CAS integration tests regression report
Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 vs. Maxima 5.44 via sagemath 9.3

Nasser M. Abbasi

September 22, 2022   Compiled on September 22, 2022 at 2:55am

Contents

1 Summary of regression test table

Table 1: Summary table of regression tests

#	test file #	inte-gral #	Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6	Maxima 5.44 via sagemath 9.3

1	66	203	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

2	66	204	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

3	66	205	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

4	66	281	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

5	66	282	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

				Continued on next page

Table 1 – continued from previous page

#	test file #	integral #	Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6	Maxima 5.44 via sagemath 9.3

6	66	283	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

7	101	506	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

8	150	64	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

9	160	283	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

10	160	284	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

11	160	286	-2 (exception)
			
			`Exception raised:`
			`    RuntimeError >> ECL says:`
			`    THROW: The catch RAT-ERR`
			`    is undefined.`
				1 (pass)

Table 1 – continued from previous page

#	test file #	inte-gral #	Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6	Maxima 5.44 via sagemath 9.3

12	183	90	-2 (exception)
			
			Exception raised:
			    RuntimeError >> ECL says:
			    THROW: The catch RAT–ERR
			    is undefined.
				1 (pass)

13	183	91	-2 (exception)
			
			Exception raised:
			    RuntimeError >> ECL says:
			    THROW: The catch RAT–ERR
			    is undefined.
				1 (pass)

2 Test file number 66

Test folder name:

`test_cases/4_Trig_functions/4.1_Sine/66_4.1.10-c+d_x-^m-a+b_sin-^n`

2.1 Problem number 203

$$\int \frac{(e + fx)^3 \csc^2(c + dx)}{a + a \sin(c + dx)} \, dx$$

Optimal antiderivative

$$
-\frac{3\, I f^2 (fx + e) \operatorname{polylog}\left(2, e^{2\, I(dx+c)}\right)}{a\, d^3} + \frac{2(fx + e)^3 \operatorname{arctanh}\left(e^{I(dx+c)}\right)}{ad}
$$
$$
-\frac{(fx + e)^3 \cot\left(\frac{c}{2} + \frac{\pi}{4} + \frac{dx}{2}\right)}{ad} - \frac{(fx + e)^3 \cot(dx + c)}{ad} + \frac{6f(fx + e)^2 \ln\left(1 - I e^{I(dx+c)}\right)}{a\, d^2}
$$
$$
+\frac{3f(fx + e)^2 \ln\left(1 - e^{2\, I(dx+c)}\right)}{a\, d^2} - \frac{6\, I f^3 \operatorname{polylog}\left(4, e^{I(dx+c)}\right)}{a\, d^4}
$$
$$
+\frac{6\, I f^3 \operatorname{polylog}\left(4, -e^{I(dx+c)}\right)}{a\, d^4} - \frac{3\, I f (fx + e)^2 \operatorname{polylog}\left(2, -e^{I(dx+c)}\right)}{a\, d^2}
$$
$$
+\frac{3\, I f (fx + e)^2 \operatorname{polylog}\left(2, e^{I(dx+c)}\right)}{a\, d^2} + \frac{6f^2 (fx + e) \operatorname{polylog}\left(3, -e^{I(dx+c)}\right)}{a\, d^3}
$$
$$
+\frac{12 f^3 \operatorname{polylog}\left(3, I e^{I(dx+c)}\right)}{a\, d^4} - \frac{6f^2 (fx + e) \operatorname{polylog}\left(3, e^{I(dx+c)}\right)}{a\, d^3}
$$
$$
+\frac{3f^3 \operatorname{polylog}\left(3, e^{2\, I(dx+c)}\right)}{2a\, d^4} - \frac{12\, I f^2 (fx + e) \operatorname{polylog}\left(2, I e^{I(dx+c)}\right)}{a\, d^3} - \frac{2\, I (fx + e)^3}{ad}
$$

