Test Suite for the Maxima Plugin Maxima

$t_0 := \mathrm{time}(0)$

All formatted labels on the right margin should be green (pass).

MaximaControl("restart") = "Restart complete."

⊞— Test functions

Maxima version

T := Test(("$args(build_info())$") ; {"5.34.1", "2014-11-11 09:57:09", "i686-pc-mingw32", "GNU Common Lisp (GCL)", "GCL 2.6.11"}) pass T

Preset and switch for internal functions

Maxima can directly handle the functions int(), diff(), lim(), det() and sum()

Current default is to let SMath handle all functions.

$T := \mathrm{Test}\left(\frac{d}{d\,x}\,\mathrm{sech}(x) \; ; \; -\mathrm{sech}(x)\cdot\tanh(x)\right)$ pass T

$T := \mathrm{STest}\left(\int \sin(x)\,d\,x \; ; \; \text{"int(sin(x),x)"}\right)$ pass T

$T := \mathrm{STest}\left(\lim_{x \to \infty} \frac{x^2}{x} \; ; \; \text{"lim(x,x,}\infty\text{)"}\right)$ pass T

$\sum_{j=1}^{n} j = \blacksquare$ $T := \mathrm{SameError}(\mathrm{description}(\mathrm{n\_notDefined}))$ pass T

$T := \mathrm{STest}\left(\left|a\cdot\begin{bmatrix}1 & 2\\ b & 3\end{bmatrix}\right| \; ; \; \text{"det(a*mat(1,2,b,3,2,2))"}\right)$ pass T

Alternatives for internal functions

Maxima provides alternatives to the functions int(), diff(), lim(), det() and sum()

$T := \mathrm{Test}(\mathrm{Diff}(\mathrm{sech}(x)) \; ; \; -\mathrm{sech}(x)\cdot\tanh(x))$ pass T

$T := \mathrm{Test}(\mathrm{Diff}(\mathrm{sech}(x) \; ; \; x) \; ; \; -\mathrm{sech}(x)\cdot\tanh(x))$ pass T

$T := \mathrm{Test}(\mathrm{Diff}(\mathrm{sech}(x) \; ; \; x \; ; \; 2) \; ; \; (\tanh(x)-\mathrm{sech}(x))\cdot(\tanh(x)+\mathrm{sech}(x))\cdot\mathrm{sech}(x))$ pass T

$T := \mathrm{Test}(\mathrm{Int}(\sin(x) \; ; \; x) \; ; \; -\cos(x))$ pass T

$T := \mathrm{Test}\left(\mathrm{Int}\left(10\,\frac{N}{m} \; ; \; x \; ; \; 0 \; ; \; 2\,m\right) \; ; \; 20\,N\right)$ pass T

$T := \mathrm{STest}\left(\mathrm{Lim}\left(\frac{x^2}{x} \; ; \; x \; ; \; \infty\right) \; ; \; \text{"}\infty\text{"}\right)$ pass T

$T := \mathrm{Test}\left(\mathrm{Det}\left(a\cdot\begin{bmatrix}1 & 2\\ b & 3\end{bmatrix}\right) \; ; \; a^2\cdot(3-2\cdot b)\right)$ pass T

T := Test(... n·(1+n)) ... pass

T := Test(Sum(j ; j ; 1 ; n) ; n·(1+n)/2) Sum(j ; j ; 1 ; n) = n·(1+n)/2 pass T

Wrapping of the internal functions (in order to use their operator representation)

$\frac{d}{dx}\left(\operatorname{sech}(x)\right) = -\operatorname{sech}(x)\cdot\tanh(x)$

MaximaLog(■) =
```
"Request: diff(sech(x),x,1);
Answer:
(%o39) -sech(x)*tanh(x)
(%i40)
Received bytes: 32
SMath get: "
```
Maxima

