

CAS integration tests regression report

Fricas 1.3.6 and Fricas 1.3.5

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0.1 Test number 14

Test folder name

test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.1_Linear/1.1.1.3-a+b_x-
^m-c+d_x-^n-e+f_x-^p

0.1.1 Problem number 625

$$\int \frac{(a + bx)^{3/2}(c + dx)^{5/2}}{x^7} dx$$

Optimal antiderivative

$$-\frac{\sqrt{a+bx}(c+dx)^{3/2}(5ad+7bc)(bc-ad)^3}{768a^3c^3x^2} + \frac{\sqrt{a+bx}(c+dx)^{5/2}(5ad+7bc)(bc-ad)^2}{960a^2c^3x^3} + \frac{\sqrt{a+bx}\sqrt{c+dx}(5ad+7bc)(bc-ad)^4}{512a^4c^3x} - \frac{(5ad+7bc)(bc-ad)^5}{512a^4c^3x^4}$$

command

```
integrate((b*x+a)^(3/2)*(d*x+c)^(5/2)/x^7,x, algorithm="fricas")
```

Fricas 1.3.6 output

Exception raised: TypeError

Fricas 1.3.5 output

$$\left[\frac{15(7b^6c^6 - 30ab^5c^5d + 45a^2b^4c^4d^2 - 20a^3b^3c^3d^3 - 15a^4b^2c^2d^4 + 18a^5bcd^5 - 5a^6d^6)\sqrt{ac}x^6 \log\left(\frac{8a^2c^2 + (b^2c^2 + 6abcd + a^2d^2)x^2 + 4(2ac + (bc+ad)x)\sqrt{ac}\sqrt{bx+a}\sqrt{dx+c} + 8(abc^2 + a^2cd)}{x^2}\right)}{\dots} \right]$$

0.2 Test number 34

Test folder name

test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.1_Quadratic/1.2.1.3-d+e_x-^m-f+g_x-a+b_x+c_x^2-^p

0.2.1 Problem number 703

$$\int \frac{(A + Bx)(a^2 + 2abx + b^2x^2)^{5/2}}{x^{14}} dx$$

Optimal antiderivative

$$-\frac{a^4\sqrt{a^2+2abx+b^2x^2}(aB+5Ab)}{12x^{12}(a+bx)} - \frac{5a^3b\sqrt{a^2+2abx+b^2x^2}(aB+2Ab)}{11x^{11}(a+bx)} - \frac{a^2b^2\sqrt{a^2+2abx+b^2x^2}(aB+Ab)}{x^{10}(a+bx)} - \frac{5ab^3\sqrt{a^2+2abx+b^2x^2}(2aB+Ab)}{9x^9(a+bx)}$$

command

```
integrate((B*x+A)*(b^2*x^2+2*a*b*x+a^2)^(5/2)/x^14,x, algorithm="fricas")
```

Fricas 1.3.6 output

Timed out

Fricas 1.3.5 output

$$-\frac{10296Bb^5x^6 + 5544Aa^5 + 9009(5Bab^4 + Ab^5)x^5 + 40040(2Ba^2b^3 + Aab^4)x^4 + 72072(Ba^3b^2 + Aa^2b^3)x^3 + 32760(Ba^4b + 2Aa^3b^2)x^2 + 6006(Ba^5 + 5Aa^4b)x}{72072x^{13}}$$

0.3 Test number 94

Test folder name

test_cases/4_Trig_functions/4.2_Cosine/4.2.4.2-a+b_cos-^m-c+d_cos-^n-A+B_cos+C_cos^2-

0.3.1 Problem number 597

$$\int \frac{(1 - \cos^2(c + dx)) \sec(c + dx)}{a + b \cos(c + dx)} dx$$

Optimal antiderivative

$$\frac{2\sqrt{a-b}\sqrt{a+b} \tan^{-1}\left(\frac{\sqrt{a-b} \tan\left(\frac{1}{2}(c+dx)\right)}{\sqrt{a+b}}\right)}{abd} + \frac{\tanh^{-1}(\sin(c + dx))}{ad} - \frac{x}{b}$$

command

```
integrate((1-cos(d*x+c)^2)*sec(d*x+c)/(a+b*cos(d*x+c)),x, algorithm="fricas")
```

