0.791497, size = 443, normalized size = 1.07

$$\frac{\left(F^{bc+a}b^3d^3x^3\log\left(F\right)^3-3\,F^{bc+a}b^2d^2x^2\log\left(F\right)^2+6\,F^{bc+a}bdx\log\left(F\right)-6\,F^{bc+a}\right)F^{bdx}e^2}{b^4d^4\log\left(F\right)^4}+\frac{2\left(F^{bc+a}b^4d^4x^4\log\left(F\right)^4-4\,F^{bc+a}b^3d^3x^3\log\left(F\right)^3+12\,F^{bc+a}b^2d^2x^2\log\left(F\right)^2-24\,F^{bc+a}bdx\log\left(F\right)+24\,F^{bc+a}\right)F^{bdx}ef}{b^5d^5\log\left(F\right)^5}+\frac{\left(F^{bc+a}b^5d^5x^5\log\left(F\right)^5-5\,F^{bc+a}b^4d^4x^4\log\left(F\right)^4+20\,F^{bc+a}b^3d^3x^3\log\left(F\right)^3-60\,F^{bc+a}b^2d^2x^2\log\left(F\right)^2+120\,F^{bc+a}bdx\log\left(F\right.\right.}{b^6d^6\log\left(F\right)^6}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.261049, size = 308, normalized size = 0.74

$$\frac{\left(\left(b^5d^5f^2x^5 + 2\,b^5d^5efx^4 + b^5d^5e^2x^3\right)\log\left(F\right)^5 - \left(5\,b^4d^4f^2x^4 + 8\,b^4d^4efx^3 + 3\,b^4d^4e^2x^2\right)\log\left(F\right)^4 + 2\,\left(10\,b^3d^3f^2x^3 + 12\,b^3 \cdots\right.\right.}{b^6 \cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.601954, size = 323, normalized size = 0.78

$$\begin{cases} \frac{F^{a+b(c+dx)}\left(b^5d^5e^2x^3\log\left(F\right)^5+2b^5d^5efx^4\log\left(F\right)^5+b^5d^5f^2x^5\log\left(F\right)^5-3b^4d^4e^2x^2\log\left(F\right)^4-8b^4d^4efx^3\log\left(F\right)^4-5b^4d^4f^2x^4\log\left(F\right)^4+6b^3d^3e^2x\log\left(F\right)^3+24b^3 \cdots\right.}{b^6d^6\log\left(F\right)^6} & \cdots \\ \frac{e^2x^4}{4} + \frac{2efx^5}{5} + \frac{f^2x^6}{6} & \cdots \end{cases}$$

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))
```

GIAC/XCAS [A] time = 0.369523, size = 1, normalized size = 0.

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

3.66 $\int F^{a+b(c+dx)}x^2(e+fx)^2\,dx$

Optimal. Leaf size=328

$$\frac{24f^2F^{a+bc+bdx}}{b^5d^5\log^5(F)}-\frac{12efF^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{24f^2xF^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{2e^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{12efxF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{12f^2x^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{2e^2xF^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{6efx^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{4f^2x^3F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{e^2x^2F^{a+bc+bdx}}{bd\log(F)}+\frac{2efx^3F^{a+bc+bdx}}{bd\log(F)}+\frac{f^2x^4F^{a+bc+bdx}}{bd\log(F)}$$

```
[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])
```

Rubi [A] time = 0.86392, antiderivative size = 328, normalized size of antiderivative = 1., number of steps used = 14, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}} = 0.136$

$$\frac{24f^2F^{a+bc+bdx}}{b^5d^5\log^5(F)}-\frac{12efF^{a+bc+bdx}}{b^4d^4\log^4(F)}-\frac{24f^2xF^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{2e^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{12efxF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{12f^2x^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{2e^2xF^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{6efx^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{4f^2x^3F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{e^2x^2F^{a+bc+bdx}}{bd\log(F)}+\frac{2efx^3F^{a+bc+bdx}}{bd\log(F)}+\frac{f^2x^4F^{a+bc+bdx}}{bd\log(F)}$$

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])
```

Rubi in Sympy [A] time = 68.9908, size = 352, normalized size = 1.07

$$\frac{F^{a+bc+bdx}e^2x^2}{bd\log(F)}+\frac{2F^{a+bc+bdx}efx^3}{bd\log(F)}+\frac{F^{a+bc+bdx}f^2x^4}{bd\log(F)}-\frac{2F^{a+bc+bdx}e^2x}{b^2d^2\log(F)^2}-\frac{6F^{a+bc+bdx}efx^2}{b^2d^2\log(F)^2}-\frac{4F^{a+bc+bdx}f^2x^3}{b^2d^2\log(F)^2}+\frac{2F^{a+bc+bdx}e^2}{b^3d^3\log(F)^3}+\frac{12F^{a+bc+bdx}efx}{b^3d^3\log(F)^3}+\frac{12F^{a+bc+bdx}f^2x^2}{b^3d^3\log(F)^3}-\frac{12F^{a+bc+bdx}ef}{b^4d^4\log(F)^4}-\frac{24F^{a+bc+bdx}f^2x}{b^4d^4\log(F)^4}+\frac{24F^{a+bc+bdx}f^2}{b^5d^5\log(F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0891082, size = 121, normalized size = 0.37

$$\frac{F^{a+b(c+dx)}\left(b^4d^4x^2\log^4(F)(e+fx)^2-2b^3d^3x\log^3(F)\left(e^2+3efx+2f^2x^2\right)+2b^2d^2\log^2(F)\left(e^2+6efx+6f^2x^2\right)-12bdf\,\text{lo}\right.}{b^5d^5\log^5(F)}$$

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)
```

Maple [A] time = 0.014, size = 197, normalized size = 0.6

$$\frac{\left((\ln (F))^4 b^4 d^4 f^2 x^4 + 2 (\ln (F))^4 b^4 d^4 e f x^3 + (\ln (F))^4 b^4 d^4 e^2 x^2 - 4 (\ln (F))^3 b^3 d^3 f^2 x^3 - 6 (\ln (F))^3 b^3 d^3 e f x^2 - 2 (\ln (F))^3 b^3 \cdots}{(\ln (\cdots}$$

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

Maxima [A] time = 0.821868, size = 354, normalized size = 1.08

$$\frac{\left(F^{bc+a} b^2 d^2 x^2 \log (F)^2 - 2 F^{bc+a} b d x \log (F) + 2 F^{bc+a}\right) F^{bdx} e^2}{b^3 d^3 \log (F)^3} + \frac{2 \left(F^{bc+a} b^3 d^3 x^3 \log (F)^3 - 3 F^{bc+a} b^2 d^2 x^2 \log (F)^2 + 6 F^{bc+a} b d x \log (F) - 6 F^{bc+a}\right) F^{bdx} e f}{b^4 d^4 \log (F)^4} + \frac{\left(F^{bc+a} b^4 d^4 x^4 \log (F)^4 - 4 F^{bc+a} b^3 d^3 x^3 \log (F)^3 + 12 F^{bc+a} b^2 d^2 x^2 \log (F)^2 - 24 F^{bc+a} b d x \log (F) + 24 F^{bc+a}\right) F^{bdx} f^2}{b^5 d^5 \log (F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((f*x + e)^2*F^((d*x + c)*b + a)*x^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*log(F)
^5)
```

Fricas [A] time = 0.263431, size = 240, normalized size = 0.73

$$\frac{\left(\left(b^4 d^4 f^2 x^4 + 2 b^4 d^4 e f x^3 + b^4 d^4 e^2 x^2\right) \log (F)^4 - 2 \left(2 b^3 d^3 f^2 x^3 + 3 b^3 d^3 e f x^2 + b^3 d^3 e^2 x\right) \log (F)^3 + 2 \left(6 b^2 d^2 f^2 x^2 + 6 b^2 d^2 e \cdots\right.}{b^5 d^5 \log (F)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.546149, size = 260, normalized size = 0.79

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

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*log(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))
```

GIAC/XCAS [A] time = 0.341357, size = 1, normalized size = 0.

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

3.67 $\int F^{a+b(c+dx)}x(e+fx)^2\,dx$

Optimal. Leaf size=242

$$-\frac{6f^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{4efF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{6f^2xF^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{e^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{4efxF^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{3f^2x^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{e^2xF^{a+bc+bdx}}{bd\log(F)}+\frac{2efx^2F^{a+bc+bdx}}{bd\log(F)}+\frac{f^2x^3F^{a+bc+bdx}}{bd\log(F)}$$

```
[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])
```

Rubi [A] time = 0.583605, antiderivative size = 242, normalized size of antiderivative = 1., number of steps used = 11, number of rules used = 3, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.15

$$-\frac{6f^2F^{a+bc+bdx}}{b^4d^4\log^4(F)}+\frac{4efF^{a+bc+bdx}}{b^3d^3\log^3(F)}+\frac{6f^2xF^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{e^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{4efxF^{a+bc+bdx}}{b^2d^2\log^2(F)}-\frac{3f^2x^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{e^2xF^{a+bc+bdx}}{bd\log(F)}+\frac{2efx^2F^{a+bc+bdx}}{bd\log(F)}+\frac{f^2x^3F^{a+bc+bdx}}{bd\log(F)}$$

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])
```

Rubi in Sympy [A] time = 47.535, size = 253, normalized size = 1.05

$$\frac{F^{a+bc+bdx}e^2x}{bd\log(F)}+\frac{2F^{a+bc+bdx}efx^2}{bd\log(F)}+\frac{F^{a+bc+bdx}f^2x^3}{bd\log(F)}-\frac{F^{a+bc+bdx}e^2}{b^2d^2\log(F)^2}-\frac{4F^{a+bc+bdx}efx}{b^2d^2\log(F)^2}-\frac{3F^{a+bc+bdx}f^2x^2}{b^2d^2\log(F)^2}+\frac{4F^{a+bc+bdx}ef}{b^3d^3\log(F)^3}+\frac{6F^{a+bc+bdx}f^2x}{b^3d^3\log(F)^3}-\frac{6F^{a+bc+bdx}f^2}{b^4d^4\log(F)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0777754, 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)
```

Maple [A] time = 0.012, size = 144, normalized size = 0.6

$$\frac{\left((\ln(F))^3 b^3d^3f^2x^3+2\,(\ln(F))^3 b^3d^3efx^2+(\ln(F))^3 b^3d^3e^2x-3\,(\ln(F))^2 b^2d^2f^2x^2-4\,(\ln(F))^2 b^2d^2efx-(\ln(F))^2 b^2d^2e^2}{(\ln(F))^4 b^4d^4}$$

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

Maxima [A] time = 0.828295, size = 265, normalized size = 1.1

$$\frac{\left(F^{bc+a}bdx\log\left(F\right)-F^{bc+a}\right)F^{bdx}e^{2}}{b^{2}d^{2}\log\left(F\right)^{2}}+\frac{2\left(F^{bc+a}b^{2}d^{2}x^{2}\log\left(F\right)^{2}-2F^{bc+a}bdx\log\left(F\right)+2F^{bc+a}\right)F^{bdx}ef}{b^{3}d^{3}\log\left(F\right)^{3}}+\frac{\left(F^{bc+a}b^{3}d^{3}x^{3}\log\left(F\right)^{3}-3F^{bc+a}b^{2}d^{2}x^{2}\log\left(F\right)^{2}+6F^{bc+a}bdx\log\left(F\right)-6F^{bc+a}\right)F^{bdx}f^{2}}{b^{4}d^{4}\log\left(F\right)^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.273116, size = 178, normalized size = 0.74

$$\frac{\left(\left(b^{3}d^{3}f^{2}x^{3}+2\,b^{3}d^{3}efx^{2}+b^{3}d^{3}e^{2}x\right)\log\left(F\right)^{3}-\left(3\,b^{2}d^{2}f^{2}x^{2}+4\,b^{2}d^{2}efx+b^{2}d^{2}e^{2}\right)\log\left(F\right)^{2}-6\,f^{2}+2\left(3\,bdf^{2}x+2\,bdef\right)\,\mathrm{l}}{b^{4}d^{4}\log\left(F\right)^{4}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.46996, size = 199, normalized size = 0.82

$$\begin{cases}\frac{F^{a+b(c+dx)}\left(b^{3}d^{3}e^{2}x\log\left(F\right)^{3}+2b^{3}d^{3}efx^{2}\log\left(F\right)^{3}+b^{3}d^{3}f^{2}x^{3}\log\left(F\right)^{3}-b^{2}d^{2}e^{2}\log\left(F\right)^{2}-4b^{2}d^{2}efx\log\left(F\right)^{2}-3b^{2}d^{2}f^{2}x^{2}\log\left(F\right)^{2}+4bdef\log\left(F\right)+6bdf^{2}x\log\left(F\right.}{b^{4}d^{4}\log\left(F\right)^{4}} \\ \frac{e^{2}x^{2}}{2}+\frac{2efx^{3}}{3}+\frac{f^{2}x^{4}}{4}\end{cases}$$

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))
```

GIAC/XCAS [A] time = 0.346138, size = 1, normalized size = 0.

$$\text{Done}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

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^(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])
```

Rubi [A] time = 0.192087, antiderivative size = 85, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158

$$\frac{2f^2F^{a+bc+bdx}}{b^3d^3\log^3(F)}-\frac{2f(e+fx)F^{a+bc+bdx}}{b^2d^2\log^2(F)}+\frac{(e+fx)^2F^{a+bc+bdx}}{bd\log(F)}$$

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])
```

Rubi in Sympy [A] time = 18.3629, size = 85, normalized size = 1.

$$\frac{F^{a+bc+bdx}\left(e+fx\right)^2}{bd\log\left(F\right)}-\frac{2F^{a+bc+bdx}f\left(e+fx\right)}{b^2d^2\log\left(F\right)^2}+\frac{2F^{a+bc+bdx}f^2}{b^3d^3\log\left(F\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0568514, 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)
```

Maple [A] time = 0.01, size = 93, normalized size = 1.1

$$\frac{\left((\ln(F))^2 b^2d^2f^2x^2+2\,(\ln(F))^2 b^2d^2efx+(\ln(F))^2 b^2d^2e^2-2\,\ln(F)\,bdf^2x-2\,ef\ln(F)\,bd+2\,f^2\right)F^{bdx+cb+a}}{(\ln(F))^3\,b^3d^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.783351, size = 181, normalized size = 2.13

$$\frac{F^{bdx+bc+a}e^2}{bd\log(F)}+\frac{2\left(F^{bc+a}bdx\log(F)-F^{bc+a}\right)F^{bdx}ef}{b^2d^2\log(F)^2}+\frac{\left(F^{bc+a}b^2d^2x^2\log(F)^2-2\,F^{bc+a}bdx\log(F)+2\,F^{bc+a}\right)F^{bdx}f^2}{b^3d^3\log(F)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.253537, size = 115, normalized size = 1.35

$$\frac{\left(\left(b^2d^2f^2x^2 + 2\,b^2d^2efx + b^2d^2e^2\right)\,\log\left(F\right)^2 + 2\,f^2 - 2\,\left(bdf^2x + bdef\right)\,\log\left(F\right)\right)F^{bdx+bc+a}}{b^3d^3\log\left(F\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.408104, 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), N
e(b**3*d**3*log(F)**3, 0)), (e**2*x + e*f*x**2 + f**2*x**3/3, Tru
e))
```

GIAC/XCAS [A] time = 0.292454, size = 1, normalized size = 0.01

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

3.69 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x}\,dx$

Optimal. Leaf size=96

$$-\frac{f^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+e^2F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))+\frac{2efF^{a+bc+bdx}}{bd\log(F)}+\frac{f^2xF^{a+bc+bdx}}{bd\log(F)}$$

```
[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])
```

Rubi [A] time = 0.406891, antiderivative size = 96, normalized size of antiderivative = 1., number of steps used = 6, number of rules used = 4, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182

$$-\frac{f^2F^{a+bc+bdx}}{b^2d^2\log^2(F)}+e^2F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))+\frac{2efF^{a+bc+bdx}}{bd\log(F)}+\frac{f^2xF^{a+bc+bdx}}{bd\log(F)}$$

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])
```

Rubi in Sympy [A] time = 24.0848, size = 94, normalized size = 0.98

$$F^{a+bc}e^2\,\text{Ei}\left(bdx\log\left(F\right)\right)+\frac{2F^{a+bc+bdx}ef}{bd\log\left(F\right)}+\frac{F^{a+bc+bdx}f^2x}{bd\log\left(F\right)}-\frac{F^{a+bc+bdx}f^2}{b^2d^2\log\left(F\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0982223, size = 54, normalized size = 0.56

$$F^{a+bc}\left(\frac{fF^{bdx}(bd\log(F)(2e+fx)-f)}{b^2d^2\log^2(F)}+e^2\text{ExpIntegralEi}(bdx\log(F))\right)$$

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))
```

Maple [A] time = 0.033, size = 119, normalized size = 1.2

$$-e^2F^{cb+a}Ei(1, cb\ln(F)+\ln(F)a-bdx\ln(F)-\ln(F)(cb+a)) + \frac{f^2F^{bdx+cb+a}x}{bd\ln(F)} - \frac{f^2F^{bdx+cb+a}}{(\ln(F))^2b^2d^2} + 2\frac{efF^{bdx+cb+a}}{bd\ln(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Maxima [A] time = 0.80998, size = 117, normalized size = 1.22

$$F^{bc+a}e^2\text{Ei}(bdx\log(F)) + \frac{2F^{bdx+bc+a}ef}{bd\log(F)} + \frac{\left(F^{bc+a}bdx\log(F)-F^{bc+a}\right)F^{bdx}f^2}{b^2d^2\log(F)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.263736, size = 101, normalized size = 1.05

$$\frac{F^{bc+a}b^2d^2e^2\mathrm{Ei}\left(bdx\log\left(F\right)\right)\log\left(F\right)^2-\left(f^2-\left(bdf^2x+2\,bdef\right)\,\log\left(F\right)\right)F^{bdx+bc+a}}{b^2d^2\log\left(F\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.70 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^2}\,dx$

Optimal. Leaf size=85

$$bde^2\log(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{x}+2efF^{a+bc}\text{ExpIntegralEi}(bdx\log(F))+\frac{f^2F^{a+bc+bdx}}{bd\log(F)}$$

```
[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)*ExpIntegralEi[b*d*x*Log[F]]*Log[F]
```

Rubi [A] time = 0.430445, antiderivative size = 85, normalized size of antiderivative = 1., number of steps used = 6, number of rules used = 4, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182

$$bde^2\log(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{x}+2efF^{a+bc}\text{ExpIntegralEi}(bdx\log(F))+\frac{f^2F^{a+bc+bdx}}{bd\log(F)}$$

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)*ExpIntegralEi[b*d*x*Log[F]]*Log[F]
```

Rubi in Sympy [A] time = 20.3791, size = 87, normalized size = 1.02

$$F^{a+bc}bde^2\log(F)\,\text{Ei}\left(bdx\log(F)\right)+2F^{a+bc}ef\,\text{Ei}\left(bdx\log(F)\right)-\frac{F^{a+bc+bdx}e^2}{x}+\frac{F^{a+bc+bdx}f^2}{bd\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

```
b*d*x)*f**2/(b*d*log(F))
```

Mathematica [A] time = 0.109195, size = 58, normalized size = 0.68

$$F^{a+bc}\left(F^{bdx}\left(\frac{f^2}{bd\log(F)}-\frac{e^2}{x}\right)+e(bde\log(F)+2f)\text{ExpIntegralEi}(bdx\log(F))\right)$$

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*ExpInteg
ralEi[b*d*x*Log[F]]*(2*f + b*d*e*Log[F]))
```