command

`integrate((f*x+e)^3*csc(d*x+c)^2/(a+a*sin(d*x+c)),x, algorithm="maxima")`

Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

output too large to display

2.2 Problem number 204

$$\int \frac{(e+fx)^2 \csc^2(c+dx)}{a + a\sin(c+dx)}\, dx$$

Optimal antiderivative

$$-\frac{2\,\mathrm{I}(fx+e)^2}{ad} + \frac{2(fx+e)^2 \operatorname{arctanh}\left(e^{\mathrm{I}(dx+c)}\right)}{ad} - \frac{(fx+e)^2 \cot\left(\frac{c}{2} + \frac{\pi}{4} + \frac{dx}{2}\right)}{ad}$$
$$-\frac{(fx+e)^2 \cot(dx+c)}{ad} + \frac{4f(fx+e)\ln\left(1 - \mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{a\,d^2}$$
$$+\frac{2f(fx+e)\ln\left(1 - e^{2\,\mathrm{I}(dx+c)}\right)}{a\,d^2} - \frac{2\,\mathrm{I}f(fx+e)\operatorname{polylog}\left(2, -e^{\mathrm{I}(dx+c)}\right)}{a\,d^2}$$
$$-\frac{4\,\mathrm{I}f^2 \operatorname{polylog}\left(2, \mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{a\,d^3} + \frac{2\,\mathrm{I}f(fx+e)\operatorname{polylog}\left(2, e^{\mathrm{I}(dx+c)}\right)}{a\,d^2}$$
$$-\frac{\mathrm{I}f^2 \operatorname{polylog}\left(2, e^{2\,\mathrm{I}(dx+c)}\right)}{a\,d^3} + \frac{2f^2 \operatorname{polylog}\left(3, -e^{\mathrm{I}(dx+c)}\right)}{a\,d^3} - \frac{2f^2 \operatorname{polylog}\left(3, e^{\mathrm{I}(dx+c)}\right)}{a\,d^3}$$

command

```
integrate((f*x+e)^2*csc(d*x+c)^2/(a+a*sin(d*x+c)),x, algorithm="maxima")
```

Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

output too large to display

2.3 Problem number 205

$$\int \frac{(e+fx)\csc^2(c+dx)}{a + a\sin(c+dx)}\, dx$$

Optimal antiderivative

$$\frac{2(fx+e)\operatorname{arctanh}\left(e^{\mathrm{I}(dx+c)}\right)}{ad} - \frac{(fx+e)\cot\left(\frac{c}{2} + \frac{\pi}{4} + \frac{dx}{2}\right)}{ad}$$
$$-\frac{(fx+e)\cot(dx+c)}{ad} + \frac{2f\ln\left(\sin\left(\frac{c}{2} + \frac{\pi}{4} + \frac{dx}{2}\right)\right)}{a\,d^2} + \frac{f\ln(\sin(dx+c))}{a\,d^2}$$
$$-\frac{\mathrm{I}f\operatorname{polylog}\left(2, -e^{\mathrm{I}(dx+c)}\right)}{a\,d^2} + \frac{\mathrm{I}f\operatorname{polylog}\left(2, e^{\mathrm{I}(dx+c)}\right)}{a\,d^2}$$

command

```
integrate((f*x+e)*csc(d*x+c)^2/(a+a*sin(d*x+c)),x, algorithm="maxima")
```
Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