Fricas 1.3.6 output

Exception raised: TypeError

Fricas 1.3.5 output

$$\left[\frac{2adx - b \log(\sin(dx + c) + 1) + b \log(-\sin(dx + c) + 1) - \sqrt{-a^2 + b^2} \log\left(\frac{2ab \cos(dx+c) + (2a^2 - b^2) \cos(dx+c)^2 - 2\sqrt{-a^2 + b^2}(a \cos(dx+c) + b) \sin(dx+c) - a^2 + 2b^2}{b^2 \cos(dx+c)^2 + 2ab \cos(dx+c) + a^2}\right)}{2abd}, - \frac{2adx - b \log(\sin(dx + c) + 1) + b \log(-\sin(dx + c) + 1) - \sqrt{-a^2 + b^2} \log\left(\frac{2ab \cos(dx+c) + (2a^2 - b^2) \cos(dx+c)^2 - 2\sqrt{-a^2 + b^2}(a \cos(dx+c) + b) \sin(dx+c) - a^2 + 2b^2}{b^2 \cos(dx+c)^2 + 2ab \cos(dx+c) + a^2}\right)}{2abd} \right]$$

0.4 Test number 139

Test folder name

test_cases/4_Trig_functions/4.7_Miscellaneous/4.7.5_x^m_trig-a+b_log-c_x^n~p

0.4.1 Problem number 48

$$\int \sin\left(a + \frac{1}{2}i \log(cx^2)\right) dx$$

Optimal antiderivative

$$\frac{ie^{-ia}cx^3}{4\sqrt{cx^2}} - \frac{ie^{ia}x \log(x)}{2\sqrt{cx^2}}$$

command

```
integrate(sin(a+1/2*I*log(c*x^2)),x, algorithm="fricas")
```

Fricas 1.3.6 output

Exception raised: NotImplementedError

Fricas 1.3.5 output

$$\frac{(icx^2 - 2ie^{(2ia)} \log(x))e^{(-ia)}}{4\sqrt{c}}$$

0.4.2 Problem number 50

$$\int \sin^2\left(a + \frac{1}{4}i \log(cx^2)\right) dx$$

Optimal antiderivative

$$-\frac{e^{-2ia}cx^3}{8\sqrt{cx^2}} - \frac{e^{2ia}x \log(x)}{4\sqrt{cx^2}} + \frac{x}{2}$$

command

```
integrate(sin(a+1/4*I*log(c*x^2))^2,x, algorithm="fricas")
```

Fricas 1.3.6 output

Exception raised: NotImplementedError

Fricas 1.3.5 output

$$\left(\frac{4x^2 e^{2ia} - \frac{x e^{4ia} \log\left(\frac{\left(\sqrt{cx^2(x^2+1)} e^{(2ia)} + \frac{(cx^3-cx)e^{(2ia)}}{\sqrt{c}}\right) e^{(-2ia)}}{8x^2}\right)}{\sqrt{c}}}{8x} + \frac{x e^{4ia} \log\left(\frac{\left(\sqrt{cx^2(x^2+1)} e^{(2ia)} - \frac{(cx^3-cx)e^{(2ia)}}{\sqrt{c}}\right) e^{(-2ia)}}{8x^2}\right)}{\sqrt{c}} - \sqrt{cx^2(x^2-1)} e^{(-2ia)} \right)$$

0.4.3 Problem number 52

$$\int \sin^3\left(a + \frac{1}{6}i \log(cx^2)\right) dx$$

Optimal antiderivative

$$-\frac{ie^{-3ia}cx^3}{16\sqrt{cx^2}} + \frac{9}{32}ie^{-ia}x\sqrt{cx^2} - \frac{9ie^{ia}x}{16\sqrt{cx^2}} + \frac{ie^{3ia}x \log(x)}{8\sqrt{cx^2}}$$

command

```
integrate(sin(a+1/6*I*log(c*x^2))^3,x, algorithm="fricas")
```

Fricas 1.3.6 output

Exception raised: NotImplementedError

Fricas 1.3.5 output

$$\left(\frac{2cx\sqrt{-\frac{e^{(6ia)}}{c}} e^{(3ia)} \log\left(\frac{\left(4\sqrt{cx^2(x^2+1)} e^{(3ia)} + (4icx^3-4icx)\sqrt{-\frac{e^{(6ia)}}{c}}\right) e^{(-3ia)}}{32x^2}\right)}{32cx} - 2cx\sqrt{-\frac{e^{(6ia)}}{c}} e^{(3ia)} \log\left(\frac{\left(4\sqrt{cx^2(x^2+1)} e^{(3ia)} + (-4icx^3+4icx)\sqrt{-\frac{e^{(6ia)}}{c}}\right) e^{(-3ia)}}{32x^2}\right)}{32cx} - 9i(cx^2)^{\frac{1}{6}} cx^2 e^{(2ia)} + 18i(cx^2)^{\frac{1}{6}} \right)$$