Maple [A] time = 0.047, size = 129, normalized size = 1.5

$$-2\,feF^{cb+a}Ei\left(1,cb\ln\left(F\right)+\ln\left(F\right)a-bdx\ln\left(F\right)-\ln\left(F\right)\left(cb+a\right)\right)-\frac{e^2F^{bdx+cb+a}}{x}+\frac{f^2F^{bdx+cb+a}}{bd\ln\left(F\right)}-\ln\left(F\right)bde^2F^{cb+a}Ei\left(1,cb\ln\left(F\right)+\ln\left(F\right)a-bdx\ln\left(F\right)-\ln\left(F\right)\left(cb+a\right)\right)$$

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

Maxima [A] time = 0.824211, size = 92, normalized size = 1.08

$$F^{bc+a}bde^2\left(-1,-bdx\log\left(F\right)\right)\log\left(F\right)+2\,F^{bc+a}ef\,\text{Ei}\left(bdx\log\left(F\right)\right)+\frac{F^{bdx+bc+a}f^2}{bd\log\left(F\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.270982, size = 112, normalized size = 1.32

$$\frac{\left(b^2d^2e^2x\log(F)^2+2\,bdefx\log(F)\right)F^{bc+a}\mathrm{Ei}\left(bdx\log(F)\right)-\left(bde^2\log(F)-f^2x\right)F^{bdx+bc+a}}{bdx\log(F)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.71 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^3}\,dx$

Optimal. Leaf size=136

$$\frac{1}{2}b^2d^2e^2\log^2(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{2x^2}-\frac{bde^2\log(F)F^{a+bc+bdx}}{2x}+2bdef\log(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{2efF^{a+bc+bdx}}{x}+f^2F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))$$

```
[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
```

Rubi [A] time = 0.56159, antiderivative size = 136, normalized size of antiderivative = 1., number of steps used = 8, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}} = 0.136$

$$\frac{1}{2}b^2d^2e^2\log^2(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{2x^2}-\frac{bde^2\log(F)F^{a+bc+bdx}}{2x}+2bdef\log(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{2efF^{a+bc+bdx}}{x}+f^2F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))$$

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
```

Rubi in Sympy [A] time = 25.3953, size = 146, normalized size = 1.07

$$\frac{F^{a+bc}b^2d^2e^2\log(F)^2\operatorname{Ei}(bdx\log(F))}{2}+2F^{a+bc}bdef\log(F)\operatorname{Ei}(bdx\log(F))+F^{a+bc}f^2\operatorname{Ei}(bdx\log(F))-\frac{F^{a+bc+bdx}bde^2\log(F)}{2x}-\frac{F^{a+bc+bdx}e^2}{2x^2}-\frac{2F^{a+bc+bdx}ef}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mathematica [A] time = 0.0758798, size = 76, normalized size = 0.56

$$\frac{F^{a+bc}\left(x^2\left(b^2d^2e^2\log^2(F)+4bdef\log(F)+2f^2\right)\text{ExpIntegralEi}(bdx\log(F))-eF^{bdx}(bdex\log(F)+e+4fx)\right)}{2x^2}$$

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*E
xpIntegralEi[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)
```

Maple [A] time = 0.055, size = 195, normalized size = 1.4

$$-\frac{e^2F^{bdx+cb+a}}{2\,x^2}-\frac{bde^2F^{bdx+cb+a}\ln(F)}{2\,x}-f^2F^{cb+a}Ei(1,cb\ln(F)+\ln(F)\,a-bdx\ln(F)-\ln(F)\,(cb+a))$$
$$-2\,\frac{efF^{bdx+cb+a}}{x}-2\,\ln(F)\,bdfeF^{cb+a}Ei(1,cb\ln(F)+\ln(F)\,a-bdx\ln(F)-\ln(F)\,(cb+a))$$
$$-\frac{(\ln(F))^2\,b^2d^2e^2F^{cb+a}Ei(1,cb\ln(F)+\ln(F)\,a-bdx\ln(F)-\ln(F)\,(cb+a))}{2}$$

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

Maxima [A] time = 0.851818, size = 100, normalized size = 0.74

$$-F^{bc+a}b^2d^2e^2\,(-2,-bdx\log(F))\log(F)^2+2\,F^{bc+a}bdef\,(-1,-bdx\log(F))\log(F)+F^{bc+a}f^2\text{Ei}(bdx\log(F))$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.2842, size = 120, normalized size = 0.88

$$\frac{\left(b^2d^2e^2x^2\log\left(F\right)^2+4\,bdefx^2\log\left(F\right)+2\,f^2x^2\right)F^{bc+a}\mathrm{Ei}\left(bdx\log\left(F\right)\right)-\left(bde^2x\log\left(F\right)+4\,efx+e^2\right)F^{bdx+bc+a}}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.72 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^4}\,dx$

Optimal. Leaf size=217

$$\frac{1}{6}b^3d^3e^2\log^3(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F)) - \frac{b^2d^2e^2\log^2(F)F^{a+bc+bdx}}{6x} + b^2d^2ef\log^2(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F)) - \frac{e^2F^{a+bc+bdx}}{3x^3} - \frac{bde^2\log(F)F^{a+bc+bdx}}{6x^2} - \frac{efF^{a+bc+bdx}}{x^2} - \frac{bdef\log(F)F^{a+bc+bdx}}{x} + bdf^2\log(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F)) - \frac{f^2F^{a+bc+bdx}}{x}$$

```
[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)*Lo
g[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)*ExpInt
egralEi[b*d*x*Log[F]]*Log[F]^2 + (b^3*d^3*e^2*F^(a + b*c)*ExpInte
gralEi[b*d*x*Log[F]]*Log[F]^3)/6
```

Rubi [A] time = 0.720951, antiderivative size = 217, normalized size of antiderivative = 1., number of steps used = 11, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}} = 0.136$

$$\frac{1}{6}b^3d^3e^2\log^3(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F)) - \frac{b^2d^2e^2\log^2(F)F^{a+bc+bdx}}{6x} + b^2d^2ef\log^2(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F)) - \frac{e^2F^{a+bc+bdx}}{3x^3} - \frac{bde^2\log(F)F^{a+bc+bdx}}{6x^2} - \frac{efF^{a+bc+bdx}}{x^2} - \frac{bdef\log(F)F^{a+bc+bdx}}{x} + bdf^2\log(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F)) - \frac{f^2F^{a+bc+bdx}}{x}$$

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)*Lo
g[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)*ExpInt
egralEi[b*d*x*Log[F]]*Log[F]^2 + (b^3*d^3*e^2*F^(a + b*c)*ExpInte
gralEi[b*d*x*Log[F]]*Log[F]^3)/6
```

Rubi in Sympy [A] time = 36.9716, size = 230, normalized size = 1.06

$$\frac{F^{a+bc}b^3d^3e^2\log(F)^3\operatorname{Ei}(bdx\log(F))}{6}+F^{a+bc}b^2d^2ef\log(F)^2\operatorname{Ei}(bdx\log(F))+F^{a+bc}bdf^2\log(F)\operatorname{Ei}(bdx\log(F))-\frac{F^{a+bc+bdx}b^2d^2e^2\log(F)^2}{6x}-\frac{F^{a+bc+bdx}bde^2\log(F)}{6x^2}-\frac{F^{a+bc+bdx}bdef\log(F)}{x}-\frac{F^{a+bc+bdx}e^2}{3x^3}-\frac{F^{a+bc+bdx}ef}{x^2}-\frac{F^{a+bc+bdx}f^2}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(a+b*(d*x+c))*(f*x+e)**2/x**4,x)
```

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

Mathematica [A] time = 0.13435, size = 116, normalized size = 0.53

$$\frac{F^{a+bc}\left(bdx^3\log(F)\left(b^2d^2e^2\log^2(F)+6bdef\log(F)+6f^2\right)\text{ExpIntegralEi}(bdx\log(F))-F^{bdx}\left(b^2d^2e^2x^2\log^2(F)+bdex\log(\right.\right.}{6x^3}$$

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)
```

Maple [A] time = 0.061, size = 275, normalized size = 1.3

$$-(\ln(F))^2 b^2 d^2 f e F^{cb+a} Ei(1, cb\ln(F) + \ln(F)a - bdx\ln(F) - \ln(F)(cb+a)) - \frac{efF^{bdx+cb+a}}{x^2} - \frac{(\ln(F))^3 b^3 d^3 e^2 F^{cb+a} Ei(1, cb\ln(F) + \ln(F)a - bdx\ln(F) - \ln(F)(cb+a))}{6} - \frac{bdefF^{bdx+cb+a}\ln(F)}{x} - \frac{e^2F^{bdx+cb+a}}{3x^3} - \frac{bde^2F^{bdx+cb+a}\ln(F)}{6x^2} - \frac{b^2d^2e^2F^{bdx+cb+a}(\ln(F))^2}{6x} - \frac{f^2F^{bdx+cb+a}}{x} - \ln(F)bdf^2F^{cb+a}Ei(1, cb\ln(F) + \ln(F)a - bdx\ln(F) - \ln(F)(cb+a))$$

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

Maxima [A] time = 0.888627, size = 115, normalized size = 0.53

$$F^{bc+a}b^3d^3e^2(-3, -bdx\log(F))\log(F)^3 - 2F^{bc+a}b^2d^2ef(-2, -bdx\log(F))\log(F)^2 + F^{bc+a}bdf^2(-1, -bdx\log(F))\log(F)$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.258162, size = 185, normalized size = 0.85

$$\frac{\left(b^3d^3e^2x^3\log(F)^3 + 6b^2d^2efx^3\log(F)^2 + 6bdf^2x^3\log(F)\right)F^{bc+a}\mathrm{Ei}(bdx\log(F)) - \left(b^2d^2e^2x^2\log(F)^2 + 6f^2x^2 + 6efx + 2}{6x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

$$\int \frac{F^{a+b(c+dx)}\left(e+fx\right)^{2}}{x^{4}}\,dx$$

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{(fx+e)^{2}F^{(dx+c)b+a}}{x^{4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.73 $\int \frac{F^{a+b(c+dx)}(e+fx)^2}{x^5}\,dx$

Optimal. Leaf size=321

$$\frac{1}{24}b^4d^4e^2\log^4(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{b^3d^3e^2\log^3(F)F^{a+bc+bdx}}{24x}+\frac{1}{3}b^3d^3ef\log^3(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{b^2d^2e^2\log^2(F)F^{a+bc+bdx}}{24x^2}-\frac{b^2d^2ef\log^2(F)F^{a+bc+bdx}}{3x}+\frac{1}{2}b^2d^2f^2\log^2(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{4x^4}-\frac{bde^2\log(F)F^{a+bc+bdx}}{12x^3}-\frac{2efF^{a+bc+bdx}}{3x^3}-\frac{bdef\log(F)F^{a+bc+bdx}}{3x^2}-\frac{f^2F^{a+bc+bdx}}{2x^2}-\frac{bdf^2\log(F)F^{a+bc+bdx}}{2x}$$

```
[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])/(12*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)*ExpIntegr
alEi[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
```

Rubi [A] time = 0.907998, antiderivative size = 321, normalized size of antiderivative = 1., number of steps used = 14, number of rules used = 3, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.136

$$\frac{1}{24}b^4d^4e^2\log^4(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{b^3d^3e^2\log^3(F)F^{a+bc+bdx}}{24x}+\frac{1}{3}b^3d^3ef\log^3(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{b^2d^2e^2\log^2(F)F^{a+bc+bdx}}{24x^2}-\frac{b^2d^2ef\log^2(F)F^{a+bc+bdx}}{3x}+\frac{1}{2}b^2d^2f^2\log^2(F)F^{a+bc}\text{ExpIntegralEi}(bdx\log(F))-\frac{e^2F^{a+bc+bdx}}{4x^4}-\frac{bde^2\log(F)F^{a+bc+bdx}}{12x^3}-\frac{2efF^{a+bc+bdx}}{3x^3}-\frac{bdef\log(F)F^{a+bc+bdx}}{3x^2}-\frac{f^2F^{a+bc+bdx}}{2x^2}-\frac{bdf^2\log(F)F^{a+bc+bdx}}{2x}$$

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])/(12*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)*ExpIntegr
alEi[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
```

Rubi in Sympy [A] time = 50.1695, size = 337, normalized size = 1.05

$$\frac{F^{a+bc}b^4d^4e^2\log(F)^4\operatorname{Ei}(bdx\log(F))}{24}+\frac{F^{a+bc}b^3d^3ef\log(F)^3\operatorname{Ei}(bdx\log(F))}{3}+\frac{F^{a+bc}b^2d^2f^2\log(F)^2\operatorname{Ei}(bdx\log(F))}{2}-\frac{F^{a+bc+bdx}b^3d^3e^2\log(F)^3}{24x}-\frac{F^{a+bc+bdx}b^2d^2e^2\log(F)^2}{24x^2}-\frac{F^{a+bc+bdx}b^2d^2ef\log(F)^2}{3x}-\frac{F^{a+bc+bdx}bde^2\log(F)}{12x^3}-\frac{F^{a+bc+bdx}bdef\log(F)}{3x^2}-\frac{F^{a+bc+bdx}bdf^2\log(F)}{2x}-\frac{F^{a+bc+bdx}e^2}{4x^4}-\frac{2F^{a+bc+bdx}ef}{3x^3}-\frac{F^{a+bc+bdx}f^2}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(F**(a+b*(d*x+c))*(f*x+e)**2/x**5,x)
```

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

Mathematica [A] time = 0.198703, size = 156, normalized size = 0.49

$$\frac{F^{a+bc}\left(b^2d^2x^4\log^2(F)\left(b^2d^2e^2\log^2(F)+8bdef\log(F)+12f^2\right)\text{ExpIntegralEi}(bdx\log(F))-F^{bdx}\left(b^3d^3e^2x^3\log^3(F)+b^2d^2e\right.\right.}{24x^4}$$

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*(1
2*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*L
og[F]^3)))/(24*x^4)
```

Maple [A] time = 0.069, size = 361, normalized size = 1.1

$$
\begin{aligned}
&-\frac{e^2F^{bdx+cb+a}}{4\,x^4}-\frac{bde^2F^{bdx+cb+a}\ln(F)}{12\,x^3}-\frac{b^2d^2e^2F^{bdx+cb+a}(\ln(F))^2}{24\,x^2}-\frac{b^3d^3e^2F^{bdx+cb+a}(\ln(F))^3}{24\,x}\\
&-\frac{(\ln(F))^4\,b^4d^4e^2F^{cb+a}Ei(1,cb\ln(F)+\ln(F)\,a-bdx\ln(F)-\ln(F)\,(cb+a))}{24}\\
&-\frac{2\,efF^{bdx+cb+a}}{3\,x^3}-\frac{bdefF^{bdx+cb+a}\ln(F)}{3\,x^2}-\frac{b^2d^2efF^{bdx+cb+a}(\ln(F))^2}{3\,x}\\
&-\frac{(\ln(F))^3\,b^3d^3feF^{cb+a}Ei(1,cb\ln(F)+\ln(F)\,a-bdx\ln(F)-\ln(F)\,(cb+a))}{3}\\
&-\frac{(\ln(F))^2\,b^2d^2f^2F^{cb+a}Ei(1,cb\ln(F)+\ln(F)\,a-bdx\ln(F)-\ln(F)\,(cb+a))}{2}\\
&-\frac{f^2F^{bdx+cb+a}}{2\,x^2}-\frac{bdf^2F^{bdx+cb+a}\ln(F)}{2\,x}
\end{aligned}
$$

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

Maxima [A] time = 0.840192, size = 126, normalized size = 0.39

$$
\begin{aligned}
&-F^{bc+a}b^4d^4e^2\,(-4,-bdx\log(F))\log(F)^4+2\,F^{bc+a}b^3d^3ef\,(-3,-bdx\log(F))\log(F)^3\\
&\quad-F^{bc+a}b^2d^2f^2\,(-2,-bdx\log(F))\log(F)^2
\end{aligned}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((f*x + e)^2*F^((d*x + c)*b + a)/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*gamma(-2, -b*d*x*log(F))*log(F)^2
```

Fricas [A] time = 0.262844, size = 251, normalized size = 0.78

$$\frac{\left(b^4d^4e^2x^4\log(F)^4 + 8\,b^3d^3efx^4\log(F)^3 + 12\,b^2d^2f^2x^4\log(F)^2\right)F^{bc+a}\mathrm{Ei}\left(bdx\log(F)\right) - \left(b^3d^3e^2x^3\log(F)^3 + 12\,f^2x^2 + 16\,e\right.}{24\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

$$\int \frac{F^{a+b(c+dx)}\left(e+fx\right)^2}{x^5}\,dx$$

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)
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{(fx+e)^2F^{(dx+c)b+a}}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((f*x + e)^2*F^((d*x + c)*b + a)/x^5,x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*F^((d*x + c)*b + a)/x^5, x)
```

3.74 $\int e^{-a-bx}(a+bx)^4(c+dx)^3\,dx$

Optimal. Leaf size=754

$$-\frac{3d^2e^{-a-bx}(a+bx)^6(bc-ad)}{b^4}-\frac{18d^2e^{-a-bx}(a+bx)^5(bc-ad)}{b^4}-\frac{90d^2e^{-a-bx}(a+bx)^4(bc-ad)}{b^4}-\frac{360d^2e^{-a-bx}(a+bx)^3(bc-ad)}{b^4}-\frac{1080d^2e^{-a-bx}(a+bx)^2(bc-ad)}{b^4}-\frac{2160d^2e^{-a-bx}(a+bx)(bc-ad)}{b^4}-\frac{2160d^2e^{-a-bx}(bc-ad)}{b^4}-\frac{3de^{-a-bx}(a+bx)^5(bc-ad)^2}{b^4}-\frac{e^{-a-bx}(a+bx)^4(bc-ad)^3}{b^4}-\frac{15de^{-a-bx}(a+bx)^4(bc-ad)^2}{b^4}-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)^3}{b^4}-\frac{60de^{-a-bx}(a+bx)^3(bc-ad)^2}{b^4}-\frac{12e^{-a-bx}(a+bx)^2(bc-ad)^3}{b^4}-\frac{180de^{-a-bx}(a+bx)^2(bc-ad)^2}{b^4}-\frac{24e^{-a-bx}(a+bx)(bc-ad)^3}{b^4}-\frac{360de^{-a-bx}(a+bx)(bc-ad)^2}{b^4}-\frac{24e^{-a-bx}(bc-ad)^3}{b^4}-\frac{360de^{-a-bx}(bc-ad)^2}{b^4}-\frac{d^3e^{-a-bx}(a+bx)^7}{b^4}-\frac{7d^3e^{-a-bx}(a+bx)^6}{b^4}-\frac{42d^3e^{-a-bx}(a+bx)^5}{b^4}-\frac{210d^3e^{-a-bx}(a+bx)^4}{b^4}-\frac{840d^3e^{-a-bx}(a+bx)^3}{b^4}-\frac{2520d^3e^{-a-bx}(a+bx)^2}{b^4}-\frac{5040d^3e^{-a-bx}(a+bx)}{b^4}-\frac{5040d^3e^{-a-bx}}{b^4}$$

```
[Out] (-5040*d^3*E^(-a - b*x))/b^4 - (2160*d^2*(b*c - a*d)*E^(-a - b*x)
)/b^4 - (360*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 - (21
60*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 - (3
60*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 - (9
0*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
```