$\frac{d}{dx}\operatorname{sech}(x) = -\operatorname{sech}(x)\cdot\tanh(x)$

MaximaLog(■) =
```
"Request: -sech(x)*tanh(x);
Answer:
(%o41) -sech(x)*tanh(x)
(%i42)
Received bytes: 32
SMath get: "
```
SMath

$\int \sin(x)\,dx = -\cos(x)$

MaximaLog(■) =
```
"Request: integrate(sin(x),x);
Answer:
(%o43) -cos(x)
(%i44)
Received bytes: 23
SMath get: "
```
Maxima

$\int_0^{2\,m} 10\,\frac{N}{m}\,dx = \frac{20\,kg}{s^2}$

MaximaLog(■) =
```
"Request: 20*%unitkg/(%units^2);
Answer:
(%o45) 20*%unitkg/%units^2
(%i46)
Received bytes: 35
SMath get: "
```
SMath, wrong

$\int_0^{b} q\,dx = b\cdot q$

MaximaLog(■) =
```
"Request: integrate(q,x,0,b);
Answer:
(%o49) b*q
(%i50)
Received bytes: 19
SMath get: "
```
Maxima

$\lim_{x\to\infty} \frac{x^2}{x} = \infty$

MaximaLog(■) =
```
"Request: limit((x^2)/x,x,inf);
Answer:
(%o51) inf
(%i52)
Received bytes: 19
SMath get: "
```
Maxima

$\left|a\cdot\begin{bmatrix}1 & 2\\ b & 3\end{bmatrix}\right| = a^2\cdot(3-2\cdot b)$

MaximaLog(■) =
```
"Request: determinant(a*matrix([1,2],[b,3]));
Answer:
(%o53) 3*a^2-2*a^2*b
(%i54)
Received bytes: 29
SMath get: "
```
Maxima

$\sum_{j=1}^{n} j = \frac{n\cdot(1+n)}{2}$

MaximaLog(■) =
```
"Request: determinant(a*matrix([1,2],[b,3]));
Answer:
(%o53) 3*a^2-2*a^2*b
(%i54)
Received bytes: 29
SMath get: "
```

lastError = "n - not defined."

T := Test(∑(j=1..n) j ; n·(1+n)/2) pass T

i can't be used as variable in Maxima expressions

T := Test(∑(i=1..n) i ; n·(1+n)/2)

MaximaLog(■) =
```
"Request: sum(%i,%i,1,n);
Answer:
(%o59) %i*n
(%i60)
Received bytes: 20
SMath get: "
```

fail T

Test of MaximaTakeover() option "sum()"

MaximaTakeover("sum")="sum() handled by Maxima"

$T := Test\left(\frac{d}{dx}\operatorname{sech}(x) ; -\operatorname{sech}(x)\cdot\tanh(x)\right)$ pass T

$T := STest\left(\int \sin(x)\,dx ; "int(sin(x),x)"\right)$ pass T

$T := STest\left(\lim_{x\to\infty}\frac{x^2}{x} ; "lim(x,x,\infty)"\right)$ pass T

$T := STest\left(\sum_{j=1}^{n} j ; "\{n*(1+n)\}/2"\right)$ pass T

$T := STest\left(\left|a\cdot\begin{bmatrix}1 & 2\\ b & 3\end{bmatrix}\right| ; "det(a*mat(1,2,b,3,2,2))"\right)$ pass T

Test of MaximaTakeover() option "det()"

MaximaTakeover("det()")="det() handled by Maxima"

$T := Test\left(\frac{d}{dx}\operatorname{sech}(x) ; -\operatorname{sech}(x)\cdot\tanh(x)\right)$ pass T

$T := STest\left(\int \sin(x)\,dx ; "int(sin(x),x)"\right)$ pass T

$T := STest\left(\lim_{x\to\infty}\frac{x^2}{x} ; "lim(x,x,\infty)"\right)$ pass T

$T := STest\left(\lim_{x\to\infty}\frac{x^2}{x} ; "lim(x,x,\infty)"\right)$ pass T