output too large to display

2.4   Problem number 281

$$\int \frac{(e+fx)^3 \sec^3(c+dx)}{a+a\sin(c+dx)}\,dx$$

Optimal antiderivative

$$-\frac{5\,\mathrm{I}f^3 \operatorname{polylog}\left(2,\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{2a\,d^4} - \frac{9\,\mathrm{I}f(fx+e)^2 \operatorname{polylog}\left(2,\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{8a\,d^2}$$
$$-\frac{9\,\mathrm{I}f^3 \operatorname{polylog}\left(4,-\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{4a\,d^4} + \frac{f^2(fx+e)\ln\left(1+e^{2\,\mathrm{I}(dx+c)}\right)}{a\,d^3}$$
$$+\frac{9\,\mathrm{I}f(fx+e)^2 \operatorname{polylog}\left(2,-\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{8a\,d^2} + \frac{5\,\mathrm{I}f^3 \operatorname{polylog}\left(2,-\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{2a\,d^4}$$
$$-\frac{3\,\mathrm{I}(fx+e)^3 \arctan\left(e^{\mathrm{I}(dx+c)}\right)}{4ad} - \frac{5\,\mathrm{I}f^2(fx+e)\arctan\left(e^{\mathrm{I}(dx+c)}\right)}{a\,d^3}$$
$$-\frac{\mathrm{I}f(fx+e)^2}{2a\,d^2} - \frac{9f^2(fx+e)\operatorname{polylog}\left(3,-\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{4a\,d^3}$$
$$+\frac{9f^2(fx+e)\operatorname{polylog}\left(3,\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{4a\,d^3} - \frac{\mathrm{I}f^3 \operatorname{polylog}\left(2,-e^{2\,\mathrm{I}(dx+c)}\right)}{2a\,d^4}$$
$$+\frac{9\,\mathrm{I}f^3 \operatorname{polylog}\left(4,\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{4a\,d^4} - \frac{f^3 \sec(dx+c)}{4a\,d^4} - \frac{9f(fx+e)^2 \sec(dx+c)}{8a\,d^2}$$
$$-\frac{f^2(fx+e)\left(\sec^2(dx+c)\right)}{4a\,d^3} - \frac{f(fx+e)^2 \left(\sec^3(dx+c)\right)}{4a\,d^2}$$
$$-\frac{(fx+e)^3 \left(\sec^4(dx+c)\right)}{4ad} + \frac{f^3 \tan(dx+c)}{4a\,d^4} + \frac{f(fx+e)^2 \tan(dx+c)}{2a\,d^2}$$
$$+\frac{f^2(fx+e)\sec(dx+c)\tan(dx+c)}{4a\,d^3} + \frac{3(fx+e)^3 \sec(dx+c)\tan(dx+c)}{8ad}$$
$$+\frac{f(fx+e)^2 \left(\sec^2(dx+c)\right)\tan(dx+c)}{4a\,d^2} + \frac{(fx+e)^3 \left(\sec^3(dx+c)\right)\tan(dx+c)}{4ad}$$

command

```
integrate((f*x+e)^3*sec(d*x+c)^3/(a+a*sin(d*x+c)),x, algorithm="maxima")
```
Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

<div align="center">Exception raised: RuntimeError</div>

Maxima 5.44 via sagemath 9.3 output

<div align="center">output too large to display</div>

2.5 Problem number 282

$$\int \frac{(e+fx)^2 \sec^3(c+dx)}{a+a\sin(c+dx)}\,dx$$

Optimal antiderivative

$$
-\frac{3\,\mathrm{I}f(fx+e)\operatorname{polylog}\left(2,\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{4a\,d^2} + \frac{5f^2\operatorname{arctanh}(\sin(dx+c))}{6a\,d^3}
$$
$$
+\frac{f^2\ln(\cos(dx+c))}{3a\,d^3} - \frac{3\,\mathrm{I}(fx+e)^2\arctan\left(e^{\mathrm{I}(dx+c)}\right)}{4ad}
$$
$$
+\frac{3\,\mathrm{I}f(fx+e)\operatorname{polylog}\left(2,-\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{4a\,d^2} - \frac{3f^2\operatorname{polylog}\left(3,-\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{4a\,d^3}
$$
$$
+\frac{3f^2\operatorname{polylog}\left(3,\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{4a\,d^3} - \frac{3f(fx+e)\sec(dx+c)}{4a\,d^2} - \frac{f^2\left(\sec^2(dx+c)\right)}{12a\,d^3}
$$
$$
-\frac{f(fx+e)\left(\sec^3(dx+c)\right)}{6a\,d^2} - \frac{(fx+e)^2\left(\sec^4(dx+c)\right)}{4ad} + \frac{f(fx+e)\tan(dx+c)}{3a\,d^2}
$$
$$
+\frac{f^2\sec(dx+c)\tan(dx+c)}{12a\,d^3} + \frac{3(fx+e)^2\sec(dx+c)\tan(dx+c)}{8ad}
$$
$$
+\frac{f(fx+e)\left(\sec^2(dx+c)\right)\tan(dx+c)}{6a\,d^2} + \frac{(fx+e)^2\left(\sec^3(dx+c)\right)\tan(dx+c)}{4ad}
$$