Rubi [A] time = 1.52185, antiderivative size = 754, normalized size of antiderivative = 1., number of steps used = 28, number of rules used = 3, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}} = 0.12$

$$
\begin{aligned}
&-\frac{3d^2e^{-a-bx}(a+bx)^6(bc-ad)}{b^4}-\frac{18d^2e^{-a-bx}(a+bx)^5(bc-ad)}{b^4} \\
&-\frac{90d^2e^{-a-bx}(a+bx)^4(bc-ad)}{b^4}-\frac{360d^2e^{-a-bx}(a+bx)^3(bc-ad)}{b^4} \\
&-\frac{1080d^2e^{-a-bx}(a+bx)^2(bc-ad)}{b^4}-\frac{2160d^2e^{-a-bx}(a+bx)(bc-ad)}{b^4} \\
&-\frac{2160d^2e^{-a-bx}(bc-ad)}{b^4}-\frac{3de^{-a-bx}(a+bx)^5(bc-ad)^2}{b^4} \\
&-\frac{e^{-a-bx}(a+bx)^4(bc-ad)^3}{b^4}-\frac{15de^{-a-bx}(a+bx)^4(bc-ad)^2}{b^4} \\
&-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)^3}{b^4}-\frac{60de^{-a-bx}(a+bx)^3(bc-ad)^2}{b^4} \\
&-\frac{12e^{-a-bx}(a+bx)^2(bc-ad)^3}{b^4}-\frac{180de^{-a-bx}(a+bx)^2(bc-ad)^2}{b^4} \\
&-\frac{24e^{-a-bx}(a+bx)(bc-ad)^3}{b^4}-\frac{360de^{-a-bx}(a+bx)(bc-ad)^2}{b^4}-\frac{24e^{-a-bx}(bc-ad)^3}{b^4} \\
&-\frac{360de^{-a-bx}(bc-ad)^2}{b^4}-\frac{d^3e^{-a-bx}(a+bx)^7}{b^4}-\frac{7d^3e^{-a-bx}(a+bx)^6}{b^4} \\
&-\frac{42d^3e^{-a-bx}(a+bx)^5}{b^4}-\frac{210d^3e^{-a-bx}(a+bx)^4}{b^4}-\frac{840d^3e^{-a-bx}(a+bx)^3}{b^4} \\
&-\frac{2520d^3e^{-a-bx}(a+bx)^2}{b^4}-\frac{5040d^3e^{-a-bx}(a+bx)}{b^4}-\frac{5040d^3e^{-a-bx}}{b^4}
\end{aligned}
$$

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 - (360*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 - (21
60*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 - (3
60*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 - (9
0*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
```

Rubi in Sympy [A] time = 126.016, size = 694, normalized size = 0.92

$$-\frac{d^3(a+bx)^7e^{-a-bx}}{b^4}-\frac{7d^3(a+bx)^6e^{-a-bx}}{b^4}-\frac{42d^3(a+bx)^5e^{-a-bx}}{b^4}-\frac{210d^3(a+bx)^4e^{-a-bx}}{b^4}-\frac{840d^3(a+bx)^3e^{-a-bx}}{b^4}-\frac{2520d^3(a+bx)^2e^{-a-bx}}{b^4}-\frac{5040d^3(a+bx)e^{-a-bx}}{b^4}-\frac{5040d^3e^{-a-bx}}{b^4}+\frac{3d^2(a+bx)^6(ad-bc)e^{-a-bx}}{b^4}+\frac{18d^2(a+bx)^5(ad-bc)e^{-a-bx}}{b^4}+\frac{90d^2(a+bx)^4(ad-bc)e^{-a-bx}}{b^4}+\frac{360d^2(a+bx)^3(ad-bc)e^{-a-bx}}{b^4}+\frac{1080d^2(a+bx)^2(ad-bc)e^{-a-bx}}{b^4}+\frac{2160d^2(a+bx)(ad-bc)e^{-a-bx}}{b^4}+\frac{2160d^2(ad-bc)e^{-a-bx}}{b^4}-\frac{3d(a+bx)^5(ad-bc)^2e^{-a-bx}}{b^4}-\frac{15d(a+bx)^4(ad-bc)^2e^{-a-bx}}{b^4}-\frac{60d(a+bx)^3(ad-bc)^2e^{-a-bx}}{b^4}-\frac{180d(a+bx)^2(ad-bc)^2e^{-a-bx}}{b^4}-\frac{360d(a+bx)(ad-bc)^2e^{-a-bx}}{b^4}-\frac{360d(ad-bc)^2e^{-a-bx}}{b^4}+\frac{(a+bx)^4(ad-bc)^3e^{-a-bx}}{b^4}+\frac{4(a+bx)^3(ad-bc)^3e^{-a-bx}}{b^4}+\frac{12(a+bx)^2(ad-bc)^3e^{-a-bx}}{b^4}+\frac{24(a+bx)(ad-bc)^3e^{-a-bx}}{b^4}+\frac{24(ad-bc)^3e^{-a-bx}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**4*(d*x+c)**3,x)
```

```
[Out] -d**3*(a + b*x)**7*exp(-a - b*x)/b**4 - 7*d**3*(a + b*x)**6*exp(-
a - b*x)/b**4 - 42*d**3*(a + b*x)**5*exp(-a - b*x)/b**4 - 210*d**
3*(a + b*x)**4*exp(-a - b*x)/b**4 - 840*d**3*(a + b*x)**3*exp(-a
- b*x)/b**4 - 2520*d**3*(a + b*x)**2*exp(-a - b*x)/b**4 - 5040*d*
*3*(a + b*x)*exp(-a - b*x)/b**4 - 5040*d**3*exp(-a - b*x)/b**4 +
3*d**2*(a + b*x)**6*(a*d - b*c)*exp(-a - b*x)/b**4 + 18*d**2*(a +
 b*x)**5*(a*d - b*c)*exp(-a - b*x)/b**4 + 90*d**2*(a + b*x)**4*(a
*d - b*c)*exp(-a - b*x)/b**4 + 360*d**2*(a + b*x)**3*(a*d - b*c)*
exp(-a - b*x)/b**4 + 1080*d**2*(a + b*x)**2*(a*d - b*c)*exp(-a -
b*x)/b**4 + 2160*d**2*(a + b*x)*(a*d - b*c)*exp(-a - b*x)/b**4 +
2160*d**2*(a*d - b*c)*exp(-a - b*x)/b**4 - 3*d*(a + b*x)**5*(a*d
- b*c)**2*exp(-a - b*x)/b**4 - 15*d*(a + b*x)**4*(a*d - b*c)**2*e
xp(-a - b*x)/b**4 - 60*d*(a + b*x)**3*(a*d - b*c)**2*exp(-a - b*x
)/b**4 - 180*d*(a + b*x)**2*(a*d - b*c)**2*exp(-a - b*x)/b**4 - 3
60*d*(a + b*x)*(a*d - b*c)**2*exp(-a - b*x)/b**4 - 360*d*(a*d - b
```

```
*c)**2*exp(-a - b*x)/b**4 + (a + b*x)**4*(a*d - b*c)**3*exp(-a -
b*x)/b**4 + 4*(a + b*x)**3*(a*d - b*c)**3*exp(-a - b*x)/b**4 + 12
*(a + b*x)**2*(a*d - b*c)**3*exp(-a - b*x)/b**4 + 24*(a + b*x)*(a
*d - b*c)**3*exp(-a - b*x)/b**4 + 24*(a*d - b*c)**3*exp(-a - b*x)
/b**4
```

Mathematica [A] time = 0.264688, size = 458, normalized size = 0.61

$$\frac{e^{-a-bx}\left(-6b^5x^2(c+dx)\left(\left(a^2+2a+2\right)c^2+2\left(a^2+3a+4\right)cdx+\left(a^2+4a+7\right)d^2x^2\right)-2b^4x\left(2\left(a^3+3a^2+6a+6\right)c^3+3\left(2\right.\right.\right.}{}$$

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 + 1
6*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
```

Maple [A] time = 0.014, size = 1062, normalized size = 1.4

result too large to display

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+1
2*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+432*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+28
8*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 = 0.900927, size = 1207, normalized size = 1.6

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*(d*x + c)^3*e^(-b*x - a),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
```

Fricas [A] time = 0.27069, size = 734, normalized size = 0.97

$$-\frac{\left(b^7d^3x^7 + \left(a^4 + 4\,a^3 + 12\,a^2 + 24\,a + 24\right)b^3c^3 + \left(3\,b^7cd^2 + (4\,a + 7)b^6d^3\right)x^6 + 3\,\left(a^4 + 8\,a^3 + 36\,a^2 + 96\,a + 120\right)b^2c^2d + 3\,(b\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*(d*x + c)^3*e^(-b*x - a),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 + 36
0)*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 + 72*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
```

Sympy [A] time = 1.79167, size = 1445, normalized size = 1.92

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)
```

```
[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 - 2
4*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 + 12*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))
```

GIAC/XCAS [A] time = 0.256988, size = 1, normalized size = 0.

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

3.75 $\int e^{-a-bx}(a+bx)^4(c+dx)^2\,dx$

Optimal. Leaf size=495

$$-\frac{2de^{-a-bx}(a+bx)^5(bc-ad)}{b^3}-\frac{e^{-a-bx}(a+bx)^4(bc-ad)^2}{b^3}-\frac{10de^{-a-bx}(a+bx)^4(bc-ad)}{b^3}-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)^2}{b^3}-\frac{40de^{-a-bx}(a+bx)^3(bc-ad)}{b^3}-\frac{12e^{-a-bx}(a+bx)^2(bc-ad)^2}{b^3}-\frac{120de^{-a-bx}(a+bx)^2(bc-ad)}{b^3}-\frac{24e^{-a-bx}(a+bx)(bc-ad)^2}{b^3}-\frac{240de^{-a-bx}(a+bx)(bc-ad)}{b^3}-\frac{24e^{-a-bx}(bc-ad)^2}{b^3}-\frac{240de^{-a-bx}(bc-ad)}{b^3}-\frac{d^2e^{-a-bx}(a+bx)^6}{b^3}-\frac{6d^2e^{-a-bx}(a+bx)^5}{b^3}-\frac{30d^2e^{-a-bx}(a+bx)^4}{b^3}-\frac{120d^2e^{-a-bx}(a+bx)^3}{b^3}-\frac{360d^2e^{-a-bx}(a+bx)^2}{b^3}-\frac{720d^2e^{-a-bx}(a+bx)}{b^3}-\frac{720d^2e^{-a-bx}}{b^3}$$

```
[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
```

Rubi [A] time = 1.04744, antiderivative size = 495, normalized size of antiderivative = 1., number of steps used = 20, number of rules used = 3, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.12

$$-\frac{2de^{-a-bx}(a+bx)^5(bc-ad)}{b^3}-\frac{e^{-a-bx}(a+bx)^4(bc-ad)^2}{b^3}-\frac{10de^{-a-bx}(a+bx)^4(bc-ad)}{b^3}-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)^2}{b^3}-\frac{40de^{-a-bx}(a+bx)^3(bc-ad)}{b^3}-\frac{12e^{-a-bx}(a+bx)^2(bc-ad)^2}{b^3}-\frac{120de^{-a-bx}(a+bx)^2(bc-ad)}{b^3}-\frac{24e^{-a-bx}(a+bx)(bc-ad)^2}{b^3}-\frac{240de^{-a-bx}(a+bx)(bc-ad)}{b^3}-\frac{24e^{-a-bx}(bc-ad)^2}{b^3}-\frac{240de^{-a-bx}(bc-ad)}{b^3}-\frac{d^2e^{-a-bx}(a+bx)^6}{b^3}-\frac{6d^2e^{-a-bx}(a+bx)^5}{b^3}-\frac{30d^2e^{-a-bx}(a+bx)^4}{b^3}-\frac{120d^2e^{-a-bx}(a+bx)^3}{b^3}-\frac{360d^2e^{-a-bx}(a+bx)^2}{b^3}-\frac{720d^2e^{-a-bx}(a+bx)}{b^3}-\frac{720d^2e^{-a-bx}}{b^3}$$

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
```

Rubi in Sympy [A] time = 83.4931, size = 454, normalized size = 0.92

$$-\frac{d^2(a+bx)^6 e^{-a-bx}}{b^3}-\frac{6d^2(a+bx)^5 e^{-a-bx}}{b^3}-\frac{30d^2(a+bx)^4 e^{-a-bx}}{b^3}-\frac{120d^2(a+bx)^3 e^{-a-bx}}{b^3}-\frac{360d^2(a+bx)^2 e^{-a-bx}}{b^3}-\frac{720d^2(a+bx)e^{-a-bx}}{b^3}-\frac{720d^2e^{-a-bx}}{b^3}+\frac{2d(a+bx)^5(ad-bc)e^{-a-bx}}{b^3}+\frac{10d(a+bx)^4(ad-bc)e^{-a-bx}}{b^3}+\frac{40d(a+bx)^3(ad-bc)e^{-a-bx}}{b^3}+\frac{120d(a+bx)^2(ad-bc)e^{-a-bx}}{b^3}+\frac{240d(a+bx)(ad-bc)e^{-a-bx}}{b^3}+\frac{240d(ad-bc)e^{-a-bx}}{b^3}-\frac{(a+bx)^4(ad-bc)^2e^{-a-bx}}{b^3}-\frac{4(a+bx)^3(ad-bc)^2e^{-a-bx}}{b^3}-\frac{12(a+bx)^2(ad-bc)^2e^{-a-bx}}{b^3}-\frac{24(a+bx)(ad-bc)^2e^{-a-bx}}{b^3}-\frac{24(ad-bc)^2e^{-a-bx}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**4*(d*x+c)**2,x)
```

```
[Out] -d**2*(a + b*x)**6*exp(-a - b*x)/b**3 - 6*d**2*(a + b*x)**5*exp(-
a - b*x)/b**3 - 30*d**2*(a + b*x)**4*exp(-a - b*x)/b**3 - 120*d**
2*(a + b*x)**3*exp(-a - b*x)/b**3 - 360*d**2*(a + b*x)**2*exp(-a
- b*x)/b**3 - 720*d**2*(a + b*x)*exp(-a - b*x)/b**3 - 720*d**2*ex
p(-a - b*x)/b**3 + 2*d*(a + b*x)**5*(a*d - b*c)*exp(-a - b*x)/b**
3 + 10*d*(a + b*x)**4*(a*d - b*c)*exp(-a - b*x)/b**3 + 40*d*(a +
b*x)**3*(a*d - b*c)*exp(-a - b*x)/b**3 + 120*d*(a + b*x)**2*(a*d
- b*c)*exp(-a - b*x)/b**3 + 240*d*(a + b*x)*(a*d - b*c)*exp(-a -
b*x)/b**3 + 240*d*(a*d - b*c)*exp(-a - b*x)/b**3 - (a + b*x)**4*(
a*d - b*c)**2*exp(-a - b*x)/b**3 - 4*(a + b*x)**3*(a*d - b*c)**2*
```

```
exp(-a - b*x)/b**3 - 12*(a + b*x)**2*(a*d - b*c)**2*exp(-a - b*x)
/b**3 - 24*(a + b*x)*(a*d - b*c)**2*exp(-a - b*x)/b**3 - 24*(a*d
- b*c)**2*exp(-a - b*x)/b**3
```

Mathematica [A] time = 0.172015, size = 320, normalized size = 0.65

$$\frac{e^{-a-bx}\left(-2b^4x^2\left(3\left(a^2+2a+2\right)c^2+2\left(3a^2+8a+10\right)cdx+\left(3a^2+10a+15\right)d^2x^2\right)-4b^3x\left(\left(a^3+3a^2+6a+6\right)c^2+\left(2a^3\right.\right.\right.}{}$$

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
```

Maple [A] time = 0.008, size = 640, normalized size = 1.3

$$-\frac{\left(d^2b^6x^6+4\,ab^5d^2x^5+2\,b^6cdx^5+6\,a^2b^4d^2x^4+8\,ab^5cdx^4+b^6c^2x^4+6\,b^5d^2x^5+4\,a^3b^3d^2x^3+12\,a^2b^4cdx^3+4\,ab^5c^2x^3+20\right.}{}$$

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+19
2*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+144*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)*exp(-b*x-a)
/b^3
```

Maxima [A] time = 0.792814, size = 809, normalized size = 1.63

$$-\frac{4\,(bx+1)a^3c^2e^{(-bx-a)}}{b}-\frac{a^4c^2e^{(-bx-a)}}{b}-\frac{2\,(bx+1)a^4cde^{(-bx-a)}}{b^2}-\frac{6\left(b^2x^2+2\,bx+2\right)a^2c^2e^{(-bx-a)}}{b}-\frac{8\left(b^2x^2+2\,bx+2\right)a^3cde^{(-bx-a)}}{b^2}-\frac{\left(b^2x^2+2\,bx+2\right)a^4d^2e^{(-bx-a)}}{b^3}-\frac{4\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)ac^2e^{(-bx-a)}}{b}-\frac{12\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)a^2cde^{(-bx-a)}}{b^2}-\frac{4\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)a^3d^2e^{(-bx-a)}}{b^3}-\frac{\left(b^4x^4+4\,b^3x^3+12\,b^2x^2+24\,bx+24\right)c^2e^{(-bx-a)}}{b}-\frac{8\left(b^4x^4+4\,b^3x^3+12\,b^2x^2+24\,bx+24\right)acde^{(-bx-a)}}{b^2}-\frac{6\left(b^4x^4+4\,b^3x^3+12\,b^2x^2+24\,bx+24\right)a^2d^2e^{(-bx-a)}}{b^3}-\frac{2\left(b^5x^5+5\,b^4x^4+20\,b^3x^3+60\,b^2x^2+120\,bx+120\right)cde^{(-bx-a)}}{b^2}-\frac{4\left(b^5x^5+5\,b^4x^4+20\,b^3x^3+60\,b^2x^2+120\,bx+120\right)ad^2e^{(-bx-a)}}{b^3}-\frac{\left(b^6x^6+6\,b^5x^5+30\,b^4x^4+120\,b^3x^3+360\,b^2x^2+720\,bx+720\right)d^2e^{(-bx-a)}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*(d*x + c)^2*e^(-b*x - a),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
```

Fricas [A] time = 0.250619, size = 478, normalized size = 0.97

$$-\frac{\left(b^{6} d^{2} x^{6} + 2 \left(b^{6} c d + (2 a + 3) b^{5} d^{2}\right) x^{5} + \left(a^{4} + 4 a^{3} + 12 a^{2} + 24 a + 24\right) b^{2} c^{2} + \left(b^{6} c^{2} + 2 (4 a + 5) b^{5} c d + 2 \left(3 a^{2} + 10 a + 15\right) b\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*(d*x + c)^2*e^(-b*x - a),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 + 7
2*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 + 3
60)*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 + 2
40*a + 360)*b*d^2)*x)*e^(-b*x - a)/b^3
```

Sympy [A] time = 1.2155, size = 899, normalized size = 1.82

$$\begin{cases} \frac{\left(-a^{4} b^{2} c^{2} - 2 a^{4} b^{2} c d x - a^{4} b^{2} d^{2} x^{2} - 2 a^{4} b c d - 2 a^{4} b d^{2} x - 2 a^{4} d^{2} - 4 a^{3} b^{3} c^{2} x - 8 a^{3} b^{3} c d x^{2} - 4 a^{3} b^{3} d^{2} x^{3} - 4 a^{3} b^{2} c^{2} - 16 a^{3} b^{2} c d x - 12 a^{3} b^{2} d^{2} x^{2} - 16 a^{3} b c d - 24 a^{3} b d^{2} x - 2\right.}{} \\ a^{4} c^{2} x + \frac{b^{4} d^{2} x^{7}}{7} + x^{6} \left(\frac{2 a b^{3} d^{2}}{3} + \frac{b^{4} c d}{3}\right) + x^{5} \left(\frac{6 a^{2} b^{2} d^{2}}{5} + \frac{8 a b^{3} c d}{5} + \frac{b^{4} c^{2}}{5}\right) + x^{4} \left(a^{3} b d^{2} + 3 a^{2} b^{2} c d + a b^{3} c^{2}\right) + x^{3} \left(\frac{a^{4} d^{2}}{3} + \frac{8 a^{3} b c d}{3} + 2\right. \end{cases}$$