$\sum_{j=1}^{n} j = \blacksquare$ $T := SameError(description(n\_notDefined))$ pass T

$T := STest\left(\left|a\cdot\begin{bmatrix}1 & 2\\ b & 3\end{bmatrix}\right| ; "a^2*(3-2*b)"\right)$ pass T

Test of MaximaTakeover() option "none"

MaximaTakeover("none")="All functions handled by SMath"

$T := Test\left(\frac{d}{dx}\operatorname{sech}(x) ; -\operatorname{sech}(x)\cdot\tanh(x)\right)$ pass T

$T := STest\left(\int \sin(x)\,dx ; "int(sin(x),x)"\right)$ pass T

$T := STest\left(\lim_{x\to\infty}\frac{x^2}{x} ; "lim(x,x,\infty)"\right)$ pass T

$\sum_{j=1}^{n} j = \blacksquare$ $T := SameError(description(n\_notDefined))$ pass T

$T := STest\left(\left|a\cdot\begin{bmatrix}1 & 2\\ b & 3\end{bmatrix}\right| ; "det(a*mat(1,2,b,3,2,2))"\right)$ pass T

Test of MaximaTakeover() option "all"

MaximaTakeover("all")="diff(), int(), lim(), sum(), det() handled by Maxima"

$T := Test\left(\frac{d}{dx}\,sech(x)\,;\,-sech(x)\cdot tanh(x)\right)$ pass T

$T := STest\left(\int sin(x)\,dx\,;\,"-cos(x)"\right)$ pass T

$T := STest\left(\lim_{x\to\infty}\frac{x^2}{x}\,;\,"\infty"\right)$ pass T

$T := STest\left(\sum_{j=1}^{n} j\,;\,"\{n*(1+n)\}/2"\right)$ pass T

$T := STest\left(\left\|a\cdot\begin{bmatrix}1 & 2\\ b & 3\end{bmatrix}\right\|\,;\,"a^2*(3-2*b)"\right)$ pass T

Unit handling

$T := Test\left(\int_0^{2\,m} 10\,\frac{N}{m}\,dx\,;\,20\,N\right)$ pass T

$T := Test\left(\text{ML}(2\,m+3\,km)\,;\,3002\,m\right)$ pass T

$T := Test\left(Solve(a+3\,m=500\,cm\,;\,a)\,;\,(a=2\,m)\right)$ pass T

$x_0 := 10\,mm \qquad y_0 := 50\,mm \qquad \varepsilon_0 := 0{,}05$

$\varepsilon(x) := \varepsilon_0\cdot\left(\frac{x}{x_0}\right) \qquad y(x) := y_0\cdot\left(\frac{x}{x_0}\right)^2$

$T := Test\left(\int_0^{x_0}\varepsilon(x)\cdot\sqrt{1+\left(\frac{d}{dx}y(x)\right)^2}\,dx\,;\,\frac{m\cdot\left(-1+101^{\frac{3}{2}}\right)}{600000}\right)$ pass T

Translation tests

$T := Test\left(\text{ML}\left(\Alpha\Gamma\Delta\Theta\Lambda\Xi_{\Pi\Sigma\Phi\Psi\Omega}\right)\,;\,\Alpha\Gamma\Delta\Theta\Lambda\Xi_{\Pi\Sigma\Phi\Psi\Omega}\right)$ pass T

$T := Test\left(\text{ML}\left(\alpha\beta\gamma\delta\varepsilon\zeta\eta\theta\iota\kappa_{\lambda\mu\nu\xi o\pi\rho\sigma\tau\upsilon\varphi\chi\psi\omega}\right)\,;\,\alpha\beta\gamma\delta\varepsilon\zeta\eta\theta\iota\kappa_{\lambda\mu\nu\xi o\pi\rho\sigma\tau\upsilon\varphi\chi\psi\omega}\right)$ pass T