0.4.4 Problem number 135

$$\int x^3 \tan(a + i \log(x)) dx$$

Optimal antiderivative

$$-ie^{2ia}x^2 + ie^{4ia} \log(x^2 + e^{2ia}) + \frac{ix^4}{4}$$

command

```
integrate(x^3*tan(a+I*log(x)),x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\text{integral}\left(\frac{-ix^3 e^{(2ia-2 \log(x))} + ix^3}{e^{(2ia-2 \log(x))} + 1}, x\right)$$

Fricas 1.3.5 output

$$\frac{1}{4}ix^4 - ix^2 e^{(2ia)} + ie^{(4ia)} \log(x^2 + e^{(2ia)})$$

0.4.5 Problem number 136

$$\int x^2 \tan(a + i \log(x)) dx$$

Optimal antiderivative

$$-2ie^{2ia}x + 2ie^{3ia} \tan^{-1}(e^{-ia}x) + \frac{ix^3}{3}$$

command

`integrate(x^2*tan(a+I*log(x)),x, algorithm="fricas")`

Fricas 1.3.6 output

$$\text{integral}\left(\frac{-ix^2e^{(2ia-2)\log(x)}+ix^2}{e^{(2ia-2)\log(x)}+1},x\right)$$

Fricas 1.3.5 output

$$\frac{1}{3}ix^3 - 2ixe^{(2ia)} - e^{(3ia)} \log(x + ie^{(ia)}) + e^{(3ia)} \log(x - ie^{(ia)})$$

0.4.6 Problem number 137

$$\int x \tan(a + i \log(x)) dx$$

Optimal antiderivative

$$\frac{ix^2}{2} - ie^{2ia} \log(x^2 + e^{2ia})$$

command

`integrate(x*tan(a+I*log(x)),x, algorithm="fricas")`

Fricas 1.3.6 output

$$\text{integral}\left(\frac{-ixe^{(2ia-2)\log(x)}+ix}{e^{(2ia-2)\log(x)}+1},x\right)$$

Fricas 1.3.5 output

$$\frac{1}{2}ix^2 - ie^{(2ia)} \log(x^2 + e^{(2ia)})$$

0.4.7 Problem number 138

$$\int \tan(a + i \log(x)) dx$$

Optimal antiderivative

$$ix - 2ie^{ia} \tan^{-1}(e^{-ia}x)$$

command

`integrate(tan(a+I*log(x)),x, algorithm="fricas")`

Fricas 1.3.6 output

$$\text{integral}\left(\frac{-ie^{(2ia-2)\log(x)}+i}{e^{(2ia-2)\log(x)}+1},x\right)$$

Fricas 1.3.5 output

$$e^{(ia)} \log(x + ie^{(ia)}) - e^{(ia)} \log(x - ie^{(ia)}) + ix$$

0.4.8 Problem number 140

$$\int \frac{\tan(a + i \log(x))}{x^2} dx$$

Optimal antiderivative

$$2ie^{-ia} \tan^{-1}(e^{-ia}x) + \frac{i}{x}$$

command

`integrate(tan(a+I*log(x))/x^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\text{integral}\left(\frac{-ie^{(2ia-2\log(x))}+i}{x^2e^{(2ia-2\log(x))}+x^2},x\right)$$

Fricas 1.3.5 output

$$\frac{(x\log(x+ie^{(ia)})-x\log(x-ie^{(ia)})-ie^{(ia)})e^{(-ia)}}{x}$$

0.4.9 Problem number 141

$$\int \frac{\tan(a+i\log(x))}{x^3} dx$$

Optimal antiderivative

$$\frac{i}{2x^2} - ie^{-2ia} \log\left(1 + \frac{e^{2ia}}{x^2}\right)$$

command

`integrate(tan(a+I*log(x))/x^3,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\text{integral}\left(\frac{-ie^{(2ia-2\log(x))}+i}{x^3e^{(2ia-2\log(x))}+x^3},x\right)$$

Fricas 1.3.5 output

$$\frac{(-2ix^2\log(x^2+e^{(2ia)})+4ix^2\log(x)+ie^{(2ia)})e^{(-2ia)}}{2x^2}$$

0.4.10 Problem number 142

$$\int \frac{\tan(a+i\log(x))}{x^4} dx$$

Optimal antiderivative

$$-\frac{2ie^{-2ia}}{x} - 2ie^{-3ia} \tan^{-1}(e^{-ia}x) + \frac{i}{3x^3}$$

command