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 - 12*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))
```

GIAC/XCAS [A] time = 0.255389, size = 910, normalized size = 1.84

$$-\frac{\left(b^{10}d^2x^6 + 2\,b^{10}cdx^5 + 4\,ab^9d^2x^5 + b^{10}c^2x^4 + 8\,ab^9cdx^4 + 6\,a^2b^8d^2x^4 + 6\,b^9d^2x^5 + 4\,ab^9c^2x^3 + 12\,a^2b^8cdx^3 + 4\,a^3b^7d^2x^3 + \cdots\right.}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^4*(d*x + c)^2*e^(-b*x - a),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 + 72*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
```

3.76 $\int e^{-a-bx}(a+bx)^4(c+dx)\,dx$

Optimal. Leaf size=271

$$-\frac{e^{-a-bx}(a+bx)^4(bc-ad)}{b^2}-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)}{b^2}-\frac{12e^{-a-bx}(a+bx)^2(bc-ad)}{b^2}-\frac{24e^{-a-bx}(a+bx)(bc-ad)}{b^2}-\frac{24e^{-a-bx}(bc-ad)}{b^2}-\frac{de^{-a-bx}(a+bx)^5}{b^2}-\frac{5de^{-a-bx}(a+bx)^4}{b^2}-\frac{20de^{-a-bx}(a+bx)^3}{b^2}-\frac{60de^{-a-bx}(a+bx)^2}{b^2}-\frac{120de^{-a-bx}(a+bx)}{b^2}-\frac{120de^{-a-bx}}{b^2}$$

```
[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
```

Rubi [A] time = 0.559341, antiderivative size = 271, normalized size of antiderivative = 1., number of steps used = 13, number of rules used = 3, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}} = 0.13$

$$-\frac{e^{-a-bx}(a+bx)^4(bc-ad)}{b^2}-\frac{4e^{-a-bx}(a+bx)^3(bc-ad)}{b^2}-\frac{12e^{-a-bx}(a+bx)^2(bc-ad)}{b^2}-\frac{24e^{-a-bx}(a+bx)(bc-ad)}{b^2}-\frac{24e^{-a-bx}(bc-ad)}{b^2}-\frac{de^{-a-bx}(a+bx)^5}{b^2}-\frac{5de^{-a-bx}(a+bx)^4}{b^2}-\frac{20de^{-a-bx}(a+bx)^3}{b^2}-\frac{60de^{-a-bx}(a+bx)^2}{b^2}-\frac{120de^{-a-bx}(a+bx)}{b^2}-\frac{120de^{-a-bx}}{b^2}$$

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
```

Rubi in Sympy [A] time = 46.0352, size = 246, normalized size = 0.91

$$-\frac{d(a+bx)^5 e^{-a-bx}}{b^2}-\frac{5d(a+bx)^4 e^{-a-bx}}{b^2}-\frac{20d(a+bx)^3 e^{-a-bx}}{b^2}-\frac{60d(a+bx)^2 e^{-a-bx}}{b^2}-\frac{120d(a+bx)e^{-a-bx}}{b^2}-\frac{120de^{-a-bx}}{b^2}+\frac{(a+bx)^4(ad-bc)e^{-a-bx}}{b^2}+\frac{4(a+bx)^3(ad-bc)e^{-a-bx}}{b^2}+\frac{12(a+bx)^2(ad-bc)e^{-a-bx}}{b^2}+\frac{24(a+bx)(ad-bc)e^{-a-bx}}{b^2}+\frac{24(ad-bc)e^{-a-bx}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**4*(d*x+c),x)
```

```
[Out] -d*(a + b*x)**5*exp(-a - b*x)/b**2 - 5*d*(a + b*x)**4*exp(-a - b*
x)/b**2 - 20*d*(a + b*x)**3*exp(-a - b*x)/b**2 - 60*d*(a + b*x)**
2*exp(-a - b*x)/b**2 - 120*d*(a + b*x)*exp(-a - b*x)/b**2 - 120*d
*exp(-a - b*x)/b**2 + (a + b*x)**4*(a*d - b*c)*exp(-a - b*x)/b**2
 + 4*(a + b*x)**3*(a*d - b*c)*exp(-a - b*x)/b**2 + 12*(a + b*x)**
2*(a*d - b*c)*exp(-a - b*x)/b**2 + 24*(a + b*x)*(a*d - b*c)*exp(-
a - b*x)/b**2 + 24*(a*d - b*c)*exp(-a - b*x)/b**2
```

Mathematica [A] time = 0.0881694, size = 191, normalized size = 0.7

$$\frac{e^{-a-bx}\left(-2b^3x^2\left(3\left(a^2+2a+2\right)c+\left(3a^2+8a+10\right)dx\right)-2b^2x\left(2\left(a^3+3a^2+6a+6\right)c+\left(2a^3+9a^2+24a+30\right)dx\right)-b\left(\right.}{}$$

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
```

Maple [A] time = 0.009, size = 297, normalized size = 1.1

$$-\frac{\left(db^5x^5+4ab^4dx^4+b^5cx^4+6a^2b^3dx^3+4ab^4cx^3+5b^4dx^4+4a^3b^2dx^2+6a^2b^3cx^2+16ab^3dx^3+4b^4cx^3+a^4bdx+4a^3\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(exp(-b*x-a)*(b*x+a)^4*(d*x+c),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+24*a*b*c+120*b*d
*x+96*a*d+24*b*c+120*d)*exp(-b*x-a)/b^2
```

Maxima [A] time = 0.894508, size = 464, normalized size = 1.71

$$-\frac{4\,(bx+1)a^3ce^{(-bx-a)}}{b}-\frac{a^4ce^{(-bx-a)}}{b}-\frac{(bx+1)a^4de^{(-bx-a)}}{b^2}-\frac{6\,\left(b^2x^2+2\,bx+2\right)a^2ce^{(-bx-a)}}{b}-\frac{4\,\left(b^2x^2+2\,bx+2\right)a^3de^{(-bx-a)}}{b^2}-\frac{4\,\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)ace^{(-bx-a)}}{b}-\frac{6\,\left(b^3x^3+3\,b^2x^2+6\,bx+6\right)a^2de^{(-bx-a)}}{b^2}-\frac{\left(b^4x^4+4\,b^3x^3+12\,b^2x^2+24\,bx+24\right)ce^{(-bx-a)}}{b}-\frac{4\,\left(b^4x^4+4\,b^3x^3+12\,b^2x^2+24\,bx+24\right)ade^{(-bx-a)}}{b^2}-\frac{\left(b^5x^5+5\,b^4x^4+20\,b^3x^3+60\,b^2x^2+120\,bx+120\right)de^{(-bx-a)}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.248944, size = 266, normalized size = 0.98

$$-\frac{\left(b^5dx^5+\left(b^5c+(4\,a+5)b^4d\right)x^4+2\,\left(2\,(a+1)b^4c+\left(3\,a^2+8\,a+10\right)b^3d\right)x^3+\left(a^4+4\,a^3+12\,a^2+24\,a+24\right)bc+2\,\left(3\,\left(a^2+\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Sympy [A] time = 0.745871, size = 447, normalized size = 1.65

$$\begin{cases} \frac{(-a^4bc-a^4bdx-a^4d-4a^3b^2cx-4a^3b^2dx^2-4a^3bc-8a^3bdx-8a^3d-6a^2b^3cx^2-6a^2b^3dx^3-12a^2b^2cx-18a^2b^2dx^2-12a^2bc-36a^2bdx-36a^2d-4ab^4cx^3-4ab^4 \\ a^4cx + \frac{b^4dx^6}{6} + x^5\left(\frac{4ab^3d}{5} + \frac{b^4c}{5}\right) + x^4\left(\frac{3a^2b^2d}{2} + ab^3c\right) + x^3\left(\frac{4a^3bd}{3} + 2a^2b^2c\right) + x^2\left(\frac{a^4d}{2} + 2a^3bc\right) \end{cases}$$

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))
```

GIAC/XCAS [A] time = 0.259754, size = 447, normalized size = 1.65

$$-\frac{(b^9dx^5 + b^9cx^4 + 4\,ab^8dx^4 + 4\,ab^8cx^3 + 6\,a^2b^7dx^3 + 5\,b^8dx^4 + 6\,a^2b^7cx^2 + 4\,a^3b^6dx^2 + 4\,b^8cx^3 + 16\,ab^7dx^3 + 4\,a^3b^6cx + a}{}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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*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
```

Rubi [A] time = 0.153806, antiderivative size = 102, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 2, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.111

$$-\frac{e^{-a-bx}(a+bx)^4}{b}-\frac{4e^{-a-bx}(a+bx)^3}{b}-\frac{12e^{-a-bx}(a+bx)^2}{b}-\frac{24e^{-a-bx}(a+bx)}{b}-\frac{24e^{-a-bx}}{b}$$

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
```

Rubi in Sympy [A] time = 16.1618, size = 83, normalized size = 0.81

$$-\frac{(a+bx)^4\,e^{-a-bx}}{b}-\frac{4\,(a+bx)^3\,e^{-a-bx}}{b}-\frac{12\,(a+bx)^2\,e^{-a-bx}}{b}-\frac{24\,(a+bx)\,e^{-a-bx}}{b}-\frac{24e^{-a-bx}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**4,x)
```

```
[Out] -(a + b*x)**4*exp(-a - b*x)/b - 4*(a + b*x)**3*exp(-a - b*x)/b -
12*(a + b*x)**2*exp(-a - b*x)/b - 24*(a + b*x)*exp(-a - b*x)/b -
24*exp(-a - b*x)/b
```

Mathematica [A] time = 0.0244454, 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
```

Maple [A] time = 0.007, size = 108, normalized size = 1.1

$$-\frac{\left(b^4x^4 + 4\,b^3x^3a + 6\,a^2b^2x^2 + 4\,b^3x^3 + 4\,a^3bx + 12\,ab^2x^2 + a^4 + 12\,a^2bx + 12\,b^2x^2 + 4\,a^3 + 24\,abx + 12\,a^2 + 24\,bx + 24\,a + 2}{b}$$

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+2
4)*exp(-b*x-a)/b
```

Maxima [A] time = 0.854681, size = 201, normalized size = 1.97

$$-\frac{4\,(bx+1)a^3e^{(-bx-a)}}{b} - \frac{a^4e^{(-bx-a)}}{b} - \frac{6\,\left(b^2x^2 + 2\,bx + 2\right)a^2e^{(-bx-a)}}{b} - \frac{4\,\left(b^3x^3 + 3\,b^2x^2 + 6\,bx + 6\right)ae^{(-bx-a)}}{b} - \frac{\left(b^4x^4 + 4\,b^3x^3 + 12\,b^2x^2 + 24\,bx + 24\right)e^{(-bx-a)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^4*e^(-b*x - a),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
```

Fricas [A] time = 0.236596, size = 112, normalized size = 1.1

$$-\frac{\left(b^4x^4 + 4\,(a+1)b^3x^3 + 6\,\left(a^2 + 2\,a + 2\right)b^2x^2 + a^4 + 4\,a^3 + 4\,\left(a^3 + 3\,a^2 + 6\,a + 6\right)bx + 12\,a^2 + 24\,a + 24\right)e^{(-bx-a)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^4*e^(-b*x - a),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
```

Sympy [A] time = 0.428786, size = 158, normalized size = 1.55

$$\begin{cases} \frac{\left(-a^{4}-4a^{3}bx-4a^{3}-6a^{2}b^{2}x^{2}-12a^{2}bx-12a^{2}-4ab^{3}x^{3}-12ab^{2}x^{2}-24abx-24a-b^{4}x^{4}-4b^{3}x^{3}-12b^{2}x^{2}-24bx-24\right)e^{-a-bx}}{b} & \text{for}\ b \neq 0 \\ a^{4}x + 2a^{3}bx^{2} + 2a^{2}b^{2}x^{3} + ab^{3}x^{4} + \frac{b^{4}x^{5}}{5} & \text{otherwise} \end{cases}$$

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 - 2
4*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))
```

GIAC/XCAS [A] time = 0.259183, size = 178, normalized size = 1.75

$$-\frac{\left(b^{8}x^{4} + 4\,ab^{7}x^{3} + 6\,a^{2}b^{6}x^{2} + 4\,b^{7}x^{3} + 4\,a^{3}b^{5}x + 12\,ab^{6}x^{2} + a^{4}b^{4} + 12\,a^{2}b^{5}x + 12\,b^{6}x^{2} + 4\,a^{3}b^{4} + 24\,ab^{5}x + 12\,a^{2}b^{4} + 24\,b^{5}x}{b^{5}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^4*e^(-b*x - a),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
```

3.78 $\int \frac{e^{-a-bx}(a+bx)^4}{c+dx}\,dx$

Optimal. Leaf size=277

$$\frac{e^{\frac{bc}{d}-a}(bc-ad)^4\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+\frac{e^{-a-bx}(bc-ad)^3}{d^4}-\frac{e^{-a-bx}(bc-ad)^2}{d^3}-\frac{e^{-a-bx}(a+bx)(bc-ad)^2}{d^3}+\frac{2e^{-a-bx}(bc-ad)}{d^2}+\frac{e^{-a-bx}(a+bx)^2(bc-ad)}{d^2}+\frac{2e^{-a-bx}(a+bx)(bc-ad)}{d^2}-\frac{6e^{-a-bx}}{d}-\frac{e^{-a-bx}(a+bx)^3}{d}-\frac{3e^{-a-bx}(a+bx)^2}{d}-\frac{6e^{-a-bx}(a+bx)}{d}$$

```
[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)*E
xpIntegralEi[-((b*(c + d*x))/d)])/d^5
```

Rubi [A] time = 0.561167, antiderivative size = 277, normalized size of antiderivative = 1., number of steps used = 13, number of rules used = 4, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.16

$$\frac{e^{\frac{bc}{d}-a}(bc-ad)^4\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+\frac{e^{-a-bx}(bc-ad)^3}{d^4}-\frac{e^{-a-bx}(bc-ad)^2}{d^3}-\frac{e^{-a-bx}(a+bx)(bc-ad)^2}{d^3}+\frac{2e^{-a-bx}(bc-ad)}{d^2}+\frac{e^{-a-bx}(a+bx)^2(bc-ad)}{d^2}+\frac{2e^{-a-bx}(a+bx)(bc-ad)}{d^2}-\frac{6e^{-a-bx}}{d}-\frac{e^{-a-bx}(a+bx)^3}{d}-\frac{3e^{-a-bx}(a+bx)^2}{d}-\frac{6e^{-a-bx}(a+bx)}{d}$$

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)*E
xpIntegralEi[-((b*(c + d*x))/d)])/d^5
```

Rubi in Sympy [A] time = 49.2519, size = 238, normalized size = 0.86

$$-\frac{(a+bx)^3 e^{-a-bx}}{d}-\frac{3(a+bx)^2 e^{-a-bx}}{d}-\frac{(6a+6bx) e^{-a-bx}}{d}-\frac{6e^{-a-bx}}{d}-\frac{(a+bx)^2 (ad-bc) e^{-a-bx}}{d^2} -\frac{(2a+2bx)(ad-bc) e^{-a-bx}}{d^2}-\frac{2(ad-bc) e^{-a-bx}}{d^2}-\frac{(a+bx)(ad-bc)^2 e^{-a-bx}}{d^3} -\frac{(ad-bc)^2 e^{-a-bx}}{d^3}-\frac{(ad-bc)^3 e^{-a-bx}}{d^4}+\frac{(ad-bc)^4 e^{-a} e^{\frac{bc}{d}} \operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**4/(d*x+c),x)
```

```
[Out] -(a + b*x)**3*exp(-a - b*x)/d - 3*(a + b*x)**2*exp(-a - b*x)/d -
(6*a + 6*b*x)*exp(-a - b*x)/d - 6*exp(-a - b*x)/d - (a + b*x)**2*
(a*d - b*c)*exp(-a - b*x)/d**2 - (2*a + 2*b*x)*(a*d - b*c)*exp(-a
 - b*x)/d**2 - 2*(a*d - b*c)*exp(-a - b*x)/d**2 - (a + b*x)*(a*d
- b*c)**2*exp(-a - b*x)/d**3 - (a*d - b*c)**2*exp(-a - b*x)/d**3
- (a*d - b*c)**3*exp(-a - b*x)/d**4 + (a*d - b*c)**4*exp(-a)*exp(
b*c/d)*Ei(b*(-c - d*x)/d)/d**5
```

Mathematica [A] time = 0.179147, size = 175, normalized size = 0.63

$$\frac{e^{-a-bx}\left((bc-ad)^4 e^{b\left(\frac{c}{d}+x\right)} \text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)-d\left(2bd^2\left(\left(3a^2+4a+3\right)dx-\left(3a^2+2a+1\right)c\right)+2\left(2a^3+3a^2+4a+\right.\right.}{d^5}$$

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))*ExpInt
egralEi[-((b*(c + d*x))/d)]))/d^5
```

Maple [A] time = 0.019, size = 489, normalized size = 1.8

$$-\frac{1}{b}\left(-\frac{b\left((-bx-a)^3 e^{-bx-a}-3(-bx-a)^2 e^{-bx-a}+6(-bx-a) e^{-bx-a}-6 e^{-bx-a}\right)}{d}+\frac{ab\left((-bx-a)^2 e^{-bx-a}-2(-bx-\right.}{d}\right.$$

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] -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))+b/d*a*((-b*x-a)^2*exp(-b*x-a)-2*
(-b*x-a)*exp(-b*x-a)+2*exp(-b*x-a))-b^2/d^2*c*((-b*x-a)^2*exp(-b*
x-a)-2*(-b*x-a)*exp(-b*x-a)+2*exp(-b*x-a))-b/d*a^2*((-b*x-a)*exp(
-b*x-a)-exp(-b*x-a))+2*b^2/d^2*a*c*((-b*x-a)*exp(-b*x-a)-exp(-b*x
-a))-b^3/d^3*c^2*((-b*x-a)*exp(-b*x-a)-exp(-b*x-a))+b/d*a^3*exp(-
b*x-a)-3*b^2/d^2*a^2*c*exp(-b*x-a)+3*b^3/d^3*a*c^2*exp(-b*x-a)-b^
4/d^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., size = 0, normalized size = 0.

$$-4\,a^3b\left(\frac{xe^{(-bx)}}{bdxe^a + bce^a} + \frac{ce^{\left(-a+\frac{bc}{d}\right)}exp_integral_e\left(2, \frac{(dx+c)b}{d}\right)}{(dx+c)bd}\right) - \frac{a^4e^{\left(-a+\frac{bc}{d}\right)}exp_integral_e\left(1, \frac{(dx+c)b}{d}\right)}{d}$$

$$-\frac{\left(b^3d^2x^4 + \left(4\,ab^2d^2 + 3\,b^2d^2\right)x^3 + \left(6\,a^2bd^2 + b^2cd + 8\,abd^2 + 6\,bd^2\right)x^2 - \left(b^2c^2 - 6\,a^2d^2 - 4\,bcd - 4\left(bcd + 2\,d^2\right)a - 6\,d^2\right)x}{d^3xe^a + cd^2e^a}$$

$$+\int -\frac{\left(b^2c^3 - 6\,a^2cd^2 - 4\,bc^2d - 6\,cd^2 - 4\left(bc^2d + 2\,cd^2\right)a - \left(b^3c^3 + 6\,a^2bcd^2 - 2\,b^2c^2d + 6\,bcd^2 - 4\left(b^2c^2d - 2\,bcd^2\right)a\right)x\right)e^{(-bx}}{d^4x^2e^a + 2\,cd^3xe^a + c^2d^2e^a}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -4*a^3*b*(x*e^(-b*x)/(b*d*x*e^a + b*c*e^a) + c*e^(-a + b*c/d)*exp
_integral_e(2, (d*x + c)*b/d)/((d*x + c)*b*d)) - 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 - (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(-(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)
```