$T := Test\left(\text{ML}\left(\begin{matrix}"a\ b\backslash\backslash c"\\ abc\end{matrix}\right)\,;\,\begin{matrix}"a\ b\backslash\backslash c"\\ abc\end{matrix}\right)$ pass T

$T := Test\left(\text{ML}("äöüß°")\,;\,"äöüß°"\right)$ pass T

$T := Test\left(\text{ML}("a+b")\,;\,"a+b"\right)$ pass T

$T := Test\left(\text{ML}(strrep("a\b"\,;\,"\"\,;\,"/"))\,;\,"a/b"\right)$ pass T

$T := Test\left(\text{ML}("a\\b")\,;\,"a\\b"\right)$ pass T

$T := Test\left(\text{ML}("\$"a\\b"\$")\,;\,"a\\b"\right)$ pass T

$T := Test\left(\text{ML}(a+"\$b\_c\$"+d)\,;\,d+b\_c+a\right)$ pass T

$T := Test\left(\text{ML}("\$[x,y]\$")\,;\,\begin{matrix}x\\ y\end{matrix}\right)$ pass T

((x = 1) pass

$T := Test\left(\text{aM}\left("\$[[x=1,y=2],[x=2,y=3]]\$"\right); \begin{cases} y = 2 \\ x = 2 \\ y = 3 \end{cases}\right)$ pass T

$T := Test\left(\text{aM}\left("\$2.1e100\$"\right); 2{,}1 \cdot 10^{+100}\right)$ pass T

$T := Test\left(\text{aM}\left("\$2.1b100\$"\right); 2{,}1 \cdot 10^{100}\right)$ pass T

$T := Test\left(\text{aM}\left(2 \cdot \pi\right); 2 \cdot \pi\right)$ pass T

$T := Test\left(\text{aM}\left(\sin(i)\right); i \cdot \sinh(1)\right)$ pass T

$T := Test\left(\text{aM}\left(e^{i} \cdot e^{i}\right); e^{i} \cdot e^{i}\right)$ pass T

$T := Test\left(\text{aM}\left(2{,}3 \cdot \pi\right); 2{,}3 \cdot \pi\right)$ pass T

$T := Test\left(\text{aM}\left(\text{dummy}(a\,;b)\right); \text{dummy}(a\,;b)\right)$ pass T

$T := Test\left(\text{aM}\left(\begin{bmatrix} 1 & 2 \\ x_y & a \end{bmatrix}\right); \begin{bmatrix} 1 & 2 \\ x_y & a \end{bmatrix}\right)$ pass T

$T := Test\left(\text{aM}\left(\begin{bmatrix} "1" & 2 \\ x_y & a \end{bmatrix}\right); \begin{bmatrix} "1" & 2 \\ x_y & a \end{bmatrix}\right)$ pass T

$T := Test\left(\text{aM}\left(v_k\right); v_k\right)$ Vector indices pass T

$T := Test\left(\text{aM}\left(M_{j\,k}\right); M_{j\,k}\right)$ Matrix indizes pass T

$T := Test\left(\text{aM}\left(a \le b\right); a \le b\right)$ Boolean and relational operators pass T

$T := Test\left(\text{aM}\left(a \ge b\right); a \ge b\right)$ pass T

$T := Test\left(\text{aM}\left((a \ne b)\right); (a \ne b)\right)$ pass T

$T := Test\left(\text{aM}\left(a \wedge b\right); a \wedge b\right)$ pass T

$T := Test\left(\text{aM}\left(a \vee b\right); a \vee b\right)$ pass T

$T := Test\left(\text{aM}\left(\begin{bmatrix} \begin{cases} x = 1 \\ y = 2 \end{cases} & \begin{cases} x = 2 \\ y = 3 \end{cases} \end{bmatrix}\right); \begin{bmatrix} \begin{cases} x = 1 \\ y = 2 \end{cases} & \begin{cases} x = 2 \\ y = 3 \end{cases} \end{bmatrix}\right)$ matrices of lists pass T