`integrate(tan(a+I*log(x))/x^4,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\text{integral}\left(\frac{-ie^{(2ia-2\log(x))}+i}{x^4e^{(2ia-2\log(x))}+x^4},x\right)$$

Fricas 1.3.5 output

$$\frac{(3x^3\log(x+ie^{(ia)})-3x^3\log(x-ie^{(ia)})-6ix^2e^{(ia)}+ie^{(3ia)})e^{(-3ia)}}{3x^3}$$

0.4.11 Problem number 143

$$\int x^3 \tan^2(a+i\log(x)) dx$$

Optimal antiderivative

$$2e^{2ia}x^2 - \frac{2e^{6ia}}{x^2+e^{2ia}} - 4e^{4ia} \log(x^2+e^{2ia}) - \frac{x^4}{4}$$

command

`integrate(x^3*tan(a+I*log(x))^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\frac{2x^4 + (e^{(2ia-2 \log(x))} + 1) \operatorname{integral}\left(-\frac{x^3 e^{(2ia-2 \log(x))} + 9x^3}{e^{(2ia-2 \log(x))} + 1}, x\right)}{e^{(2ia-2 \log(x))} + 1}$$

Fricas 1.3.5 output

$$\frac{x^6 - 7x^4 e^{(2ia)} - 8x^2 e^{(4ia)} + 16(x^2 e^{(4ia)} + e^{(6ia)}) \log(x^2 + e^{(2ia)}) + 8e^{(6ia)}}{4(x^2 + e^{(2ia)})}$$

0.4.12 Problem number 144

$$\int x^2 \tan^2(a + i \log(x)) dx$$

Optimal antiderivative

$$-\frac{2e^{2ia} x^3}{x^2 + e^{2ia}} + 6e^{2ia} x - 6e^{3ia} \tan^{-1}(e^{-ia} x) - \frac{x^3}{3}$$

command

`integrate(x^2*tan(a+I*log(x))^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\frac{2x^3 + (e^{(2ia-2 \log(x))} + 1) \operatorname{integral}\left(-\frac{x^2 e^{(2ia-2 \log(x))} + 7x^2}{e^{(2ia-2 \log(x))} + 1}, x\right)}{e^{(2ia-2 \log(x))} + 1}$$

Fricas 1.3.5 output

$$\frac{x^5 - 11x^3 e^{(2ia)} - 18x e^{(4ia)} - (-9ix^2 e^{(3ia)} - 9ie^{(5ia)}) \log(x + i e^{(ia)}) - (9ix^2 e^{(3ia)} + 9ie^{(5ia)}) \log(x - i e^{(ia)})}{3(x^2 + e^{(2ia)})}$$

0.4.13 Problem number 145

$$\int x \tan^2(a + i \log(x)) dx$$

Optimal antiderivative

$$\frac{2e^{4ia}}{x^2 + e^{2ia}} + 2e^{2ia} \log(x^2 + e^{2ia}) - \frac{x^2}{2}$$

command

`integrate(x*tan(a+I*log(x))^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\frac{2x^2 + (e^{(2ia-2 \log(x))} + 1) \operatorname{integral}\left(-\frac{x e^{(2ia-2 \log(x))} + 5x}{e^{(2ia-2 \log(x))} + 1}, x\right)}{e^{(2ia-2 \log(x))} + 1}$$

Fricas 1.3.5 output

$$\frac{x^4 + x^2 e^{(2ia)} - 4(x^2 e^{(2ia)} + e^{(4ia)}) \log(x^2 + e^{(2ia)}) - 4e^{(4ia)}}{2(x^2 + e^{(2ia)})}$$

0.4.14 Problem number 146

$$\int \tan^2(a + i \log(x)) dx$$

Optimal antiderivative

$$-\frac{2e^{2ia} x}{x^2 + e^{2ia}} + 2e^{ia} \tan^{-1}(e^{-ia} x) - x$$

command

`integrate(tan(a+I*log(x))^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\frac{(e^{(2ia-2 \log(x))} + 1) \operatorname{integral}\left(-\frac{e^{(2ia-2 \log(x))} + 3}{e^{(2ia-2 \log(x))} + 1}, x\right) + 2x}{e^{(2ia-2 \log(x))} + 1}$$

Fricas 1.3.5 output

$$-\frac{x^3 + 3xe^{2ia} - (ix^2e^{ia} + ie^{3ia})\log(x + ie^{ia}) - (-ix^2e^{ia} - ie^{3ia})\log(x - ie^{ia})}{x^2 + e^{2ia}}$$

0.4.15 Problem number 148

$$\int \frac{\tan^2(a + i\log(x))}{x^2} dx$$

Optimal antiderivative

$$\frac{3x}{x^2 + e^{2ia}} + \frac{e^{2ia}}{x(x^2 + e^{2ia})} + 2e^{-ia}\tan^{-1}(e^{-ia}x)$$

command