command

`integrate(((f*x+e)^2*sec(d*x+c)^3/(a+a*sin(d*x+c))),x, algorithm="maxima")`

Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

<div align="center">Exception raised: RuntimeError</div>

Maxima 5.44 via sagemath 9.3 output

<div align="center">output too large to display</div>

2.6 Problem number 283

$$\int \frac{(e+fx)\sec^3(c+dx)}{a+a\sin(c+dx)}\,dx$$

Optimal antiderivative

$$-\frac{3\,\mathrm{I}(fx+e)\arctan\left(e^{\mathrm{I}(dx+c)}\right)}{4ad}+\frac{3\,\mathrm{I}f\,\mathrm{polylog}\left(2,-\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{8a\,d^2}-\frac{3\,\mathrm{I}f\,\mathrm{polylog}\left(2,\mathrm{I}\,e^{\mathrm{I}(dx+c)}\right)}{8a\,d^2}$$
$$-\frac{3f\sec(dx+c)}{8a\,d^2}-\frac{f\left(\sec^3\left(dx+c\right)\right)}{12a\,d^2}-\frac{(fx+e)\left(\sec^4\left(dx+c\right)\right)}{4ad}+\frac{f\tan(dx+c)}{4a\,d^2}$$
$$+\frac{3(fx+e)\sec(dx+c)\tan(dx+c)}{8ad}+\frac{(fx+e)\left(\sec^3\left(dx+c\right)\right)\tan(dx+c)}{4ad}+\frac{f\left(\tan^3\left(dx+c\right)\right)}{12a\,d^2}$$

command

`integrate((f*x+e)*sec(d*x+c)^3/(a+a*sin(d*x+c)),x, algorithm="maxima")`

Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

output too large to display

3 Test file number 101

Test folder name:

`test_cases/4_Trig_functions/4.3_Tangent/101_4.3.1.2-d_sec-^m-a+b_tan-^n`

3.1 Problem number 506

$$\int (d\sec(e+fx))^{2n}(a+ia\tan(e+fx))^{3-n}\,dx$$

Optimal antiderivative

$$\frac{4\,\mathrm{I}a^2(d\sec(fx+e))^{2n}\left(a+\mathrm{I}a\tan(fx+e)\right)^{1-n}}{f\left(n^2+3n+2\right)}+\frac{\mathrm{I}a(d\sec(fx+e))^{2n}\left(a+\mathrm{I}a\tan(fx+e)\right)^{2-n}}{f\left(2+n\right)}$$
$$+\frac{8\,\mathrm{I}a^3(d\sec(fx+e))^{2n}\left(a+\mathrm{I}a\tan(fx+e)\right)^{-n}}{fn\left(n^2+3n+2\right)}$$

command

```
integrate((d*sec(f*x+e))^(2*n)*(a+I*a*tan(f*x+e))^(3-n),x, algorithm="maxima")
```
Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

$$\frac{2^{n+3}a^3d^{2\,n}\cos\left(n\arctan\left(\sin\left(2\,fx+2\,e\right),\cos\left(2\,fx+2\,e\right)+1\right)\right)-i\cdot 2^{n+3}a^3d^{2\,n}\sin\left(n\arctan\left(\sin\left(2\,fx+2\,e\right),\cos\left(2\right.\right.}{\left(\left(-i\,a^n n^3-3i\,a^n n^2-2i\,a^n n\right)\left(\cos\left(2\,fx+2\,e\right)^2+\text{si}\right.}$$

4   Test file number 150

Test folder name:

```
test_cases/5_Inverse_trig_functions/5.3_Inverse_tangent/150_5.3.4_u-a+b_arctan-c_x-
^p
```

4.1   Problem number 64

$$\int \frac{a+b\mathrm{ArcTan}(cx)}{x^2(d+icdx)^3}\,dx$$

Optimal antiderivative

$$\frac{bc}{8d^3\left(\mathrm{I}-cx\right)^2}-\frac{9\,\mathrm{I}bc}{8d^3\left(\mathrm{I}-cx\right)}+\frac{9\,\mathrm{I}bc\arctan(cx)}{8d^3}+\frac{-a-b\arctan(cx)}{d^3x}+\frac{\mathrm{I}c(a+b\arctan(cx))}{2d^3\left(\mathrm{I}-cx\right)^2}$$