Fricas [A] time = 0.249642, size = 317, normalized size = 1.14

$$\frac{\left(b^4c^4 - 4\,ab^3c^3d + 6\,a^2b^2c^2d^2 - 4\,a^3bcd^3 + a^4d^4\right)\mathrm{Ei}\left(-\frac{bdx+bc}{d}\right)e^{\left(\frac{bc-ad}{d}\right)} - \left(b^3d^4x^3 - b^3c^3d + (4\,a+1)b^2c^2d^2 - 2\left(3\,a^2 + 2\,a\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^4*e^(-b*x - a)/(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
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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),x)
```

```
[Out] Timed out
```

GIAC/XCAS [A] time = 0.257864, size = 240, normalized size = 0.87

$$\frac{b^4c^4\mathrm{Ei}\left(-\frac{bdx+bc}{d}\right)e^{\left(-a+\frac{bc}{d}\right)} - 4\,ab^3c^3d\mathrm{Ei}\left(-\frac{bdx+bc}{d}\right)e^{\left(-a+\frac{bc}{d}\right)} + 6\,a^2b^2c^2d^2\mathrm{Ei}\left(-\frac{bdx+bc}{d}\right)e^{\left(-a+\frac{bc}{d}\right)} - 4\,a^3bcd^3\mathrm{Ei}\left(-\frac{bdx+bc}{d}\right)}{d^5}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (b^4*c^4*Ei(-(b*d*x + b*c)/d)*e^(-a + b*c/d) - 4*a*b^3*c^3*d*Ei(-
(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))/d^5
```

3.79 $\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^2}\,dx$

Optimal. Leaf size=258

$$-\frac{b^3e^{-a-bx}(c+dx)^2}{d^4}+\frac{4b^2e^{-a-bx}(c+dx)(bc-ad)}{d^4}-\frac{2b^2e^{-a-bx}(c+dx)}{d^3}-\frac{be^{\frac{bc}{d}-a}(bc-ad)^4\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^6}-\frac{4be^{\frac{bc}{d}-a}(bc-ad)^3\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}-\frac{e^{-a-bx}(bc-ad)^4}{d^5(c+dx)}-\frac{6be^{-a-bx}(bc-ad)^2}{d^4}+\frac{4be^{-a-bx}(bc-ad)}{d^3}-\frac{2be^{-a-bx}}{d^2}$$

```
[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)*ExpInte
gralEi[-((b*(c + d*x))/d)])/d^6
```

Rubi [A] time = 0.622479, antiderivative size = 258, normalized size of antiderivative = 1., number of steps used = 11, number of rules used = 5, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}} = 0.2$

$$-\frac{b^3e^{-a-bx}(c+dx)^2}{d^4}+\frac{4b^2e^{-a-bx}(c+dx)(bc-ad)}{d^4}-\frac{2b^2e^{-a-bx}(c+dx)}{d^3}-\frac{be^{\frac{bc}{d}-a}(bc-ad)^4\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^6}-\frac{4be^{\frac{bc}{d}-a}(bc-ad)^3\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}-\frac{e^{-a-bx}(bc-ad)^4}{d^5(c+dx)}-\frac{6be^{-a-bx}(bc-ad)^2}{d^4}+\frac{4be^{-a-bx}(bc-ad)}{d^3}-\frac{2be^{-a-bx}}{d^2}$$

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)*ExpInte
gralEi[-((b*(c + d*x))/d)])/d^6
```

Rubi in Sympy [A] time = 63.1004, size = 230, normalized size = 0.89

$$-\frac{b^3(c+dx)^2e^{-a-bx}}{d^4}-\frac{2b^2(c+dx)e^{-a-bx}}{d^3}-\frac{4b^2(c+dx)(ad-bc)e^{-a-bx}}{d^4}-\frac{2be^{-a-bx}}{d^2}-\frac{4b(ad-bc)e^{-a-bx}}{d^3}-\frac{6b(ad-bc)^2e^{-a-bx}}{d^4}+\frac{4b(ad-bc)^3e^{-a}e^{\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^5}-\frac{b(ad-bc)^4e^{-a+\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^6}-\frac{(ad-bc)^4e^{-a-bx}}{d^5(c+dx)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**4/(d*x+c)**2,x)
```

```
[Out] -b**3*(c + d*x)**2*exp(-a - b*x)/d**4 - 2*b**2*(c + d*x)*exp(-a -
 b*x)/d**3 - 4*b**2*(c + d*x)*(a*d - b*c)*exp(-a - b*x)/d**4 - 2*
b*exp(-a - b*x)/d**2 - 4*b*(a*d - b*c)*exp(-a - b*x)/d**3 - 6*b*(
a*d - b*c)**2*exp(-a - b*x)/d**4 + 4*b*(a*d - b*c)**3*exp(-a)*exp
(b*c/d)*Ei(b*(-c - d*x)/d)/d**5 - b*(a*d - b*c)**4*exp(-a + b*c/d
)*Ei(b*(-c - d*x)/d)/d**6 - (a*d - b*c)**4*exp(-a - b*x)/(d**5*(c
 + d*x))
```

Mathematica [A] time = 0.321389, 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)
```

Maple [A] time = 0.02, size = 406, normalized size = 1.6

$$-\frac{1}{b}\left(\frac{b^2\left((-bx-a)^2e^{-bx-a}-2(-bx-a)e^{-bx-a}+2e^{-bx-a}\right)}{d^2}-2\frac{b^2a\left((-bx-a)e^{-bx-a}-e^{-bx-a}\right)}{d^2}+2\frac{cb^3\left((-bx-a)e^{-b\right.}{d^3}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(exp(-b*x-a)*(b*x+a)^4/(d*x+c)^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*ex
p(-b*x-a))-2*b^2/d^2*a*((-b*x-a)*exp(-b*x-a)-exp(-b*x-a))+2*b^3/d
^3*c*((-b*x-a)*exp(-b*x-a)-exp(-b*x-a))+3*b^2/d^2*a^2*exp(-b*x-a)
-6*b^3/d^3*a*c*exp(-b*x-a)+3*b^4/d^4*c^2*exp(-b*x-a)+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)+(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)-ex
p(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d)))
```

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

$$-\frac{a^4 e^{\left(-a+\frac{bc}{d}\right)} exp_integral_e\left(2, \frac{(dx+c)b}{d}\right)}{(dx+c)d} - \frac{\left(b^3d^2x^4 + 2\left(2\,ab^2d^2 + b^2d^2\right)x^3 + 2\left(3\,a^2bd^2 + b^2cd + 2\,abd^2 + bd^2\right)x^2 + 2\left(2\,a^3d^2 - b^2c^2 + 4\,abcd + 2\,bcd\right)x\right)e^{(-bx)}}{d^4x^2e^a + 2\,cd^3xe^a + c^2d^2e^a} - \int -\frac{2\left(2\,a^3cd^2 - b^2c^3 + 4\,abc^2d + 2\,bc^2d + \left(b^3c^3 - 4\,ab^2c^2d + 6\,a^2bcd^2 - 2\,a^3d^3 + b^2c^2d\right)x\right)e^{(-bx)}}{d^5x^3e^a + 3\,cd^4x^2e^a + 3\,c^2d^3xe^a + c^3d^2e^a}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*e^(-b*x - a)/(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)
```

Fricas [A] time = 0.266609, size = 477, normalized size = 1.85

$$-\frac{\left(b^5c^5 - 4\,(a-1)b^4c^4d + 6\left(a^2 - 2\,a\right)b^3c^3d^2 - 4\left(a^3 - 3\,a^2\right)b^2c^2d^3 + \left(a^4 - 4\,a^3\right)bcd^4 + \left(b^5c^4d - 4\,(a-1)b^4c^3d^2 + 6\left(a^2 - 2\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*e^(-b*x - a)/(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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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)**2,x)
```

```
[Out] Timed out
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

undef

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] undef
```

3.80 $\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^3}\,dx$

Optimal. Leaf size=294

$$-\frac{b^3xe^{-a-bx}}{d^3}+\frac{b^2e^{\frac{bc}{d}-a}(bc-ad)^4\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{2d^7}+\frac{4b^2e^{\frac{bc}{d}-a}(bc-ad)^3\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^6}+\frac{6b^2e^{\frac{bc}{d}-a}(bc-ad)^2\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+\frac{b^2e^{-a-bx}(3bc-4ad)}{d^4}-\frac{b^2e^{-a-bx}}{d^3}+\frac{be^{-a-bx}(bc-ad)^4}{2d^6(c+dx)}-\frac{e^{-a-bx}(bc-ad)^4}{2d^5(c+dx)^2}+\frac{4be^{-a-bx}(bc-ad)^3}{d^5(c+dx)}$$

```
[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)*ExpIntegralEi[-((b*(c +
d*x))/d)])/d^6 + (b^2*(b*c - a*d)^4*E^(-a + (b*c)/d)*ExpIntegralE
i[-((b*(c + d*x))/d)])/(2*d^7)
```

Rubi [A] time = 0.683168, antiderivative size = 294, normalized size of antiderivative = 1., number of steps used = 11, number of rules used = 5, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}} = 0.2$

$$-\frac{b^3xe^{-a-bx}}{d^3}+\frac{b^2e^{\frac{bc}{d}-a}(bc-ad)^4\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{2d^7}+\frac{4b^2e^{\frac{bc}{d}-a}(bc-ad)^3\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^6}+\frac{6b^2e^{\frac{bc}{d}-a}(bc-ad)^2\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+\frac{b^2e^{-a-bx}(3bc-4ad)}{d^4}-\frac{b^2e^{-a-bx}}{d^3}+\frac{be^{-a-bx}(bc-ad)^4}{2d^6(c+dx)}-\frac{e^{-a-bx}(bc-ad)^4}{2d^5(c+dx)^2}+\frac{4be^{-a-bx}(bc-ad)^3}{d^5(c+dx)}$$

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)*ExpIntegralEi[-((b*(c +
d*x))/d)])/d^6 + (b^2*(b*c - a*d)^4*E^(-a + (b*c)/d)*ExpIntegralE
i[-((b*(c + d*x))/d)])/(2*d^7)
```

Rubi in Sympy [A] time = 69.9322, size = 258, normalized size = 0.88

$$-\frac{b^3xe^{-a-bx}}{d^3}-\frac{b^2e^{-a-bx}}{d^3}-\frac{b^2(4ad-3bc)e^{-a-bx}}{d^4}+\frac{6b^2(ad-bc)^2e^{-a}e^{\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^5}-\frac{4b^2(ad-bc)^3e^{-a+\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^6}+\frac{b^2(ad-bc)^4e^{-a}e^{\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{2d^7}-\frac{4b(ad-bc)^3e^{-a-bx}}{d^5(c+dx)}+\frac{b(ad-bc)^4e^{-a-bx}}{2d^6(c+dx)}-\frac{(ad-bc)^4e^{-a-bx}}{2d^5(c+dx)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**4/(d*x+c)**3,x)
```

```
[Out] -b**3*x*exp(-a - b*x)/d**3 - b**2*exp(-a - b*x)/d**3 - b**2*(4*a*
d - 3*b*c)*exp(-a - b*x)/d**4 + 6*b**2*(a*d - b*c)**2*exp(-a)*exp
(b*c/d)*Ei(b*(-c - d*x)/d)/d**5 - 4*b**2*(a*d - b*c)**3*exp(-a +
b*c/d)*Ei(b*(-c - d*x)/d)/d**6 + b**2*(a*d - b*c)**4*exp(-a)*exp(
b*c/d)*Ei(b*(-c - d*x)/d)/(2*d**7) - 4*b*(a*d - b*c)**3*exp(-a -
b*x)/(d**5*(c + d*x)) + b*(a*d - b*c)**4*exp(-a - b*x)/(2*d**6*(c
 + d*x)) - (a*d - b*c)**4*exp(-a - b*x)/(2*d**5*(c + d*x)**2)
```

Mathematica [A] time = 0.719643, size = 267, normalized size = 0.91

$$e^{-a}\left(b^2e^{\frac{bc}{d}}\left(\left(a^2-8a+12\right)d^2-2(a-4)bcd+b^2c^2\right)(bc-ad)^2\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)+\frac{de^{-bx}\left(-a^4d^5+a^3bd^4((a-4)c+(a-8)dx)+\cdots\right.}{\cdots}\right.\cdots$$

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)
```

Maple [A] time = 0.02, size = 418, normalized size = 1.4

$$-\frac{1}{b}\left(-\frac{b^3\left((-bx-a)\,\mathrm{e}^{-bx-a}-\mathrm{e}^{-bx-a}\right)}{d^3}+3\,\frac{ab^3\mathrm{e}^{-bx-a}}{d^3}-3\,\frac{b^4c\mathrm{e}^{-bx-a}}{d^4}+6\,\frac{\left(a^2d^2-2\,abcd+b^2c^2\right)b^3}{d^5}\mathrm{e}^{-\frac{ad-cb}{d}}Ei\left(1,bx+a-\right.\right.$$

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*b^3/d^3*a*exp
(-b*x-a)-3*b^4/d^4*c*exp(-b*x-a)+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)+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*(-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))-(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*exp(-b*x-a)/(-b*x-a+(a*d-b
*c)/d)-1/2*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d)))
```

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

$$-\frac{a^4e^{\left(-a+\frac{bc}{d}\right)}exp_integral_e\left(3,\frac{(dx+c)b}{d}\right)}{(dx+c)^2d}-\frac{\left(b^3d^2x^4+\left(4\,ab^2d^2+b^2d^2\right)x^3+3\left(2\,a^2bd^2+b^2cd\right)x^2+\left(4\,a^3d^2-3\,b^2c^2+12\,abcd-6\,a^2d^2\right)x\right)e^{(-bx)}}{d^5x^3e^a+3\,cd^4x^2e^a+3\,c^2d^3xe^a+c^3d^2e^a}-\int-\frac{\left(4\,a^3cd^2-3\,b^2c^3+12\,abc^2d-6\,a^2cd^2+\left(3\,b^3c^3-8\,a^3d^3+12\,b^2c^2d+6\left(3\,bcd^2+2\,d^3\right)a^2-12\left(b^2c^2d+2\,bcd^2\right)a\right)x\right)e^{(-bx)}}{d^6x^4e^a+4\,cd^5x^3e^a+6\,c^2d^4x^2e^a+4\,c^3d^3xe^a+c^4d^2e^a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^4*e^(-b*x - a)/(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)
```

Fricas [A] time = 0.244809, size = 743, normalized size = 2.53

$$\frac{\left(b^6c^6 - 4\,(a-2)b^5c^5d + 6\,\left(a^2-4\,a+2\right)b^4c^4d^2 - 4\,\left(a^3-6\,a^2+6\,a\right)b^3c^3d^3 + \left(a^4-8\,a^3+12\,a^2\right)b^2c^2d^4 + \left(b^6c^4d^2 - 4\,(a-2)\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*e^(-b*x - a)/(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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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)**3,x)
```

```
[Out] Timed out
```

GIAC/XCAS [A] time = 0.244993, size = 1, normalized size = 0.

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

3.81 $\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^4}\,dx$

Optimal. Leaf size=396

$$-\frac{b^3e^{\frac{bc}{d}-a}(bc-ad)^4\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{6d^8}-\frac{2b^3e^{\frac{bc}{d}-a}(bc-ad)^3\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^7}-\frac{6b^3e^{\frac{bc}{d}-a}(bc-ad)^2\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^6}-\frac{4b^3e^{\frac{bc}{d}-a}(bc-ad)\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}-\frac{b^3e^{-a-bx}}{d^4}-\frac{b^2e^{-a-bx}(bc-ad)^4}{6d^7(c+dx)}-\frac{2b^2e^{-a-bx}(bc-ad)^3}{d^6(c+dx)}-\frac{6b^2e^{-a-bx}(bc-ad)^2}{d^5(c+dx)}+\frac{be^{-a-bx}(bc-ad)^4}{6d^6(c+dx)^2}-\frac{e^{-a-bx}(bc-ad)^4}{3d^5(c+dx)^3}+\frac{2be^{-a-bx}(bc-ad)^3}{d^5(c+dx)^2}$$

```
[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)*ExpIntegra
lEi[-((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)
```

Rubi [A] time = 0.859049, antiderivative size = 396, normalized size of antiderivative = 1., number of steps used = 13, number of rules used = 4, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}} = 0.16$

$$-\frac{b^3e^{\frac{bc}{d}-a}(bc-ad)^4\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{6d^8}-\frac{2b^3e^{\frac{bc}{d}-a}(bc-ad)^3\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^7}-\frac{6b^3e^{\frac{bc}{d}-a}(bc-ad)^2\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^6}-\frac{4b^3e^{\frac{bc}{d}-a}(bc-ad)\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}-\frac{b^3e^{-a-bx}}{d^4}-\frac{b^2e^{-a-bx}(bc-ad)^4}{6d^7(c+dx)}-\frac{2b^2e^{-a-bx}(bc-ad)^3}{d^6(c+dx)}-\frac{6b^2e^{-a-bx}(bc-ad)^2}{d^5(c+dx)}+\frac{be^{-a-bx}(bc-ad)^4}{6d^6(c+dx)^2}-\frac{e^{-a-bx}(bc-ad)^4}{3d^5(c+dx)^3}+\frac{2be^{-a-bx}(bc-ad)^3}{d^5(c+dx)^2}$$

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)*ExpIntegra
lEi[-((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)
```

Rubi in Sympy [A] time = 87.5981, size = 347, normalized size = 0.88

$$-\frac{b^3e^{-a-bx}}{d^4}+\frac{4b^3\left(ad-bc\right)e^{-a}e^{\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^5}-\frac{6b^3\left(ad-bc\right)^2e^{-a+\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^6}+\frac{2b^3\left(ad-bc\right)^3e^{-a}e^{\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^7}-\frac{b^3\left(ad-bc\right)^4e^{-a+\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{6d^8}-\frac{6b^2\left(ad-bc\right)^2e^{-a-bx}}{d^5\left(c+dx\right)}+\frac{2b^2\left(ad-bc\right)^3e^{-a-bx}}{d^6\left(c+dx\right)}-\frac{b^2\left(ad-bc\right)^4e^{-a-bx}}{6d^7\left(c+dx\right)}-\frac{2b\left(ad-bc\right)^3e^{-a-bx}}{d^5\left(c+dx\right)^2}+\frac{b\left(ad-bc\right)^4e^{-a-bx}}{6d^6\left(c+dx\right)^2}-\frac{\left(ad-bc\right)^4e^{-a-bx}}{3d^5\left(c+dx\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**4/(d*x+c)**4,x)
```

```
[Out] -b**3*exp(-a - b*x)/d**4 + 4*b**3*(a*d - b*c)*exp(-a)*exp(b*c/d)*
Ei(b*(-c - d*x)/d)/d**5 - 6*b**3*(a*d - b*c)**2*exp(-a + b*c/d)*E
i(b*(-c - d*x)/d)/d**6 + 2*b**3*(a*d - b*c)**3*exp(-a)*exp(b*c/d)
*Ei(b*(-c - d*x)/d)/d**7 - b**3*(a*d - b*c)**4*exp(-a + b*c/d)*Ei
(b*(-c - d*x)/d)/(6*d**8) - 6*b**2*(a*d - b*c)**2*exp(-a - b*x)/(
d**5*(c + d*x)) + 2*b**2*(a*d - b*c)**3*exp(-a - b*x)/(d**6*(c +
d*x)) - b**2*(a*d - b*c)**4*exp(-a - b*x)/(6*d**7*(c + d*x)) - 2*
b*(a*d - b*c)**3*exp(-a - b*x)/(d**5*(c + d*x)**2) + b*(a*d - b*c
)**4*exp(-a - b*x)/(6*d**6*(c + d*x)**2) - (a*d - b*c)**4*exp(-a
- b*x)/(3*d**5*(c + d*x)**3)
```