```
integrate(tan(a+I*log(x))^2/x^2,x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\frac{(xe^{2ia-2\log(x)} + x)\text{integral}\left(-\frac{e^{2ia-2\log(x)}-1}{x^2e^{2ia-2\log(x)}+x^2}, x\right) + 2}{xe^{2ia-2\log(x)} + x}$$

Fricas 1.3.5 output

$$\frac{3x^2e^{ia} + (ix^3 + ix^2e^{2ia})\log(x + ie^{ia}) + (-ix^3 - ix^2e^{2ia})\log(x - ie^{ia}) + e^{3ia}}{x^3e^{ia} + xe^{3ia}}$$

0.4.16 Problem number 149

$$\int \frac{\tan^2(a + i\log(x))}{x^3} dx$$

Optimal antiderivative

$$-\frac{2e^{-2ia}}{1 + \frac{e^{2ia}}{x^2}} - 2e^{-2ia}\log\left(1 + \frac{e^{2ia}}{x^2}\right) + \frac{1}{2x^2}$$

command

```
integrate(tan(a+I*log(x))^2/x^3,x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\frac{(x^2e^{2ia-2\log(x)} + x^2)\text{integral}\left(-\frac{e^{2ia-2\log(x)}-3}{x^3e^{2ia-2\log(x)}+x^3}, x\right) + 2}{x^2e^{2ia-2\log(x)} + x^2}$$

Fricas 1.3.5 output

$$\frac{5x^2e^{2ia} - 4(x^4 + x^2e^{2ia})\log(x^2 + e^{2ia}) + 8(x^4 + x^2e^{2ia})\log(x) + e^{4ia}}{2(x^4e^{2ia} + x^2e^{4ia})}$$

0.4.17 Problem number 186

$$\int x^3 \cot(a + i\log(x)) dx$$

Optimal antiderivative

$$-ie^{2ia}x^2 - ie^{4ia}\log(-x^2 + e^{2ia}) - \frac{ix^4}{4}$$

command

```
integrate(x^3*cot(a+I*log(x)),x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\text{integral}\left(\frac{ix^3e^{2ia-2\log(x)} + ix^3}{e^{2ia-2\log(x)} - 1}, x\right)$$

Fricas 1.3.5 output

$$-\frac{1}{4}ix^4 - ix^2e^{2ia} - ie^{4ia}\log(x^2 - e^{2ia})$$

0.4.18 Problem number 187

$$\int x^2 \cot(a + i \log(x)) dx$$

Optimal antiderivative

$$-2ie^{2ia}x + 2ie^{3ia} \tanh^{-1}(e^{-ia}x) - \frac{ix^3}{3}$$

command

```
integrate(x^2*cot(a+I*log(x)),x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\text{integral}\left(\frac{ix^2e^{(2ia-2)\log(x)} + ix^2}{e^{(2ia-2)\log(x)} - 1}, x\right)$$

Fricas 1.3.5 output

$$-\frac{1}{3}ix^3 - 2ixe^{(2ia)} + ie^{(3ia)} \log(x + e^{(ia)}) - ie^{(3ia)} \log(x - e^{(ia)})$$

0.4.19 Problem number 188

$$\int x \cot(a + i \log(x)) dx$$

Optimal antiderivative

$$-ie^{2ia} \log(-x^2 + e^{2ia}) - \frac{ix^2}{2}$$

command