$$+\frac{2c(a+b\arctan(cx))}{d^3\left(\mathrm{I}-cx\right)}-\frac{3\,\mathrm{I}ac\ln(x)}{d^3}+\frac{bc\ln(x)}{d^3}-\frac{3\,\mathrm{I}c(a+b\arctan(cx))\ln\left(\frac{2}{1+\mathrm{I}cx}\right)}{d^3}$$

$$-\frac{bc\ln\left(c^2x^2+1\right)}{2d^3}+\frac{3bc\,\mathrm{polylog}(2,-\mathrm{I}cx)}{2d^3}-\frac{3bc\,\mathrm{polylog}(2,\mathrm{I}cx)}{2d^3}+\frac{3bc\,\mathrm{polylog}\left(2,1-\frac{2}{1+\mathrm{I}cx}\right)}{2d^3}$$

command

```
integrate((a+b*arctan(c*x))/x^2/(d+I*c*d*x)^3,x, algorithm="maxima")
```
Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

$$-\frac{17i\,bc^3x^3\arctan\left(1,cx\right)+\left(b(34\arctan\left(1,cx\right)-18i)+48\,a\right)c^2x^2+\left(b(-17i\arctan\left(1,cx\right)-20)-72i\,a\right)cx+\left(12\right.}{}$$

5   Test file number 160

Test folder name:

`test_cases/6_Hyperbolic_functions/6.1_Hyperbolic_sine/160_6.1.1-c+d_x-^m-a+b_sinh-^n`

5.1   Problem number 283

$$\int \frac{(e+fx)^3 \operatorname{sech}^3(c+dx)}{a+ia\sinh(c+dx)}\, dx$$

Optimal antiderivative

$$-\frac{\mathrm{I}f(fx+e)^2\tanh(dx+c)}{2a\,d^2} - \frac{5f^2(fx+e)\arctan\left(\mathrm{e}^{dx+c}\right)}{a\,d^3}$$
$$+\frac{3(fx+e)^3\arctan\left(\mathrm{e}^{dx+c}\right)}{4ad} - \frac{9\,\mathrm{I}f(fx+e)^2\operatorname{polylog}\left(2,-\mathrm{I}\,\mathrm{e}^{dx+c}\right)}{8a\,d^2}$$
$$-\frac{\mathrm{I}f(fx+e)^2\operatorname{sech}(dx+c)^2\tanh(dx+c)}{4a\,d^2} - \frac{\mathrm{I}f^2(fx+e)\operatorname{sech}(dx+c)^2}{4a\,d^3}$$
$$-\frac{5\,\mathrm{I}f^3\operatorname{polylog}\left(2,\mathrm{I}\,\mathrm{e}^{dx+c}\right)}{2a\,d^4} + \frac{9\,\mathrm{I}f(fx+e)^2\operatorname{polylog}\left(2,\mathrm{I}\,\mathrm{e}^{dx+c}\right)}{8a\,d^2}$$
$$+\frac{5\,\mathrm{I}f^3\operatorname{polylog}\left(2,-\mathrm{I}\,\mathrm{e}^{dx+c}\right)}{2a\,d^4} - \frac{9\,\mathrm{I}f^2(fx+e)\operatorname{polylog}\left(3,\mathrm{I}\,\mathrm{e}^{dx+c}\right)}{4a\,d^3}$$
$$+\frac{9\,\mathrm{I}f^2(fx+e)\operatorname{polylog}\left(3,-\mathrm{I}\,\mathrm{e}^{dx+c}\right)}{4a\,d^3} + \frac{9\,\mathrm{I}f^3\operatorname{polylog}\left(4,\mathrm{I}\,\mathrm{e}^{dx+c}\right)}{4a\,d^4}$$
$$+\frac{\mathrm{I}f^2(fx+e)\ln\left(1+\mathrm{e}^{2dx+2c}\right)}{a\,d^3} - \frac{f^3\operatorname{sech}(dx+c)}{4a\,d^4} + \frac{9f(fx+e)^2\operatorname{sech}(dx+c)}{8a\,d^2}$$
$$-\frac{9\,\mathrm{I}f^3\operatorname{polylog}\left(4,-\mathrm{I}\,\mathrm{e}^{dx+c}\right)}{4a\,d^4} + \frac{f(fx+e)^2\operatorname{sech}(dx+c)^3}{4a\,d^2}$$
$$-\frac{\mathrm{I}f(fx+e)^2}{2a\,d^2} + \frac{\mathrm{I}(fx+e)^3\operatorname{sech}(dx+c)^4}{4ad} + \frac{\mathrm{I}f^3\tanh(dx+c)}{4a\,d^4}$$
$$-\frac{f^2(fx+e)\operatorname{sech}(dx+c)\tanh(dx+c)}{4a\,d^3} + \frac{3(fx+e)^3\operatorname{sech}(dx+c)\tanh(dx+c)}{8ad}$$
$$+\frac{\mathrm{I}f^3\operatorname{polylog}\left(2,-\mathrm{e}^{2dx+2c}\right)}{2a\,d^4} + \frac{(fx+e)^3\operatorname{sech}(dx+c)^3\tanh(dx+c)}{4ad}$$