$T := Test\left(\text{aM}\left(\begin{cases} f\left(\begin{cases} a \\ b \end{cases}; \begin{cases} c \\ d \end{cases}\right) \end{cases}\right); \begin{cases} f\left(\begin{cases} a \\ b \end{cases}; \begin{cases} c \\ d \end{cases}\right) \end{cases}\right)$ Lists and functions with multiple arguments pass T

$T := Test\left(\text{aM}\left(\begin{bmatrix} \begin{cases} f(x\,;y) \\ "a" \end{cases} & 2 \\ x_y & a \end{bmatrix}\right); \begin{bmatrix} \begin{cases} f(x\,;y) \\ "a" \end{cases} & 2 \\ x_y & a \end{bmatrix}\right)$ Matrices, lists and functions with multiple arguments pass T

$c := a \cdot b$ $T := STest\left(\text{aM}\left(c^{2}\right); "a\text{\^{}}2*b\text{\^{}}2"\right)$ pass T

$T := Test\left(\text{aM}\left(\text{string}\left(\log_y(x)\right)\right); "log(x)/log(y)"\right)$ pass T

$T := Test\left(\text{aM}\left(\text{string}\left(\begin{cases} a \\ b \end{cases}\right); "[a,b]"\right)\right)$ pass T

Function ODE.2 and handling of Maxima asking questions about signs

$$T := Test\left(ODE_2\left(\left(\frac{d^2}{dt^2}w(t)+\omega^2\cdot w(t)=0\right);w(t);t\right);\begin{cases}\text{"}\omega\text{ is assumed to be positive."}\\ w(t)=k1\cdot e^{(i\cdot\omega\cdot t)}+k2\cdot e^{-(i\cdot\omega\cdot t)}\end{cases}\right)$$ pass T

$$T := Test\left(\text{Maxima}\left(assume(\omega>0)\right);\{(\omega>0)\}\right)$$ pass T

$$T := Test\left(Assign\left(ODE_2\left(\left(\frac{d^2}{dt^2}w(t)+\omega^2\cdot w(t)=0\right);w(t);t\right);k1\cdot\sin(\omega\cdot t)+k2\cdot\cos(\omega\cdot t)\right)\right)$$ pass T

Functions Solve(), Algsys(), LinSolve() and Assign()

$$T := Test\left(Assign\left(Solve\left(\begin{bmatrix}x^2+(3\cdot x)\cdot y+y^2=0\\ 3\cdot x+y=1\end{bmatrix};\begin{bmatrix}x\\y\end{bmatrix}\right)_1;\begin{cases}-\frac{-3+\sqrt{5}}{2}\\ \frac{-7+3\cdot\sqrt{5}}{2}\end{cases}\right)\right)\quad Clear(x;y)=1$$ pass T

$$T := Test\left(Solve\left(\begin{cases}a_1+a_2=0\\ a_1-a_2=1\end{cases};\begin{cases}a_1\\a_2\end{cases};\begin{cases}a_1=\frac{1}{2}\\ a_2=-\frac{1}{2}\end{cases}\right)\right)$$ fail T

MaximaLog(■)=
```
"Request: solve([el(a,1)+el(a,2)=0,el(a,1)-el(a,2)=1],[el(a,1),el(a,2)]);
Answer:
(%o167) [[a[1] = 1/2,a[2] = -1/2]]
(%i168)
Received bytes: 44
SMath get: "
```

$$eq_1 := \left(x^2+(3\cdot x)\cdot y+y^2=0\right)\quad eq_2 := (3\cdot x+y=1)$$

$$T := Test\left(Algsys\left(\begin{bmatrix}eq_1\\eq_2\end{bmatrix};\begin{bmatrix}x\\y\end{bmatrix};\begin{bmatrix}\left(x=\left(-\frac{-3+\sqrt{5}}{2}\right)\right) & \left(x=\frac{3+\sqrt{5}}{2}\right)\\ \left(y=\frac{-7+3\cdot\sqrt{5}}{2}\right) & \left(y=\left(-\frac{7+3\cdot\sqrt{5}}{2}\right)\right)\end{bmatrix}\right)\right)$$ pass T