```
integrate(x*cot(a+I*log(x)),x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\text{integral}\left(\frac{ixe^{(2ia-2)\log(x)} + ix}{e^{(2ia-2)\log(x)} - 1}, x\right)$$

Fricas 1.3.5 output

$$-\frac{1}{2}ix^2 - ie^{(2ia)} \log(x^2 - e^{(2ia)})$$

0.4.20 Problem number 189

$$\int \cot(a + i \log(x)) dx$$

Optimal antiderivative

$$2ie^{ia} \tanh^{-1}(e^{-ia}x) - ix$$

command

```
integrate(cot(a+I*log(x)),x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\text{integral}\left(\frac{ie^{(2ia-2)\log(x)} + i}{e^{(2ia-2)\log(x)} - 1}, x\right)$$

Fricas 1.3.5 output

$$ie^{(ia)} \log(x + e^{(ia)}) - ie^{(ia)} \log(x - e^{(ia)}) - ix$$

0.4.21 Problem number 191

$$\int \frac{\cot(a + i \log(x))}{x^2} dx$$

Optimal antiderivative

$$2ie^{-ia} \tanh^{-1}(e^{-ia}x) - \frac{i}{x}$$

command

```
integrate(cot(a+I*log(x))/x^2,x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\text{integral}\left(\frac{ie^{(2ia-2)\log(x)}+i}{x^2e^{(2ia-2)\log(x)}-x^2},x\right)$$

Fricas 1.3.5 output

$$\frac{(ix \log(x + e^{(ia)})) - ix \log(x - e^{(ia)}) - ie^{(ia)})e^{(-ia)}}{x}$$

0.4.22 Problem number 192

$$\int \frac{\cot(a + i \log(x))}{x^3} dx$$

Optimal antiderivative

$$-ie^{-2ia} \log\left(1 - \frac{e^{2ia}}{x^2}\right) - \frac{i}{2x^2}$$

command

```
integrate(cot(a+I*log(x))/x^3,x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\text{integral}\left(\frac{ie^{(2ia-2)\log(x)}+i}{x^3e^{(2ia-2)\log(x)}-x^3},x\right)$$

Fricas 1.3.5 output

$$\frac{(-2ix^2 \log(x^2 - e^{(2ia)})) + 4ix^2 \log(x) - ie^{(2ia)})e^{(-2ia)}}{2x^2}$$

0.4.23 Problem number 193

$$\int \frac{\cot(a + i \log(x))}{x^4} dx$$

Optimal antiderivative

$$-\frac{2ie^{-2ia}}{x} + 2ie^{-3ia} \tanh^{-1}(e^{-ia}x) - \frac{i}{3x^3}$$

command