Mathematica [A] time = 0.872146, size = 389, normalized size = 0.98

$$\frac{e^{-a}\left(b^3e^{\frac{bc}{d}}\left(-\left(6\left(a^2-6a+6\right)b^2c^2d^2-4\left(a^3-9a^2+18a-6\right)bcd^3+a\left(a^3-12a^2+36a-24\right)d^4-4(a-3)b^3c^3d+b^4c^4\right)\right)\right.}{}$$

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)*ExpIntegral
Ei[-((b*(c + d*x))/d)])/(6*d^8*E^a)
```

Maple [A] time = 0.019, size = 511, normalized size = 1.3

$$-\frac{1}{b}\left(\frac{b^4 e^{-bx-a}}{d^4}+4\,\frac{(ad-cb)\,b^4}{d^5}e^{-\frac{ad-cb}{d}}Ei\left(1,bx+a-\frac{ad-cb}{d}\right)+6\,\frac{\left(a^2d^2-2\,abcd+b^2c^2\right)b^4}{d^6}\left(-e^{-bx-a}\left(-bx-a+\frac{ad-c}{d}\right.\right.\right.$$

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^5*(a*d-b*c)*b^4*exp(-(a*d-b*c)/d)*E
i(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*(-ex
p(-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^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*exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)^2-1/2*exp(-b*x-a)/(-b*x-a+
(a*d-b*c)/d)-1/2*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*exp(-b*x-a)/(-b*x-
a+(a*d-b*c)/d)^2-1/6*exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)-1/6*exp(-(a
*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d)))
```

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

$$-\frac{a^4 e^{\left(-a+\frac{bc}{d}\right)} exp_integral_e\left(4, \frac{(dx+c)b}{d}\right)}{(dx+c)^3 d} - \frac{\left(b^3d^2x^4 + 4\,ab^2d^2x^3 + 2\left(3\,a^2bd^2 + 2\,b^2cd - 2\,abd^2\right)x^2 + 4\left(a^3d^2 - b^2c^2 - 3\,a^2d^2 - 2\,bcd + 2\left(2\,bcd + d^2\right)a\right)x\right)e^{(-bx)}}{d^6x^4e^a + 4\,cd^5x^3e^a + 6\,c^2d^4x^2e^a + 4\,c^3d^3xe^a + c^4d^2e^a} - \int -\frac{4\left(a^3cd^2 - b^2c^3 - 3\,a^2cd^2 - 2\,bc^2d + 2\left(2\,bc^2d + cd^2\right)a + \left(b^3c^3 - 3\,a^3d^3 + 7\,b^2c^2d + 6\,bcd^2 + 3\left(2\,bcd^2 + 3\,d^3\right)a^2 - 2\left(2\,b^2c^2 \cdots\right.\right.}{d^7x^5e^a + 5\,cd^6x^4e^a + 10\,c^2d^5x^3e^a + 10\,c^3d^4x^2e^a + 5\,c^4d^3xe^a + c^5d^2e^a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*e^(-b*x - a)/(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 + 1
0*c^3*d^4*x^2*e^a + 5*c^4*d^3*x*e^a + c^5*d^2*e^a), x)
```

Fricas [A] time = 0.271633, size = 1071, normalized size = 2.7

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*e^(-b*x - a)/(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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [A] time = 0.254977, size = 1, normalized size = 0.

Done

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Done
```

3.82 $\int \frac{e^{-a-bx}(a+bx)^4}{(c+dx)^5}\,dx$

Optimal. Leaf size=557

$$\frac{b^4(bc-ad)^4e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{24d^9}+\frac{2b^4(bc-ad)^3e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{3d^8}+\frac{3b^4(bc-ad)^2e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^7}+\frac{4b^4(bc-ad)e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^6}+\frac{b^4e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+\frac{b^3e^{-a-bx}(bc-ad)^4}{24d^8(c+dx)}+\frac{2b^3e^{-a-bx}(bc-ad)^3}{3d^7(c+dx)}+\frac{3b^3e^{-a-bx}(bc-ad)^2}{d^6(c+dx)}+\frac{4b^3e^{-a-bx}(bc-ad)}{d^5(c+dx)}-\frac{b^2e^{-a-bx}(bc-ad)^4}{24d^7(c+dx)^2}-\frac{2b^2e^{-a-bx}(bc-ad)^3}{3d^6(c+dx)^2}-\frac{3b^2e^{-a-bx}(bc-ad)^2}{d^5(c+dx)^2}+\frac{be^{-a-bx}(bc-ad)^4}{12d^6(c+dx)^3}+\frac{4be^{-a-bx}(bc-ad)^3}{3d^5(c+dx)^3}-\frac{e^{-a-bx}(bc-ad)^4}{4d^5(c+dx)^4}$$

```
[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)*ExpIntegr
alEi[-((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)
```

Rubi [A] time = 1.15225, antiderivative size = 557, normalized size of antiderivative = 1., number of steps used = 17, number of rules used = 3, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}} = 0.12$

$$\frac{b^4(bc-ad)^4e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{24d^9}+\frac{2b^4(bc-ad)^3e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{3d^8}+\frac{3b^4(bc-ad)^2e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^7}+\frac{4b^4(bc-ad)e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^6}+\frac{b^4e^{\frac{bc}{d}-a}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)}{d^5}+\frac{b^3e^{-a-bx}(bc-ad)^4}{24d^8(c+dx)}+\frac{2b^3e^{-a-bx}(bc-ad)^3}{3d^7(c+dx)}+\frac{3b^3e^{-a-bx}(bc-ad)^2}{d^6(c+dx)}+\frac{4b^3e^{-a-bx}(bc-ad)}{d^5(c+dx)}-\frac{b^2e^{-a-bx}(bc-ad)^4}{24d^7(c+dx)^2}-\frac{2b^2e^{-a-bx}(bc-ad)^3}{3d^6(c+dx)^2}-\frac{3b^2e^{-a-bx}(bc-ad)^2}{d^5(c+dx)^2}+\frac{be^{-a-bx}(bc-ad)^4}{12d^6(c+dx)^3}+\frac{4be^{-a-bx}(bc-ad)^3}{3d^5(c+dx)^3}-\frac{e^{-a-bx}(bc-ad)^4}{4d^5(c+dx)^4}$$

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)*ExpIntegr
alEi[-((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)
```

Rubi in Sympy [A] time = 112.574, size = 493, normalized size = 0.89

$$\frac{b^4e^{-a}e^{\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^5}-\frac{4b^4\,(ad-bc)\,e^{-a+\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^6}+\frac{3b^4\,(ad-bc)^2\,e^{-a}e^{\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{d^7}-\frac{2b^4\,(ad-bc)^3\,e^{-a+\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{3d^8}+\frac{b^4\,(ad-bc)^4\,e^{-a}e^{\frac{bc}{d}}\operatorname{Ei}\left(\frac{b(-c-dx)}{d}\right)}{24d^9}-\frac{4b^3\,(ad-bc)\,e^{-a-bx}}{d^5\,(c+dx)}+\frac{3b^3\,(ad-bc)^2\,e^{-a-bx}}{d^6\,(c+dx)}-\frac{2b^3\,(ad-bc)^3\,e^{-a-bx}}{3d^7\,(c+dx)}+\frac{b^3\,(ad-bc)^4\,e^{-a-bx}}{24d^8\,(c+dx)}-\frac{3b^2\,(ad-bc)^2\,e^{-a-bx}}{d^5\,(c+dx)^2}+\frac{2b^2\,(ad-bc)^3\,e^{-a-bx}}{3d^6\,(c+dx)^2}-\frac{b^2\,(ad-bc)^4\,e^{-a-bx}}{24d^7\,(c+dx)^2}-\frac{4b\,(ad-bc)^3\,e^{-a-bx}}{3d^5\,(c+dx)^3}+\frac{b\,(ad-bc)^4\,e^{-a-bx}}{12d^6\,(c+dx)^3}-\frac{(ad-bc)^4\,e^{-a-bx}}{4d^5\,(c+dx)^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(-b*x-a)*(b*x+a)**4/(d*x+c)**5,x)
```

```
[Out] b**4*exp(-a)*exp(b*c/d)*Ei(b*(-c - d*x)/d)/d**5 - 4*b**4*(a*d - b
*c)*exp(-a + b*c/d)*Ei(b*(-c - d*x)/d)/d**6 + 3*b**4*(a*d - b*c)*
*2*exp(-a)*exp(b*c/d)*Ei(b*(-c - d*x)/d)/d**7 - 2*b**4*(a*d - b*c
)**3*exp(-a + b*c/d)*Ei(b*(-c - d*x)/d)/(3*d**8) + b**4*(a*d - b*
c)**4*exp(-a)*exp(b*c/d)*Ei(b*(-c - d*x)/d)/(24*d**9) - 4*b**3*(a
*d - b*c)*exp(-a - b*x)/(d**5*(c + d*x)) + 3*b**3*(a*d - b*c)**2*
exp(-a - b*x)/(d**6*(c + d*x)) - 2*b**3*(a*d - b*c)**3*exp(-a - b
*x)/(3*d**7*(c + d*x)) + b**3*(a*d - b*c)**4*exp(-a - b*x)/(24*d*
*8*(c + d*x)) - 3*b**2*(a*d - b*c)**2*exp(-a - b*x)/(d**5*(c + d*
x)**2) + 2*b**2*(a*d - b*c)**3*exp(-a - b*x)/(3*d**6*(c + d*x)**2
) - b**2*(a*d - b*c)**4*exp(-a - b*x)/(24*d**7*(c + d*x)**2) - 4*
b*(a*d - b*c)**3*exp(-a - b*x)/(3*d**5*(c + d*x)**3) + b*(a*d - b
*c)**4*exp(-a - b*x)/(12*d**6*(c + d*x)**3) - (a*d - b*c)**4*exp(
-a - b*x)/(4*d**5*(c + d*x)**4)
```

Mathematica [A] time = 0.707048, size = 669, normalized size = 1.2

$$\frac{e^{-a}\left(a^4b^4d^4e^{\frac{bc}{d}}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)-4a^3b^5cd^3e^{\frac{bc}{d}}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)-16a^3b^4d^4e^{\frac{bc}{d}}\text{ExpIntegralEi}\left(-\frac{b(c+dx)}{d}\right)\right.}{}$$

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)*ExpIntegralEi[-((
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)*ExpIntegralEi[-((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)] - 9
6*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)*ExpIntegralEi[-((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)
```

Maple [A] time = 0.019, size = 596, normalized size = 1.1

$$-\frac{1}{b}\left(\frac{b^5}{d^5}e^{-\frac{ad-cb}{d}}Ei\left(1,bx+a-\frac{ad-cb}{d}\right)+4\,\frac{(ad-cb)\,b^5}{d^6}\left(-e^{-bx-a}\left(-bx-a+\frac{ad-cb}{d}\right)^{-1}-e^{-\frac{ad-cb}{d}}Ei\left(1,bx+a-\frac{ad-c}{d}\right.\right.\right.$$

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*(b^5/d^5*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d)+4*(a*d-b*
c)/d^6*b^5*(-exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)-exp(-(a*d-b*c)/d)*E
i(1,b*x+a-(a*d-b*c)/d))-(a*d-b*c)^4/d^9*b^5*(-1/4*exp(-b*x-a)/(-b
*x-a+(a*d-b*c)/d)^4-1/12*exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)^3-1/24*
exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)^2-1/24*exp(-b*x-a)/(-b*x-a+(a*d-
b*c)/d)-1/24*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d))-6*(a*d-b*
c)^2/d^7*b^5*(-1/2*exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)^2-1/2*exp(-b*
x-a)/(-b*x-a+(a*d-b*c)/d)-1/2*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b
*c)/d))+4*(a*d-b*c)^3/d^8*b^5*(-1/3*exp(-b*x-a)/(-b*x-a+(a*d-b*c)
/d)^3-1/6*exp(-b*x-a)/(-b*x-a+(a*d-b*c)/d)^2-1/6*exp(-b*x-a)/(-b*
x-a+(a*d-b*c)/d)-1/6*exp(-(a*d-b*c)/d)*Ei(1,b*x+a-(a*d-b*c)/d)))
```

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

$$-\frac{\left(b^3d^2x^4 + \left(4\,ab^2d^2 - b^2d^2\right)x^3 + \left(6\,a^2bd^2 + 5\,b^2cd - 8\,abd^2 + 2\,bd^2\right)x^2 + \left(4\,a^3d^2 - 5\,b^2c^2 - 18\,a^2d^2 - 20\,bcd + 4\left(5\,bcd + 6\right.\right.}{d^7x^5e^a + 5\,cd^6x^4e^a + 10\,c^2d^5x^3e^a + 10\,c^3d^4x^2e^a + 5\,c^4d^3xe^a + c^5d^2e^a}$$
$$-\frac{a^4e^{\left(-a+\frac{bc}{d}\right)}exp_integral_e\left(5,\frac{(dx+c)b}{d}\right)}{(dx+c)^4d} - \int$$
$$-\frac{\left(4\,a^3cd^2 - 5\,b^2c^3 - 18\,a^2cd^2 - 20\,bc^2d - 6\,cd^2 + 4\left(5\,bc^2d + 6\,cd^2\right)a + \left(5\,b^3c^3 - 16\,a^3d^3 + 50\,b^2c^2d + 90\,bcd^2 + 6\left(5\,bcd^2 +\right.\right.\right.}{d^8x^6e^a + 6\,cd^7x^5e^a + 15\,c^2d^6x^4e^a + 20\,c^3d^5x^3e^a + 15\,c^4d^4x^2e^a + 6\,c^5d^3xe}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*e^(-b*x - a)/(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_in
tegral_e(5, (d*x + c)*b/d)/((d*x + c)^4*d) - integrate(-(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)
```

Fricas [A] time = 0.269128, size = 1463, normalized size = 2.63

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x + a)^4*e^(-b*x - a)/(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 - 15)*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 - 12*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)
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

undef

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate((b*x + a)^4*e^(-b*x - a)/(d*x + c)^5,x, algorithm="giac")

[Out] undef
```

3.83 $\int F^{c(a+bx)}x^m \log^n(dx)(e+en+e(1+m+bcx\log(F))\log(dx))\,dx$

Optimal. Leaf size=24

$$ex^{m+1}\log^{n+1}(dx)F^{c(a+bx)}$$

```
[Out] e*F^(c*(a + b*x))*x^(1 + m)*Log[d*x]^(1 + n)
```

Rubi [A] time = 0.221407, antiderivative size = 24, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 39, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.026

$$ex^{m+1}\log^{n+1}(dx)F^{c(a+bx)}$$

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]),
```

```
[Out] e*F^(c*(a + b*x))*x^(1 + m)*Log[d*x]^(1 + n)
```

Rubi in Sympy [A] time = 11.1184, size = 22, normalized size = 0.92

$$F^{c(a+bx)}ex^{m+1}\log(dx)^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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*
```

```
[Out] F**(c*(a + b*x))*e*x**(m + 1)*log(d*x)**(n + 1)
```

Mathematica [A] time = 0.116804, size = 24, normalized size = 1.

$$ex^{m+1}\log^{n+1}(dx)F^{c(a+bx)}$$

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[
```

```
[Out] e*F^(c*(a + b*x))*x^(1 + m)*Log[d*x]^(1 + n)
```

Maple [F] time = 0.098, size = 0, normalized size = 0.

$$\int F^{c(bx+a)}x^m (\ln (dx))^n (e + en + e(1 + m + bcx \ln (F)) \ln (dx)) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(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] int(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)
```

Maxima [A] time = 0.965532, size = 57, normalized size = 2.38

$$(F^{ac}ex \log (d) + F^{ac}ex \log (x))e^{(bcx \log(F)+m \log(x)+n \log(\log(d)+\log(x)))}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(((b*c*x*log(F) + m + 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*x^m*log(d
```

```
[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*log(log(d) + log(x)))
```

Fricas [A] time = 0.260418, size = 43, normalized size = 1.79

$$(ex \log (d) + ex \log (x))F^{bcx+ac}x^m(\log (d) + \log (x))^n$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(((b*c*x*log(F) + m + 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*x^m*log(d
```

```
[Out] (e*x*log(d) + e*x*log(x))*F^(b*c*x + a*c)*x^m*(log(d) + log(x))^n
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int ((bcx \log(F) + m + 1)e \log(dx) + en + e)F^{(bx+a)c}x^m \log(dx)^n \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(((b*c*x*log(F) + m + 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*x^m*log(d
```

```
[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)
```

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*(a + b*x))*x^3*Log[d*x]^(1 + n)
```

Rubi [A] time = 0.192834, antiderivative size = 22, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 38, $\frac{\text{number of rules}}{\text{integrand size}} = 0.026$

$$ex^3 \log^{n+1}(dx)F^{c(a+bx)}$$

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)
```

Rubi in Sympy [A] time = 11.1257, size = 20, normalized size = 0.91

$$F^{c(a+bx)}ex^3 \log(dx)^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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)
```

```
[Out] F**(c*(a + b*x))*e*x**3*log(d*x)**(n + 1)
```

Mathematica [A] time = 0.0498399, 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])*Log[d*x]
```

```
[Out] e*F^(a*c + b*c*x)*x^3*Log[d*x]^(1 + n)
```

Maple [C] time = 0.158, size = 198, normalized size = 9.

$$\left(-\frac{i}{2}\pi\, e x^{3} \mathit{csgn}\left(i d\right) \mathit{csgn}\left(i x\right) \mathit{csgn}\left(i d x\right) F^{c(bx+a)}+\frac{i}{2}\pi\, e x^{3} \mathit{csgn}\left(i d\right) \left(\mathit{csgn}\left(i d x\right)\right)^{2} F^{c(bx+a)} +\frac{i}{2}\pi\, e x^{3} \mathit{csgn}\left(i x\right) \left(\mathit{csgn}\left(i d x\right)\right)^{2} F^{c(bx+a)}-\frac{i}{2}\pi\, e x^{3} \left(\mathit{csgn}\left(i d x\right)\right)^{3} F^{c(bx+a)} +\ln\left(d\right) e x^{3} F^{c(bx+a)}+e x^{3} F^{c(bx+a)} \ln\left(x\right)\right) \left(\ln\left(d\right)+\ln\left(x\right) -\frac{i}{2}\pi\, \mathit{csgn}\left(i d x\right) \left(-\mathit{csgn}\left(i d x\right)+\mathit{csgn}\left(i d\right)\right) \left(-\mathit{csgn}\left(i d x\right)+\mathit{csgn}\left(i x\right)\right)\right)^{n}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(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] (-1/2*I*Pi*e*x^3*csgn(I*d)*csgn(I*x)*csgn(I*d*x)*F^(c*(b*x+a))+1/
2*I*Pi*e*x^3*csgn(I*d)*csgn(I*d*x)^2*F^(c*(b*x+a))+1/2*I*Pi*e*x^3
*csgn(I*x)*csgn(I*d*x)^2*F^(c*(b*x+a))-1/2*I*Pi*e*x^3*csgn(I*d*x)
^3*F^(c*(b*x+a))+ln(d)*e*x^3*F^(c*(b*x+a))+e*x^3*F^(c*(b*x+a))*ln
(x))*(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 = 0.9331, size = 57, normalized size = 2.59

$$\left(F^{ac} e x^{3} \log\left(d\right) + F^{ac} e x^{3} \log\left(x\right)\right) e^{\left(b c x \log\left(F\right) + n \log\left(\log\left(d\right) + \log\left(x\right)\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)))
```

Fricas [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Exception raised: TypeError
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Exception raised: RuntimeError
```

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*(a + b*x))*x^2*Log[d*x]^(1 + n)
```

Rubi [A] time = 0.132276, antiderivative size = 22, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 36, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.028

$$ex^2\log^{n+1}(dx)F^{c(a+bx)}$$

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)
```