$$eq_1 := (x+z=y)\quad eq_2 := \left((2\cdot a)\cdot x-y=2\cdot a^2\right)\quad eq_3 := (y-(2\cdot z)=2)$$

$$T := Test\left(Unknowns(eq);\begin{bmatrix}a\\x\\y\\z\end{bmatrix}\right)$$ pass T

$$T := Test\left(LinSolve\left(eq;\begin{cases}x\\y\\z\end{cases};\begin{cases}(x=(1+a))\\(y=2\cdot a)\\(z=(-1+a))\end{cases}\right)\right)$$ pass T

Cross product with scaled vectors

$$a := \begin{bmatrix}a_1\\a_2\\a_3\end{bmatrix}\quad b := \begin{bmatrix}b_1\\b_2\\b_3\end{bmatrix}\quad c := \begin{bmatrix}c_1\\c_2\\c_3\end{bmatrix}\quad (\lambda\cdot a)\times b=■\quad T := Test\left(\text{Maxima}\left((\lambda\cdot a)\times b\right);\begin{bmatrix}\lambda\cdot(a_2\cdot b_3-a_3\cdot b_2)\\ \lambda\cdot(a_3\cdot b_1-a_1\cdot b_3)\\ \lambda\cdot(a_1\cdot b_2-a_2\cdot b_1)\end{bmatrix}\right)$$ pass T

$$T := Test\left(a\cdot(b\times c);a_1\cdot(b_2\cdot c_3-b_3\cdot c_2)+a_2\cdot(b_3\cdot c_1-b_1\cdot c_3)+a_3\cdot(b_1\cdot c_2-b_2\cdot c_1)\right)$$ pass T

$$a\cdot((\lambda\cdot b)\times c)=■$$

$$T := Test\left(\text{Maxima}\left(a\cdot((\lambda\cdot b)\times c)\right);\lambda\cdot\left((b_2\cdot c_3-b_3\cdot c_2)\cdot a_1+(b_3\cdot c_1-b_1\cdot c_3)\cdot a_2+(b_1\cdot c_2-b_2\cdot c_1)\cdot a_3\right)\right)$$ pass T

$$Clear(a;b;c)=1$$

Handling of warnings and messages

$$T := \text{Test}\left(\text{Solve}\left(\cos(x) = \frac{1}{\sqrt{2}}\ ;\ x\right)_2\ ;\ \left(x = \frac{\pi}{4}\right)\right)$$

pass

T

$$T := \text{Test}\left(\int_{-1}^{1} \frac{|x-1|}{x}\,dx\ ;\ \begin{pmatrix}\text{"Principal Value"}\\ -2\end{pmatrix}\right)$$

pass

T

$$T := \text{Test}\left(\text{ilt}\left(\frac{(2\cdot(s-a))\cdot(s+a)}{s^3\cdot\left(b\cdot s^2 + a\cdot(1-(a\cdot b))\right)}\ ;\ s\ ;\ t\right)\ ;\ \begin{cases}\text{"a*b*(a*b-1) is assumed to be positive."}\\ -2\cdot\dfrac{\cosh\left(\sqrt{a\cdot b\cdot(a\cdot b-1)}\cdot\dfrac{t}{b}\right)}{\left(a^3\cdot b^2 - 2\cdot a^2\cdot b + a\right)} + a\cdot\dfrac{t^2}{(a\cdot b-1)} + \dfrac{}{\left(a^3\cdot b^2 -\right.}\end{cases}\right)$$

pass

T

Back-translation of at()

$$T := \text{Test}\left(\text{laplace}\left(\frac{d^2}{dt^2}\,\text{delta}(t)\ ;\ t\ ;\ s\right)\ ;\ -\frac{d}{dt}\,\text{delta}(t)\Big|_{t=0} + s^2 - \text{delta}(0)\cdot s\right)$$