```
integrate(cot(a+I*log(x))/x^4,x, algorithm="fricas")
```

Fricas 1.3.6 output

$$\text{integral}\left(\frac{ie^{(2ia-2)\log(x)}+i}{x^4e^{(2ia-2)\log(x)}-x^4},x\right)$$

Fricas 1.3.5 output

$$\frac{(3ix^3 \log(x + e^{(ia)}) - 3ix^3 \log(x - e^{(ia)}) - 6ix^2e^{(ia)} - ie^{(3ia)})e^{(-3ia)}}{3x^3}$$

0.4.24 Problem number 194

$$\int x^3 \cot^2(a + i \log(x)) dx$$

Optimal antiderivative

$$-2e^{2ia}x^2 - \frac{2e^{6ia}}{-x^2 + e^{2ia}} - 4e^{4ia} \log(-x^2 + e^{2ia}) - \frac{x^4}{4}$$

command

`integrate(x^3*cot(a+I*log(x))^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$-\frac{2x^4 - (e^{(2ia-2 \log(x))} - 1) \operatorname{integral}\left(-\frac{x^3 e^{(2ia-2 \log(x))} - 9x^3}{e^{(2ia-2 \log(x))} - 1}, x\right)}{e^{(2ia-2 \log(x))} - 1}$$

Fricas 1.3.5 output

$$-\frac{x^6 + 7x^4 e^{(2ia)} - 8x^2 e^{(4ia)} + 16(x^2 e^{(4ia)} - e^{(6ia)}) \log(x^2 - e^{(2ia)}) - 8e^{(6ia)}}{4(x^2 - e^{(2ia)})}$$

0.4.25 Problem number 195

$$\int x^2 \cot^2(a + i \log(x)) dx$$

Optimal antiderivative

$$-\frac{2e^{2ia}x^3}{-x^2 + e^{2ia}} - 6e^{2ia}x + 6e^{3ia} \tanh^{-1}(e^{-ia}x) - \frac{x^3}{3}$$

command

`integrate(x^2*cot(a+I*log(x))^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$-\frac{2x^3 - (e^{(2ia-2 \log(x))} - 1) \operatorname{integral}\left(-\frac{x^2 e^{(2ia-2 \log(x))} - 7x^2}{e^{(2ia-2 \log(x))} - 1}, x\right)}{e^{(2ia-2 \log(x))} - 1}$$

Fricas 1.3.5 output

$$-\frac{x^5 + 11x^3 e^{(2ia)} - 18x e^{(4ia)} - 9(x^2 e^{(3ia)} - e^{(5ia)}) \log(x + e^{(ia)}) + 9(x^2 e^{(3ia)} - e^{(5ia)}) \log(x - e^{(ia)})}{3(x^2 - e^{(2ia)})}$$

0.4.26 Problem number 196

$$\int x \cot^2(a + i \log(x)) dx$$

Optimal antiderivative

$$-\frac{2e^{4ia}}{-x^2 + e^{2ia}} - 2e^{2ia} \log(-x^2 + e^{2ia}) - \frac{x^2}{2}$$

command

`integrate(x*cot(a+I*log(x))^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$-\frac{2x^2 - (e^{(2ia-2 \log(x))} - 1) \operatorname{integral}\left(-\frac{x e^{(2ia-2 \log(x))} - 5x}{e^{(2ia-2 \log(x))} - 1}, x\right)}{e^{(2ia-2 \log(x))} - 1}$$

Fricas 1.3.5 output

$$-\frac{x^4 - x^2 e^{(2ia)} + 4(x^2 e^{(2ia)} - e^{(4ia)}) \log(x^2 - e^{(2ia)}) - 4e^{(4ia)}}{2(x^2 - e^{(2ia)})}$$

0.4.27 Problem number 197

$$\int \cot^2(a + i \log(x)) dx$$

Optimal antiderivative

$$-\frac{2e^{2ia}x}{-x^2 + e^{2ia}} + 2e^{ia} \tanh^{-1}(e^{-ia}x) - x$$

command

`integrate(cot(a+I*log(x))^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\frac{(e^{(2ia-2 \log(x))} - 1) \operatorname{integral}\left(-\frac{e^{(2ia-2 \log(x))-3}}{e^{(2ia-2 \log(x))-1}}, x\right) - 2x}{e^{(2ia-2 \log(x))} - 1}$$

Fricas 1.3.5 output

$$\frac{x^3 - 3xe^{(2ia)} - (x^2e^{(ia)} - e^{(3ia)}) \log(x + e^{(ia)}) + (x^2e^{(ia)} - e^{(3ia)}) \log(x - e^{(ia)})}{x^2 - e^{(2ia)}}$$

0.4.28 Problem number 199

$$\int \frac{\cot^2(a + i \log(x))}{x^2} dx$$

Optimal antiderivative

$$-\frac{3x}{-x^2 + e^{2ia}} + \frac{e^{2ia}}{x(-x^2 + e^{2ia})} - 2e^{-ia} \tanh^{-1}(e^{-ia}x)$$

command

`integrate(cot(a+I*log(x))^2/x^2,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\frac{(xe^{(2ia-2 \log(x))} - x) \operatorname{integral}\left(-\frac{e^{(2ia-2 \log(x))+1}}{x^2e^{(2ia-2 \log(x))-x^2}}, x\right) - 2}{xe^{(2ia-2 \log(x))} - x}$$

Fricas 1.3.5 output

$$\frac{3x^2e^{(ia)} - (x^3 - xe^{(2ia)}) \log(x + e^{(ia)}) + (x^3 - xe^{(2ia)}) \log(x - e^{(ia)}) - e^{(3ia)}}{x^3e^{(ia)} - xe^{(3ia)}}$$

0.4.29 Problem number 200

$$\int \frac{\cot^2(a + i \log(x))}{x^3} dx$$

Optimal antiderivative

$$\frac{2e^{-2ia}}{1 - \frac{e^{2ia}}{x^2}} + 2e^{-2ia} \log\left(1 - \frac{e^{2ia}}{x^2}\right) + \frac{1}{2x^2}$$

command

`integrate(cot(a+I*log(x))^2/x^3,x, algorithm="fricas")`

Fricas 1.3.6 output

$$\frac{(x^2e^{(2ia-2 \log(x))} - x^2) \operatorname{integral}\left(-\frac{e^{(2ia-2 \log(x))+3}}{x^3e^{(2ia-2 \log(x))-x^3}}, x\right) - 2}{x^2e^{(2ia-2 \log(x))} - x^2}$$

Fricas 1.3.5 output

$$\frac{5x^2e^{(2ia)} + 4(x^4 - x^2e^{(2ia)}) \log(x^2 - e^{(2ia)}) - 8(x^4 - x^2e^{(2ia)}) \log(x) - e^{(4ia)}}{2(x^4e^{(2ia)} - x^2e^{(4ia)})}$$

0.5 Test number 183

Test folder name

test_cases/6_Hyperbolic_functions/6.6_Hyperbolic_cosecant/6.6.3_Hyperbolic_cosecant_function

0.5.1 Problem number 54

$$\int \frac{1}{\sqrt{a + iacsch(c + dx)}} dx$$

Optimal antiderivative

$$\frac{2 \tanh^{-1}\left(\frac{\sqrt{a} \coth(c+dx)}{\sqrt{a+iacsch(c+dx)}}\right)}{\sqrt{ad}} - \frac{\sqrt{2} \tanh^{-1}\left(\frac{\sqrt{a} \coth(c+dx)}{\sqrt{2}\sqrt{a+iacsch(c+dx)}}\right)}{\sqrt{ad}}$$

command