Rubi in Sympy [A] time = 8.15662, size = 20, normalized size = 0.91

$$F^{c(a+bx)}ex^2\log(dx)^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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] F**(c*(a + b*x))*e*x**2*log(d*x)**(n + 1)
```

Mathematica [A] time = 0.0458321, 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]),
```

```
[Out] e*F^(a*c + b*c*x)*x^2*Log[d*x]^(1 + n)
```

Maple [C] time = 0.116, size = 198, normalized size = 9.

$$\left(-\frac{i}{2}\pi\, e x^2 \mathit{csgn}(id)\,\mathit{csgn}(ix)\,\mathit{csgn}(idx)\, F^{c(bx+a)} + \frac{i}{2}\pi\, e x^2 \mathit{csgn}(id)\,(\mathit{csgn}(idx))^2 F^{c(bx+a)} + \frac{i}{2}\pi\, e x^2 \mathit{csgn}(ix)\,(\mathit{csgn}(idx))^2 F^{c(bx+a)} - \frac{i}{2}\pi\, e x^2 (\mathit{csgn}(idx))^3 F^{c(bx+a)} + \ln(d)\, e x^2 F^{c(bx+a)} + e x^2 F^{c(bx+a)} \ln(x)\right)\left(\ln(d) + \ln(x) - \frac{i}{2}\pi\, \mathit{csgn}(idx)\,(-\mathit{csgn}(idx) + \mathit{csgn}(id))\,(-\mathit{csgn}(idx) + \mathit{csgn}(ix))\right)^n$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(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] (-1/2*I*Pi*e*x^2*csgn(I*d)*csgn(I*x)*csgn(I*d*x)*F^(c*(b*x+a))+1/
2*I*Pi*e*x^2*csgn(I*d)*csgn(I*d*x)^2*F^(c*(b*x+a))+1/2*I*Pi*e*x^2
*csgn(I*x)*csgn(I*d*x)^2*F^(c*(b*x+a))-1/2*I*Pi*e*x^2*csgn(I*d*x)
^3*F^(c*(b*x+a))+ln(d)*e*x^2*F^(c*(b*x+a))+e*x^2*F^(c*(b*x+a))*ln
(x))*(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 = 0.956811, size = 57, normalized size = 2.59

$$\left(F^{ac} e x^2 \log(d) + F^{ac} e x^2 \log(x)\right) e^{(bcx \log(F) + n \log(\log(d) + \log(x)))}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)))
```

Fricas [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Exception raised: TypeError
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Exception raised: RuntimeError
```

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*(a + b*x))*x*Log[d*x]^(1 + n)
```

Rubi [A] time = 0.0702059, antiderivative size = 20, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 35, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.029

$$ex \log^{n+1}(dx)F^{c(a+bx)}$$

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)
```

Rubi in Sympy [A] time = 7.74326, size = 19, normalized size = 0.95

$$F^{c(a+bx)}ex \log(dx)^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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] F**(c*(a + b*x))*e*x*log(d*x)**(n + 1)
```

Mathematica [A] time = 0.0426681, 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)
```

Maple [C] time = 0.139, size = 186, normalized size = 9.3

$$\left(-\frac{i}{2}\pi\, ex\mathrm{csgn}\left(id\right)\mathrm{csgn}\left(ix\right)\mathrm{csgn}\left(idx\right)F^{c(bx+a)}+\frac{i}{2}\pi\, ex\mathrm{csgn}\left(id\right)\left(\mathrm{csgn}\left(idx\right)\right)^{2}F^{c(bx+a)}+\frac{i}{2}\pi\, ex\mathrm{csgn}\left(ix\right)\left(\mathrm{csgn}\left(idx\right)\right)^{2}F^{c(bx+a)}-\frac{i}{2}\pi\, ex\left(\mathrm{csgn}\left(idx\right)\right)^{3}F^{c(bx+a)}+\ln\left(d\right)exF^{c(bx+a)}+exF^{c(bx+a)}\ln\left(x\right)\right)\left(\ln\left(d\right)+\ln\left(x\right)-\frac{i}{2}\pi\,\mathrm{csgn}\left(idx\right)\left(-\mathrm{csgn}\left(idx\right)+\mathrm{csgn}\left(id\right)\right)\left(-\mathrm{csgn}\left(idx\right)+\mathrm{csgn}\left(ix\right)\right)\right)^{n}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(F^(c*(b*x+a))*ln(d*x)^n*(e+e*n+e*(1+b*c*x*ln(F))*ln(d*x)),x)
```

```
[Out] (-1/2*I*Pi*e*x*csgn(I*d)*csgn(I*x)*csgn(I*d*x)*F^(c*(b*x+a))+1/2*
I*Pi*e*x*csgn(I*d)*csgn(I*d*x)^2*F^(c*(b*x+a))+1/2*I*Pi*e*x*csgn(
I*x)*csgn(I*d*x)^2*F^(c*(b*x+a))-1/2*I*Pi*e*x*csgn(I*d*x)^3*F^(c*
(b*x+a))+ln(d)*e*x*F^(c*(b*x+a))+e*x*F^(c*(b*x+a))*ln(x))*(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 = 0.949948, size = 51, normalized size = 2.55

$$(F^{ac}ex\log(d)+F^{ac}ex\log(x))e^{(bcx\log(F)+n\log(\log(d)+\log(x)))}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(((b*c*x*log(F) + 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*log(d*x)^n,x,
```

```
[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)))
```

Fricas [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(((b*c*x*log(F) + 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*log(d*x)^n,x,
```

```
[Out] Exception raised: TypeError
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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*(1+b*c*x*ln(F))*ln(d*x)),x)
```

```
[Out] Timed out
```

GIAC/XCAS [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(((b*c*x*log(F) + 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*log(d*x)^n,x,
```

```
[Out] Exception raised: RuntimeError
```

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*(a + b*x))*Log[d*x]^(1 + n)
```

Rubi [A] time = 0.190229, antiderivative size = 19, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 35, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.029

$$e\log^{n+1}(dx)F^{c(a+bx)}$$

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)
```

Rubi in Sympy [A] time = 15.1638, size = 17, normalized size = 0.89

$$F^{c(a+bx)}e\log{(dx)}^{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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] F**(c*(a + b*x))*e*log(d*x)**(n + 1)
```

Mathematica [A] time = 0.0392606, size = 20, normalized size = 1.05

$$e\log^{n+1}(dx)F^{ac+bcx}$$

Antiderivative was successfully verified.

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

```
[Out] e*F^(a*c + b*c*x)*Log[d*x]^(1 + n)
```

Maple [C] time = 0.105, size = 180, normalized size = 9.5

$$\left(-\frac{i}{2}\pi\, e csgn\left(id\right) csgn\left(ix\right) csgn\left(idx\right) F^{c(bx+a)}+\frac{i}{2}\pi\, e csgn\left(id\right) \left(csgn\left(idx\right)\right)^{2} F^{c(bx+a)} +\frac{i}{2}\pi\, e csgn\left(ix\right) \left(csgn\left(idx\right)\right)^{2} F^{c(bx+a)}-\frac{i}{2}\pi\, e\left(csgn\left(idx\right)\right)^{3} F^{c(bx+a)}+\ln\left(d\right) eF^{c(bx+a)} +eF^{c(bx+a)}\ln\left(x\right)\right)\left(\ln\left(d\right)+\ln\left(x\right)-\frac{i}{2}\pi\, csgn\left(idx\right)\left(-csgn\left(idx\right)+csgn\left(id\right)\right)\left(-csgn\left(idx\right)+csgn\left(ix\right)\right)\right)^{n}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  int(F^(c*(b*x+a))*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*x)*csgn(I*d*x)*F^(c*(b*x+a))+1/2*I*
Pi*e*csgn(I*d)*csgn(I*d*x)^2*F^(c*(b*x+a))+1/2*I*Pi*e*csgn(I*x)*c
sgn(I*d*x)^2*F^(c*(b*x+a))-1/2*I*Pi*e*csgn(I*d*x)^3*F^(c*(b*x+a))
+ln(d)*e*F^(c*(b*x+a))+e*F^(c*(b*x+a))*ln(x))*(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 = 0.96519, size = 49, normalized size = 2.58

$$(F^{ac}e\log\left(d\right)+F^{ac}e\log\left(x\right))e^{(bcx\log(F)+n\log(\log(d)+\log(x)))}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*c*e*x*log(d*x)*log(F) + e*n + e)*F^((b*x + a)*c)*log(d*x)^n/x,x, al
```

```
[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)))
```

Fricas [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*c*e*x*log(d*x)*log(F) + e*n + e)*F^((b*x + a)*c)*log(d*x)^n/x,x, al
```

```
[Out] Exception raised: TypeError
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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+b*c*e*x*ln(F)*ln(d*x))/x,x)
```

```
[Out] Timed out
```

GIAC/XCAS [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*c*e*x*log(d*x)*log(F) + e*n + e)*F^((b*x + a)*c)*log(d*x)^n/x,x, al
```

```
[Out] Exception raised: RuntimeError
```

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*(a + b*x))*Log[d*x]^(1 + n))/x
```

Rubi [A] time = 0.197778, antiderivative size = 22, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 38, $\frac{\text{number of rules}}{\text{integrand size}} = 0.026$

$$\frac{e \log^{n+1}(dx)F^{c(a+bx)}}{x}$$

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
```

Rubi in Sympy [A] time = 11.1605, size = 19, normalized size = 0.86

$$\frac{F^{c(a+bx)}e \log{(dx)}^{n+1}}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_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] F**(c*(a + b*x))*e*log(d*x)**(n + 1)/x
```

Mathematica [A] time = 0.0638254, 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]))
```

```
[Out] (e*F^(a*c + b*c*x)*Log[d*x]^(1 + n))/x
```

Maple [C] time = 0.128, size = 136, normalized size = 6.2

$$\frac{\left(2\,\ln(d)+2\,\ln(x)-i\pi\,csgn(id)\,csgn(ix)\,csgn(idx)+i\pi\,csgn(id)\,(csgn(idx))^2+i\pi\,csgn(ix)\,(csgn(idx))^2-i\pi\,\left(csgn(idx)\right)^3}{2\,x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(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] 1/2*F^(c*(b*x+a))*e*(2*ln(d)+2*ln(x)-I*Pi*csgn(I*d)*csgn(I*x)*csg
n(I*d*x)+I*Pi*csgn(I*d)*csgn(I*d*x)^2+I*Pi*csgn(I*x)*csgn(I*d*x)^
2-I*Pi*csgn(I*d*x)^3)/x*(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 = 0.967801, size = 53, normalized size = 2.41

$$\frac{(F^{ac}e\log(d)+F^{ac}e\log(x))e^{(bcx\log(F)+n\log(\log(d)+\log(x)))}}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(((b*c*x*log(F) - 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*log(d*x)^n/x^
```

```
[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
```

Fricas [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(((b*c*x*log(F) - 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*log(d*x)^n/x^
```

```
[Out] Exception raised: TypeError
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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*(-1+b*c*x*ln(F))*ln(d*x))/x**2,x)

[Out] Timed out
```

GIAC/XCAS [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(((b*c*x*log(F) - 1)*e*log(d*x) + e*n + e)*F^((b*x + a)*c)*log(d*x)^n/x^

[Out] Exception raised: RuntimeError
```

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*(a + b*x))*Log[d*x]^(1 + n))/x^2
```

Rubi [A] time = 0.195869, antiderivative size = 22, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 38, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.026

$$\frac{e\log^{n+1}(dx)F^{c(a+bx)}}{x^2}$$

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
```

Rubi in Sympy [A] time = 11.1808, size = 20, normalized size = 0.91

$$\frac{F^{c(a+bx)}e\log(dx)^{n+1}}{x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_integrate(F**(c*(b*x+a))*ln(d*x)**n*(e+e*n+e*(-2+b*c*x*ln(F))*ln(d*x))/x*
```

```
[Out] F**(c*(a + b*x))*e*log(d*x)**(n + 1)/x**2
```

Mathematica [A] time = 0.063268, 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]))
```

```
[Out] (e*F^(a*c + b*c*x)*Log[d*x]^(1 + n))/x^2
```

Maple [C] time = 0.128, size = 136, normalized size = 6.2

$$\frac{\left(2\,\ln(d)+2\,\ln(x)-i\pi\,csgn(id)\,csgn(ix)\,csgn(idx)+i\pi\,csgn(id)\,(csgn(idx))^2+i\pi\,csgn(ix)\,(csgn(idx))^2-i\pi\,(csgn(idx))^3}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(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] 1/2*F^(c*(b*x+a))*e*(2*ln(d)+2*ln(x)-I*Pi*csgn(I*d)*csgn(I*x)*csg
n(I*d*x)+I*Pi*csgn(I*d)*csgn(I*d*x)^2+I*Pi*csgn(I*x)*csgn(I*d*x)^
2-I*Pi*csgn(I*d*x)^3)/x^2*(ln(d)+ln(x)-1/2*I*Pi*csgn(I*d*x)*(-csg
n(I*d*x)+csgn(I*d))*(-csgn(I*d*x)+csgn(I*x)))^n
```

Maxima [A] time = 0.970506, size = 53, normalized size = 2.41

$$\frac{(F^{ac}e\log(d)+F^{ac}e\log(x))e^{(bcx\log(F)+n\log(\log(d)+\log(x)))}}{x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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
```

Fricas [F(-2)] time = 0., size = 0, normalized size = 0.

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Exception raised: TypeError
```

Sympy [F(-1)] time = 0., size = 0, normalized size = 0.

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
```

GIAC/XCAS [F] time = 0., size = 0, normalized size = 0.

$$\int \frac{((bcx\log(F) - 2)e\log(dx) + en + e)F^{(bx+a)c}\log(dx)^n}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[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)
```

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*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
```

Rubi [A] time = 0.213147, antiderivative size = 91, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133

$$\frac{768\sqrt{e^{a+bx}}}{b^5}-\frac{384x\sqrt{e^{a+bx}}}{b^4}+\frac{96x^2\sqrt{e^{a+bx}}}{b^3}-\frac{16x^3\sqrt{e^{a+bx}}}{b^2}+\frac{2x^4\sqrt{e^{a+bx}}}{b}$$

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
```

Rubi in Sympy [A] time = 12.8547, size = 85, normalized size = 0.93

$$\frac{2x^4\sqrt{e^{a+bx}}}{b}-\frac{16x^3\sqrt{e^{a+bx}}}{b^2}+\frac{96x^2\sqrt{e^{a+bx}}}{b^3}-\frac{384x\sqrt{e^{a+bx}}}{b^4}+\frac{768\sqrt{e^{a+bx}}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(x**4*exp(b*x+a)**(1/2),x)
```

```
[Out] 2*x**4*sqrt(exp(a + b*x))/b - 16*x**3*sqrt(exp(a + b*x))/b**2 + 9
6*x**2*sqrt(exp(a + b*x))/b**3 - 384*x*sqrt(exp(a + b*x))/b**4 +
768*sqrt(exp(a + b*x))/b**5
```

Mathematica [A] time = 0.0143247, 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
```

Maple [A] time = 0.006, size = 43, normalized size = 0.5

$$2\,\frac{\left(x^4b^4-8\,x^3b^3+48\,x^2b^2-192\,bx+384\right)\sqrt{e^{bx+a}}}{b^5}$$

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 = 0.750999, size = 81, normalized size = 0.89

$$\frac{2\left(b^4x^4e^{\left(\frac{1}{2}\,a\right)}-8\,b^3x^3e^{\left(\frac{1}{2}\,a\right)}+48\,b^2x^2e^{\left(\frac{1}{2}\,a\right)}-192\,bxe^{\left(\frac{1}{2}\,a\right)}+384\,e^{\left(\frac{1}{2}\,a\right)}\right)e^{\left(\frac{1}{2}\,bx\right)}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(x^4*e^(1/2*b*x + 1/2*a),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
```

Fricas [A] time = 0.247205, size = 58, normalized size = 0.64

$$\frac{2\left(b^4x^4-8\,b^3x^3+48\,b^2x^2-192\,bx+384\right)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(x^4*e^(1/2*b*x + 1/2*a),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
```

Sympy [A] time = 0.229877, 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))
```

GIAC/XCAS [A] time = 0.236409, size = 58, normalized size = 0.64

$$\frac{2\left(b^4x^4 - 8\,b^3x^3 + 48\,b^2x^2 - 192\,bx + 384\right)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(x^4*e^(1/2*b*x + 1/2*a),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
```

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*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
```

Rubi [A] time = 0.152313, antiderivative size = 72, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133

$$-\frac{96\sqrt{e^{a+bx}}}{b^4}+\frac{48x\sqrt{e^{a+bx}}}{b^3}-\frac{12x^2\sqrt{e^{a+bx}}}{b^2}+\frac{2x^3\sqrt{e^{a+bx}}}{b}$$

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
```

Rubi in Sympy [A] time = 9.15162, size = 66, normalized size = 0.92

$$\frac{2x^3\sqrt{e^{a+bx}}}{b}-\frac{12x^2\sqrt{e^{a+bx}}}{b^2}+\frac{48x\sqrt{e^{a+bx}}}{b^3}-\frac{96\sqrt{e^{a+bx}}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] rubi_integrate(x**3*exp(b*x+a)**(1/2),x)
```

```
[Out] 2*x**3*sqrt(exp(a + b*x))/b - 12*x**2*sqrt(exp(a + b*x))/b**2 + 4
8*x*sqrt(exp(a + b*x))/b**3 - 96*sqrt(exp(a + b*x))/b**4
```

Mathematica [A] time = 0.0106193, 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
```

Maple [A] time = 0.006, size = 35, normalized size = 0.5

$$2\,\frac{\left(x^3b^3 - 6\,x^2b^2 + 24\,bx - 48\right)\sqrt{e^{bx+a}}}{b^4}$$

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 = 0.835351, size = 65, normalized size = 0.9

$$\frac{2\left(b^3x^3e^{\left(\frac{1}{2}\,a\right)} - 6\,b^2x^2e^{\left(\frac{1}{2}\,a\right)} + 24\,bxe^{\left(\frac{1}{2}\,a\right)} - 48\,e^{\left(\frac{1}{2}\,a\right)}\right)e^{\left(\frac{1}{2}\,bx\right)}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.260096, size = 47, normalized size = 0.65

$$\frac{2\left(b^3x^3 - 6\,b^2x^2 + 24\,bx - 48\right)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(x^3*e^(1/2*b*x + 1/2*a),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
```

Sympy [A] time = 0.218076, size = 42, normalized size = 0.58

$$\begin{cases} \frac{(2b^3x^3-12b^2x^2+48bx-96)\sqrt{e^{a+bx}}}{b^4} & \text{for } b^4 \neq 0 \\ \frac{x^4}{4} & \text{otherwise} \end{cases}$$

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))
```

GIAC/XCAS [A] time = 0.25041, size = 47, normalized size = 0.65

$$\frac{2\left(b^3x^3 - 6\,b^2x^2 + 24\,bx - 48\right)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(x^3*e^(1/2*b*x + 1/2*a),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
```

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*Sqrt[E^(a + b*x)])/b^3 - (8*Sqrt[E^(a + b*x)]*x)/b^2 + (2*Sqr
t[E^(a + b*x)]*x^2)/b
```

Rubi [A] time = 0.0973366, antiderivative size = 53, normalized size of antiderivative = 1., number of steps used = 3, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133

$$\frac{16\sqrt{e^{a+bx}}}{b^3}-\frac{8x\sqrt{e^{a+bx}}}{b^2}+\frac{2x^2\sqrt{e^{a+bx}}}{b}$$

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*Sqr
t[E^(a + b*x)]*x^2)/b
```

Rubi in Sympy [A] time = 5.87901, size = 48, normalized size = 0.91

$$\frac{2x^2\sqrt{e^{a+bx}}}{b}-\frac{8x\sqrt{e^{a+bx}}}{b^2}+\frac{16\sqrt{e^{a+bx}}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(x**2*exp(b*x+a)**(1/2),x)
```