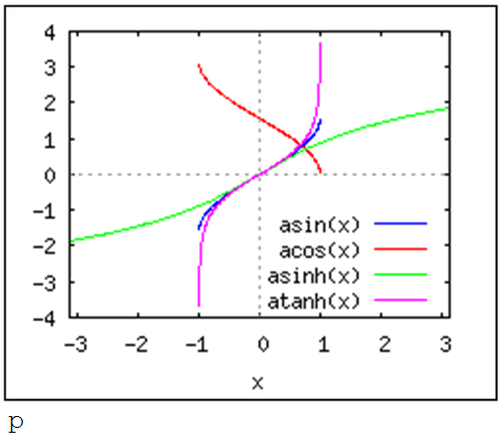
pass

T

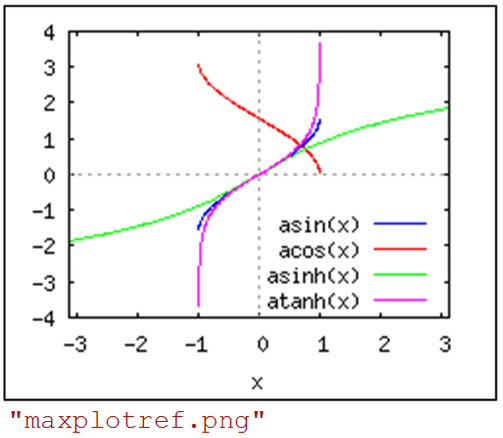
Plotting with plot2d

$$p := \begin{vmatrix}\text{set\_plot\_option}\left(\begin{pmatrix}\text{gnuplot\_preamble}\\ \text{"set key bottom right; set grid"}\end{pmatrix}\right)\\ \text{set\_plot\_option}\left(\begin{pmatrix}\text{gnuplot\_term}\\ \text{"png small size 250, 200"}\end{pmatrix}\right)\\ \text{plot2d}\left(\begin{pmatrix}\text{asin}(x)\\ \text{acos}(x)\\ \text{asinh}(x)\\ \text{atanh}(x)\end{pmatrix}\ ;\ \begin{pmatrix}x\\ -\pi\\ \pi\end{pmatrix}\right)\\ \text{concat}\left(\text{maxima\_tempdir}\ ;\ \text{"/"}\ ;\ \text{"maxplot.png"}\right)\end{vmatrix}$$

$$\text{CurrentDirectory}(\text{DocumentDirectory}(\blacksquare)) = \text{"C:\FHB\Software\SMath\Activebook\activebook\"}$$



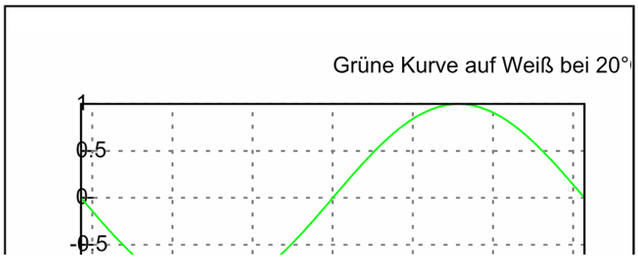
p



"maxplotref.png"