command

`integrate((f*x+e)^3*sech(d*x+c)^3/(a+I*a*sinh(d*x+c)),x, algorithm="maxima")`

Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

output too large to display

5.2 Problem number 284

$$\int \frac{(e+fx)^2 \text{sech}^3(c+dx)}{a+ia\sinh(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{3(fx+e)^2\arctan\left(e^{dx+c}\right)}{4ad} - \frac{5f^2\arctan(\sinh(dx+c))}{6a\,d^3}$$
$$-\frac{\mathrm{I}f(fx+e)\,\text{sech}(dx+c)^2\tanh(dx+c)}{6a\,d^2} - \frac{3\,\mathrm{I}f(fx+e)\,\text{polylog}\left(2,-\mathrm{I}\,e^{dx+c}\right)}{4a\,d^2}$$
$$-\frac{\mathrm{I}f^2\text{sech}(dx+c)^2}{12a\,d^3} + \frac{3\,\mathrm{I}f(fx+e)\,\text{polylog}\left(2,\mathrm{I}\,e^{dx+c}\right)}{4a\,d^2} + \frac{\mathrm{I}f^2\ln(\cosh(dx+c))}{3a\,d^3}$$
$$+\frac{3f(fx+e)\,\text{sech}(dx+c)}{4a\,d^2} + \frac{3\,\mathrm{I}f^2\,\text{polylog}\left(3,-\mathrm{I}\,e^{dx+c}\right)}{4a\,d^3}$$
$$+\frac{f(fx+e)\,\text{sech}(dx+c)^3}{6a\,d^2} + \frac{\mathrm{I}(fx+e)^2\,\text{sech}(dx+c)^4}{4ad} - \frac{3\,\mathrm{I}f^2\,\text{polylog}\left(3,\mathrm{I}\,e^{dx+c}\right)}{4a\,d^3}$$
$$-\frac{f^2\text{sech}(dx+c)\tanh(dx+c)}{12a\,d^3} + \frac{3(fx+e)^2\,\text{sech}(dx+c)\tanh(dx+c)}{8ad}$$
$$-\frac{\mathrm{I}f(fx+e)\tanh(dx+c)}{3a\,d^2} + \frac{(fx+e)^2\,\text{sech}(dx+c)^3\tanh(dx+c)}{4ad}$$

command

```
integrate((f*x+e)^2*sech(d*x+c)^3/(a+I*a*sinh(d*x+c)),x, algorithm="maxima")
```

Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

output too large to display

5.3 Problem number 286

$$\int \frac{\text{sech}^3(c+dx)}{a+ia\sinh(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{3\arctan(\sinh(dx+c))}{8ad} - \frac{\mathrm{I}}{8d\,(a-\mathrm{I}a\sinh(dx+c))}$$
$$+\frac{\mathrm{I}a}{8d\,(a+\mathrm{I}a\sinh(dx+c))^2} + \frac{\mathrm{I}}{4d\,(a+\mathrm{I}a\sinh(dx+c))}$$

command

```
integrate(sech(d*x+c)^3/(a+I*a*sinh(d*x+c)),x, algorithm="maxima")
```

Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

$$-\frac{8\left(3\,e^{(-dx-c)}-6i\,e^{(-2\,dx-2\,c)}+2\,e^{(-3\,dx-3\,c)}+6i\,e^{(-4\,dx-4\,c)}+3\,e^{(-5\,dx-5\,c)}\right)}{\left(64i\,ae^{(-dx-c)}-32\,ae^{(-2\,dx-2\,c)}+128i\,ae^{(-3\,dx-3\,c)}+32\,ae^{(-4\,dx-4\,c)}+64i\,ae^{(-5\,dx-5\,c)}+32\,ae^{(-6\,dx-6\,c)}-32\,a\right)}$$
$$-\frac{3i\,\log\left(e^{(-dx-c)}+i\right)}{8\,ad}+\frac{3i\,\log\left(e^{(-dx-c)}-i\right)}{8\,ad}$$

6 Test file number 183

Test folder name:

```
test_cases/6_Hyperbolic_functions/6.6_Hyperbolic_cosecant/183_6.6.3_Hyperbolic_cosecant_funct
```

6.1 Problem number 90

$$\int\frac{\mathrm{sech}^3(x)}{i+\mathrm{csch}(x)}\,dx$$

Optimal antiderivative

$$-\frac{I\arctan(\sinh(x))}{8}-\frac{\mathrm{sech}(x)^4}{4}-\frac{I\,\mathrm{sech}(x)\tanh(x)}{8}+\frac{I\mathrm{sech}(x)^3\tanh(x)}{4}$$

command

```
integrate(sech(x)^3/(I+csch(x)),x, algorithm="maxima")
```

Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

$$\frac{8\left(i\,e^{(-x)}+2\,e^{(-2\,x)}-10i\,e^{(-3\,x)}-2\,e^{(-4\,x)}+i\,e^{(-5\,x)}\right)}{64i\,e^{(-x)}-32\,e^{(-2\,x)}+128i\,e^{(-3\,x)}+32\,e^{(-4\,x)}+64i\,e^{(-5\,x)}+32\,e^{(-6\,x)}-32}$$
$$-\frac{1}{8}\,\log\left(e^{(-x)}+i\right)+\frac{1}{8}\,\log\left(e^{(-x)}-i\right)$$

6.2 Problem number 91

$$\int \frac{\text{sech}^4(x)}{i + \text{csch}(x)} \, dx$$

Optimal antiderivative

$$-\frac{\text{sech}(x)^5}{5} - \frac{I\left(\tanh^3(x)\right)}{3} + \frac{I\left(\tanh^5(x)\right)}{5}$$

command

`integrate(sech(x)^4/(I+csch(x)),x, algorithm="maxima")`

Maxima 5.46 SBCL 2.0.1.debian via sagemath 9.6 output

Exception raised: RuntimeError

Maxima 5.44 via sagemath 9.3 output

$$\frac{32\,e^{(-x)}}{120i\,e^{(-x)} - 120\,e^{(-2\,x)} + 360i\,e^{(-3\,x)} + 360i\,e^{(-5\,x)} + 120\,e^{(-6\,x)} + 120i\,e^{(-7\,x)} + 60\,e^{(-8\,x)} - 60}$$
$$+ \frac{32i\,e^{(-2\,x)}}{120i\,e^{(-x)} - 120\,e^{(-2\,x)} + 360i\,e^{(-3\,x)} + 360i\,e^{(-5\,x)} + 120\,e^{(-6\,x)} + 120i\,e^{(-7\,x)} + 60\,e^{(-8\,x)} - 60}$$
$$+ \frac{96\,e^{(-3\,x)}}{120i\,e^{(-x)} - 120\,e^{(-2\,x)} + 360i\,e^{(-3\,x)} + 360i\,e^{(-5\,x)} + 120\,e^{(-6\,x)} + 120i\,e^{(-7\,x)} + 60\,e^{(-8\,x)} - 60}$$
$$- \frac{240i\,e^{(-4\,x)}}{120i\,e^{(-x)} - 120\,e^{(-2\,x)} + 360i\,e^{(-3\,x)} + 360i\,e^{(-5\,x)} + 120\,e^{(-6\,x)} + 120i\,e^{(-7\,x)} + 60\,e^{(-8\,x)} - 60}$$
$$+ \frac{16i}{120i\,e^{(-x)} - 120\,e^{(-2\,x)} + 360i\,e^{(-3\,x)} + 360i\,e^{(-5\,x)} + 120\,e^{(-6\,x)} + 120i\,e^{(-7\,x)} + 60\,e^{(-8\,x)} - 60}$$