```
[Out] 2*x**2*sqrt(exp(a + b*x))/b - 8*x*sqrt(exp(a + b*x))/b**2 + 16*sq
rt(exp(a + b*x))/b**3
```

Mathematica [A] time = 0.00913231, 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
```

Maple [A] time = 0.006, size = 27, normalized size = 0.5

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

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 = 0.777594, size = 49, normalized size = 0.92

$$\frac{2 \, {\left(b^{2} x^{2} e^{\left(\frac{1}{2} \, a\right)} - 4 \, b x e^{\left(\frac{1}{2} \, a\right)} + 8 \, e^{\left(\frac{1}{2} \, a\right)}\right)} e^{\left(\frac{1}{2} \, b x\right)}}{b^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [A] time = 0.248536, size = 36, normalized size = 0.68

$$\frac{2 \, {\left(b^{2} x^{2} - 4 \, b x + 8\right)} e^{\left(\frac{1}{2} \, b x + \frac{1}{2} \, a\right)}}{b^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Sympy [A] time = 0.200027, size = 34, normalized size = 0.64

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

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))
```

GIAC/XCAS [A] time = 0.239023, size = 36, normalized size = 0.68

$$\frac{2\left(b^2x^2 - 4\,bx + 8\right)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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*Sqrt[E^(a + b*x)])/b^2 + (2*Sqrt[E^(a + b*x)]*x)/b
```

Rubi [A] time = 0.0434838, antiderivative size = 34, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154

$$\frac{2x\sqrt{e^{a+bx}}}{b} - \frac{4\sqrt{e^{a+bx}}}{b^2}$$

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
```

Rubi in Sympy [A] time = 3.05383, size = 29, normalized size = 0.85

$$\frac{2x\sqrt{e^{a+bx}}}{b} - \frac{4\sqrt{e^{a+bx}}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(x*exp(b*x+a)**(1/2),x)
```

```
[Out] 2*x*sqrt(exp(a + b*x))/b - 4*sqrt(exp(a + b*x))/b**2
```

Mathematica [A] time = 0.00642014, 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
```

Maple [A] time = 0.003, size = 19, normalized size = 0.6

$$2\,\frac{(bx-2)\sqrt{e^{bx+a}}}{b^2}$$

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 = 0.771949, size = 32, normalized size = 0.94

$$\frac{2\left(bxe^{\left(\frac{1}{2}\,a\right)}-2\,e^{\left(\frac{1}{2}\,a\right)}\right)e^{\left(\frac{1}{2}\,bx\right)}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.245078, size = 26, normalized size = 0.76

$$\frac{2\,(bx-2)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Sympy [A] time = 0.17606, 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))
```

GIAC/XCAS [A] time = 0.251503, size = 26, normalized size = 0.76

$$\frac{2(bx-2)e^{\left(\frac{1}{2}bx+\frac{1}{2}a\right)}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.94 $\int \sqrt{e^{a+bx}}\,dx$

Optimal. Leaf size=16

$$\frac{2\sqrt{e^{a+bx}}}{b}$$

```
[Out] (2*Sqrt[E^(a + b*x)])/b
```

Rubi [A] time = 0.0125971, antiderivative size = 16, normalized size of antiderivative = 1., number of steps used = 1, number of rules used = 1, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.091

$$\frac{2\sqrt{e^{a+bx}}}{b}$$

Antiderivative was successfully verified.

```
[In]  Int[Sqrt[E^(a + b*x)],x]

[Out] (2*Sqrt[E^(a + b*x)])/b
```

Rubi in Sympy [A] time = 1.19301, size = 12, normalized size = 0.75

$$\frac{2\sqrt{e^{a+bx}}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(b*x+a)**(1/2),x)

[Out] 2*sqrt(exp(a + b*x))/b
```

Mathematica [A] time = 0.00296304, size = 16, normalized size = 1.

$$\frac{2\sqrt{e^{a+bx}}}{b}$$

Antiderivative was successfully verified.

```
[In]  Integrate[Sqrt[E^(a + b*x)],x]
```

```
[Out] (2*Sqrt[E^(a + b*x)])/b
```

Maple [A] time = 0.003, size = 14, normalized size = 0.9

$$2\,\frac{\sqrt{e^{bx+a}}}{b}$$

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 = 0.787282, size = 19, normalized size = 1.19

$$\frac{2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.248416, size = 19, normalized size = 1.19

$$\frac{2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Sympy [A] time = 0.1371, 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))
```

GIAC/XCAS [A] time = 0.237854, size = 19, normalized size = 1.19

$$\frac{2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.95 $\int \frac{\sqrt{e^{a+bx}}}{x}\,dx$

Optimal. Leaf size=27

$$e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\text{ExpIntegralEi}\left(\frac{bx}{2}\right)$$

```
[Out] (Sqrt[E^(a + b*x)]*ExpIntegralEi[(b*x)/2])/E^((b*x)/2)
```

Rubi [A] time = 0.088036, antiderivative size = 27, normalized size of antiderivative = 1., number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133

$$e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\text{ExpIntegralEi}\left(\frac{bx}{2}\right)$$

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)
```

Rubi in Sympy [A] time = 5.4813, size = 32, normalized size = 1.19

$$e^{\frac{a}{2}}e^{-\frac{a}{2}-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(b*x+a)**(1/2)/x,x)
```

```
[Out] exp(a/2)*exp(-a/2 - b*x/2)*sqrt(exp(a + b*x))*Ei(b*x/2)
```

Mathematica [A] time = 0.00654141, size = 27, normalized size = 1.

$$e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\text{ExpIntegralEi}\left(\frac{bx}{2}\right)$$

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)
```

Maple [B] time = 0.088, size = 57, normalized size = 2.1

$$\sqrt{e^{bx+a}}e^{-\frac{bx}{2}e^{\frac{a}{2}}}\left(\ln(x)-\ln(2)+\ln\left(-be^{\frac{a}{2}}\right)-\ln\left(-\frac{bx}{2}e^{\frac{a}{2}}\right)-Ei\left(1,-\frac{bx}{2}e^{\frac{a}{2}}\right)\right)$$

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(x)-ln(2)+ln(-b*exp(
1/2*a))-ln(-1/2*b*x*exp(1/2*a))-Ei(1,-1/2*b*x*exp(1/2*a)))
```

Maxima [A] time = 0.848026, size = 14, normalized size = 0.52

$$\mathrm{Ei}\left(\frac{1}{2}bx\right)e^{\left(\frac{1}{2}a\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.262248, size = 14, normalized size = 0.52

$$\mathrm{Ei}\left(\frac{1}{2}bx\right)e^{\left(\frac{1}{2}a\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

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

$$\int \frac{\sqrt{e^{a}e^{bx}}}{x}\,dx$$

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)
```

GIAC/XCAS [A] time = 0.231435, size = 14, normalized size = 0.52

$$\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.96 $\int \frac{\sqrt{e^{a+bx}}}{x^2} \, dx$

Optimal. Leaf size=48

$$\frac{1}{2}be^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\text{ExpIntegralEi}\left(\frac{bx}{2}\right)-\frac{\sqrt{e^{a+bx}}}{x}$$

```
[Out] -(Sqrt[E^(a + b*x)]/x) + (b*Sqrt[E^(a + b*x)]*ExpIntegralEi[(b*x)
/2])/(2*E^((b*x)/2))
```

Rubi [A] time = 0.133816, antiderivative size = 48, normalized size of antiderivative = 1., number of steps used = 3, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.2

$$\frac{1}{2}be^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\text{ExpIntegralEi}\left(\frac{bx}{2}\right)-\frac{\sqrt{e^{a+bx}}}{x}$$

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))
```

Rubi in Sympy [A] time = 7.80962, size = 48, normalized size = 1.

$$\frac{be^{\frac{a}{2}}e^{-\frac{a}{2}-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)}{2}-\frac{\sqrt{e^{a+bx}}}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(b*x+a)**(1/2)/x**2,x)
```

```
[Out] b*exp(a/2)*exp(-a/2 - b*x/2)*sqrt(exp(a + b*x))*Ei(b*x/2)/2 - sqr
t(exp(a + b*x))/x
```

Mathematica [A] time = 0.0191843, size = 47, normalized size = 0.98

$$\frac{e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\left(bx\text{ExpIntegralEi}\left(\frac{bx}{2}\right)-2e^{\frac{bx}{2}}\right)}{2x}$$

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)
```

Maple [B] time = 0.033, size = 116, normalized size = 2.4

$$-\frac{b}{2}\sqrt{e^{bx+a}}e^{\frac{a}{2}-\frac{bx}{2}e^{\frac{a}{2}}}\left(2\frac{e^{-a/2}}{bx}+1-\ln(x)+\ln(2)-\ln\left(-be^{\frac{a}{2}}\right)-\frac{1}{bx}e^{-\frac{a}{2}}\left(bxe^{\frac{a}{2}}+2\right)+2\frac{e^{-a/2+1/2\,bxe^{a/2}}}{bx}+\ln\left(-\frac{bx}{2}e^{\frac{a}{2}}\right)+E$$

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*(2/x/b*exp(
-1/2*a)+1-ln(x)+ln(2)-ln(-b*exp(1/2*a))-1/b/x*exp(-1/2*a)*(b*x*ex
p(1/2*a)+2)+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)))
```

Maxima [A] time = 0.847892, size = 18, normalized size = 0.38

$$\frac{1}{2}\,be^{\left(\frac{1}{2}\,a\right)}\left(-1,-\frac{1}{2}\,bx\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A] time = 0.249588, size = 39, normalized size = 0.81

$$\frac{bx\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}-2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{2\,x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(e^(1/2*b*x + 1/2*a)/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
```

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

$$\int \frac{\sqrt{e^a e^{bx}}}{x^2}\,dx$$

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)
```

GIAC/XCAS [A] time = 0.24324, size = 39, normalized size = 0.81

$$\frac{bx\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)} - 2\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{2\,x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(e^(1/2*b*x + 1/2*a)/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
```

3.97 $\int \frac{\sqrt{e^{a+bx}}}{x^3}\,dx$

Optimal. Leaf size=71

$$\frac{1}{8}b^2e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\text{ExpIntegralEi}\left(\frac{bx}{2}\right)-\frac{\sqrt{e^{a+bx}}}{2x^2}-\frac{b\sqrt{e^{a+bx}}}{4x}$$

```
[Out] -Sqrt[E^(a + b*x)]/(2*x^2) - (b*Sqrt[E^(a + b*x)])/(4*x) + (b^2*S
qrt[E^(a + b*x)]*ExpIntegralEi[(b*x)/2])/(8*E^((b*x)/2))
```

Rubi [A] time = 0.179693, antiderivative size = 71, normalized size of antiderivative = 1., number of steps used = 4, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.2$

$$\frac{1}{8}b^2e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\text{ExpIntegralEi}\left(\frac{bx}{2}\right)-\frac{\sqrt{e^{a+bx}}}{2x^2}-\frac{b\sqrt{e^{a+bx}}}{4x}$$

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*S
qrt[E^(a + b*x)]*ExpIntegralEi[(b*x)/2])/(8*E^((b*x)/2))
```

Rubi in Sympy [A] time = 10.4221, size = 68, normalized size = 0.96

$$\frac{b^2e^{\frac{a}{2}}e^{-\frac{a}{2}-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)}{8}-\frac{b\sqrt{e^{a+bx}}}{4x}-\frac{\sqrt{e^{a+bx}}}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(b*x+a)**(1/2)/x**3,x)
```

```
[Out] b**2*exp(a/2)*exp(-a/2 - b*x/2)*sqrt(exp(a + b*x))*Ei(b*x/2)/8 -
b*sqrt(exp(a + b*x))/(4*x) - sqrt(exp(a + b*x))/(2*x**2)
```

Mathematica [A] time = 0.0313286, size = 56, normalized size = 0.79

$$\frac{e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\left(b^2x^2\text{ExpIntegralEi}\left(\frac{bx}{2}\right)-2e^{\frac{bx}{2}}(bx+2)\right)}{8x^2}$$

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*ExpIntegra
lEi[(b*x)/2]))/(8*E^((b*x)/2)*x^2)
```

Maple [B] time = 0.043, size = 155, normalized size = 2.2

$$\frac{b^2}{4}\sqrt{e^{bx+a}}e^{a-\frac{bx}{2}e^{\frac{a}{2}}}\left(-2\,\frac{e^{-a}}{x^2b^2}-2\,\frac{e^{-a/2}}{bx}-\frac{3}{4}+\frac{\ln(x)}{2}-\frac{\ln(2)}{2}+\frac{1}{2}\ln\left(-be^{\frac{a}{2}}\right)+\frac{e^{-a}}{3\,x^2b^2}\left(\frac{9\,b^2x^2e^a}{4}+6\,bxe^{a/2}+6\right)-\frac{2}{3\,x^2b^2}e$$

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*(-2/x^2/b^2*ex
p(-a)-2/x/b*exp(-1/2*a)-3/4+1/2*ln(x)-1/2*ln(2)+1/2*ln(-b*exp(1/2
*a))+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)))
```

Maxima [A] time = 0.831516, size = 20, normalized size = 0.28

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(e^(1/2*b*x + 1/2*a)/x^3,x, algorithm="maxima")
```

```
[Out] -1/4*b^2*e^(1/2*a)*gamma(-2, -1/2*b*x)
```

Fricas [A] time = 0.244367, size = 51, normalized size = 0.72

$$\frac{b^2x^2\mathrm{Ei}\left(\frac{1}{2}\,bx\right)e^{\left(\frac{1}{2}\,a\right)}-2\,(bx+2)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{8\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(e^(1/2*b*x + 1/2*a)/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
```

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

$$\int \frac{\sqrt{e^a e^{bx}}}{x^3}\, dx$$

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)
```

GIAC/XCAS [A] time = 0.238296, size = 62, normalized size = 0.87

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(e^(1/2*b*x + 1/2*a)/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
```

3.98 $\int \frac{\sqrt{e^{a+bx}}}{x^4}\,dx$

Optimal. Leaf size=92

$$\frac{1}{48}b^3e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\text{ExpIntegralEi}\left(\frac{bx}{2}\right)-\frac{b^2\sqrt{e^{a+bx}}}{24x}-\frac{\sqrt{e^{a+bx}}}{3x^3}-\frac{b\sqrt{e^{a+bx}}}{12x^2}$$

```
[Out] -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)]*ExpIntegralE
i[(b*x)/2])/(48*E^((b*x)/2))
```

Rubi [A] time = 0.234189, antiderivative size = 92, normalized size of antiderivative = 1., number of steps used = 5, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.2

$$\frac{1}{48}b^3e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\text{ExpIntegralEi}\left(\frac{bx}{2}\right)-\frac{b^2\sqrt{e^{a+bx}}}{24x}-\frac{\sqrt{e^{a+bx}}}{3x^3}-\frac{b\sqrt{e^{a+bx}}}{12x^2}$$

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)]*ExpIntegralE
i[(b*x)/2])/(48*E^((b*x)/2))
```

Rubi in Sympy [A] time = 13.4762, size = 87, normalized size = 0.95

$$\frac{b^3e^{\frac{a}{2}}e^{-\frac{a}{2}-\frac{bx}{2}}\sqrt{e^{a+bx}}\,\text{Ei}\left(\frac{bx}{2}\right)}{48}-\frac{b^2\sqrt{e^{a+bx}}}{24x}-\frac{b\sqrt{e^{a+bx}}}{12x^2}-\frac{\sqrt{e^{a+bx}}}{3x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  rubi_integrate(exp(b*x+a)**(1/2)/x**4,x)
```

```
[Out] b**3*exp(a/2)*exp(-a/2 - b*x/2)*sqrt(exp(a + b*x))*Ei(b*x/2)/48 -
 b**2*sqrt(exp(a + b*x))/(24*x) - b*sqrt(exp(a + b*x))/(12*x**2)
- sqrt(exp(a + b*x))/(3*x**3)
```

Mathematica [A] time = 0.0393122, size = 64, normalized size = 0.7

$$\frac{e^{-\frac{bx}{2}}\sqrt{e^{a+bx}}\left(b^3x^3\text{ExpIntegralEi}\left(\frac{bx}{2}\right)-2e^{\frac{bx}{2}}\left(b^2x^2+2bx+8\right)\right)}{48x^3}$$

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*ExpIntegralEi[(b*x)/2]))/(48*E^((b*x)/2)*x^3)
```

Maple [B] time = 0.046, size = 189, normalized size = 2.1

$$-\frac{b^3}{8}\sqrt{e^{bx+a}}e^{\frac{3a}{2}-\frac{bx}{2}e^{\frac{a}{2}}}\left(\frac{8}{3x^3b^3}e^{-\frac{3a}{2}}+2\frac{e^{-a}}{x^2b^2}+\frac{1}{bx}e^{-\frac{a}{2}}+\frac{11}{36}-\frac{\ln(x)}{6}+\frac{\ln(2)}{6}-\frac{1}{6}\ln\left(-be^{\frac{a}{2}}\right)-\frac{1}{9x^3b^3}e^{-\frac{3a}{2}}\left(\frac{11x^3b^3}{4}e^{\frac{3a}{2}}+9\right.\right.$$

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*(8/3/x^3/
b^3*exp(-3/2*a)+2/x^2/b^2*exp(-a)+1/x/b*exp(-1/2*a)+11/36-1/6*ln(
x)+1/6*ln(2)-1/6*ln(-b*exp(1/2*a))-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)))
```

Maxima [A] time = 0.831458, size = 20, normalized size = 0.22

$$\frac{1}{8}b^3e^{\left(\frac{1}{2}a\right)}\left(-3,-\frac{1}{2}bx\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(e^(1/2*b*x + 1/2*a)/x^4,x, algorithm="maxima")
```

```
[Out] 1/8*b^3*e^(1/2*a)*gamma(-3, -1/2*b*x)
```

Fricas [A] time = 0.234856, size = 62, normalized size = 0.67

$$\frac{b^3x^3\text{Ei}\left(\frac{1}{2}\,bx\right)\,e^{\left(\frac{1}{2}\,a\right)}-2\left(b^2x^2+2\,bx+8\right)e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{48\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(e^(1/2*b*x + 1/2*a)/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
```

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

$$\int\frac{\sqrt{e^ae^{bx}}}{x^4}\,dx$$

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)
```

GIAC/XCAS [A] time = 0.264472, size = 85, normalized size = 0.92

$$\frac{b^3x^3\text{Ei}\left(\frac{1}{2}\,bx\right)\,e^{\left(\frac{1}{2}\,a\right)}-2\,b^2x^2e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}-4\,bxe^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}-16\,e^{\left(\frac{1}{2}\,bx+\frac{1}{2}\,a\right)}}{48\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In]  integrate(e^(1/2*b*x + 1/2*a)/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
```

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 Mathematica/Rubi followed by one for Maple. The following are links to the source code.

The following are the listing of the above functions.

```
(* 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]
```

```
# 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
GradeAntiderivative := proc(result,optimal)
local leaf_count_result, leaf_count_optimal,ExpnType_result,ExpnType_optimal;

      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);
  #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.

  if not type(result,freeof('int')) then
     return "F";
  end if;

  if ExpnType_result<=ExpnType_optimal then
      if is_contains_complex(result) then
         if is_contains_complex(optimal) then
            #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
            return "C";
         end if
      else # result do not contain complex
           # this assumes optimal do not as well
         if leaf_count_result<=2*leaf_count_optimal then
            return "A";
         else
            return "B";
         end if
      end if
  else #ExpnType(result) > ExpnType(optimal)
      return "C";
  end if
end proc:
```

```
# is_contains_complex(result) takes expressions and returns true if it contains "I"
#Nasser 032417
is_contains_complex:= proc(expression)
  return (has(expression,I));
end proc:

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' or op(0,expn)='integrate' 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,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:
```