```
integrate(1/(a+I*a*csch(d*x+c))^(1/2),x, algorithm="fricas")
```

Fricas 1.3.6 output

Exception raised: TypeError

Fricas 1.3.5 output

$$-\frac{1}{2} \sqrt{2} \sqrt{\frac{1}{ad^2}} \log\left(2\left(\sqrt{2}(ade^{2dx+2c}) - ad\right) \sqrt{\frac{a}{e^{2dx+2c}-1}} \sqrt{\frac{1}{ad^2}} + ae^{(dx+c)} - ia\right) e^{(-dx-c)} + \frac{1}{2} \sqrt{2} \sqrt{\frac{1}{ad^2}} \log\left(-2\left(\sqrt{2}(ade^{2dx+2c}) - ad\right) \sqrt{\frac{a}{e^{2dx+2c}-1}} \sqrt{\frac{1}{ad^2}} - ae^{(dx+c)} + ia\right) e^{(-dx-c)}\right)$$

0.5.2 Problem number 57

$$\int \frac{1}{\sqrt{a - iacsch(c + dx)}} dx$$

Optimal antiderivative

$$\frac{2 \tanh^{-1}\left(\frac{\sqrt{a} \coth(c+dx)}{\sqrt{a-iacsch(c+dx)}}\right)}{\sqrt{ad}} - \frac{\sqrt{2} \tanh^{-1}\left(\frac{\sqrt{a} \coth(c+dx)}{\sqrt{2}\sqrt{a-iacsch(c+dx)}}\right)}{\sqrt{ad}}$$

command

```
integrate(1/(a-I*a*csch(d*x+c))^(1/2),x, algorithm="fricas")
```

Fricas 1.3.6 output

Exception raised: TypeError

Fricas 1.3.5 output

$$-\frac{1}{2} \sqrt{2} \sqrt{\frac{1}{ad^2}} \log\left(2\left(\sqrt{2}(ade^{2dx+2c}) - ad\right) \sqrt{\frac{a}{e^{2dx+2c}-1}} \sqrt{\frac{1}{ad^2}} + ae^{(dx+c)} + ia\right) e^{(-dx-c)} + \frac{1}{2} \sqrt{2} \sqrt{\frac{1}{ad^2}} \log\left(-2\left(\sqrt{2}(ade^{2dx+2c}) - ad\right) \sqrt{\frac{a}{e^{2dx+2c}-1}} \sqrt{\frac{1}{ad^2}} - ae^{(dx+c)} - ia\right) e^{(-dx-c)}\right)$$