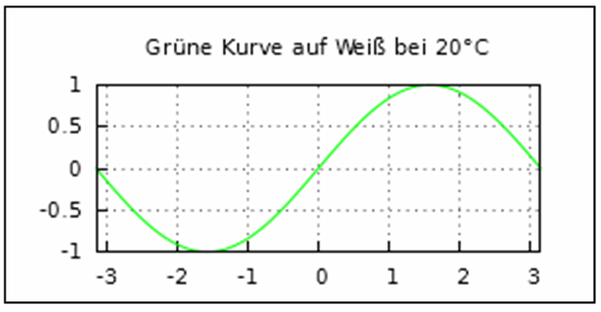
Draw2D() with special characters and automatic temporary filename

$$p := \text{Draw2D}\left(\begin{pmatrix}\text{title} = \text{"Grüne Kurve auf Weiß bei 20°C"}\\ \text{color} = \text{green}\\ \text{explicit}(\sin(x)\ ;\ x\ ;\ -\pi\ ;\ \pi)\\ \text{grid} = \text{true}\end{pmatrix}\ ;\ \begin{pmatrix}300\\ 150\end{pmatrix}\right)$$



p

$$p := \text{Draw2D}\left(\begin{cases}\text{title} = \text{"Grüne Kurve auf Weiß bei 20°C"}\\ \text{color} = \text{green}\\ \text{explicit}(\sin(x); x; -\pi; \pi)\\ \text{grid} = \text{true}\end{cases}; \text{"grün.png"}; \begin{cases}300\\150\end{cases}\right)$$



p

Result format of Eigenvalues and -vectors

$$T := \text{Test}\left(\text{eigenvectors}\left(\begin{bmatrix}100 & 50\\ 50 & 0\end{bmatrix}\right); \begin{bmatrix}50 - 25\cdot 2^{\left(\frac{3}{2}\right)} & 25\cdot 2^{\left(\frac{3}{2}\right)} + 50\\ 1 & 1\end{bmatrix}\begin{bmatrix}1 & -\sqrt{2}-1\\ 1 & \sqrt{2}-1\end{bmatrix}\right)$$

pass

T

$$T := \text{Test}\left(\text{eigenvectors}\left(\begin{bmatrix}1\,m & 0 & 0\\ 0 & 3 & 0\\ 0 & 0 & 1\,m\end{bmatrix}\right); \begin{bmatrix}1\,m & 3\\ 2 & 1\end{bmatrix}\begin{bmatrix}1 & 0 & 0\\ 0 & 0 & 1\\ 0 & 1 & 0\end{bmatrix}\right)$$

pass

T

Translation of derivatives improved

diff(3) is used only if exponent is greater than 1

$$T := \text{STest}\left(\frac{d}{dx}\frac{d}{dy} f(x; y); \text{"diff(diff(f(x,y),y),x)"}\right)$$

pass

T

$$T := \text{STest}\left(\frac{d^2}{dx^2} f(x; y); \text{"diff(f(x,y),x,2)"}\right)$$

fail

T

$$T := \text{STest}\left(\text{Diff}(f(x); x; 2); \text{"diff(f(x,y),x,2)"}\right)$$

fail

T

$$T := \text{STest}\left(\frac{d}{dx}\frac{d}{dy}\frac{d}{dz} f(x; y; z); \text{"diff(diff(diff(f(x,y,z),z),y),x)"}\right)$$

pass

T

$$T := \text{Test}\left(\text{jacobian}\left(\begin{cases}f(r; \varphi)\\ g(r; \varphi)\end{cases}; \begin{cases}r\\ \varphi\end{cases}\right); \begin{bmatrix}\frac{d}{dr} f(r; \varphi) & \frac{d}{d\varphi} f(r; \varphi)\\ \frac{d}{dr} g(r; \varphi) & \frac{d}{d\varphi} g(r; \varphi)\end{bmatrix}\right)$$

pass

T

Test of diff(1)

$$T := \text{Test}\left((f(x)\cdot g(x))'; f(x)\cdot\frac{d}{dx} g(x) + g(x)\cdot\frac{d}{dx} f(x)\right)$$

pass

T

$$T := \text{Test}\left((\sin(x)\cdot\ln(x))'; \frac{\sin(x)}{x} + \cos(x)\cdot\ln(x)\right)$$

pass

T

$$T := \text{Test}\left((f(g(x)))'; \frac{d}{dx} f(g(x))\right)$$

pass

T

$$T := \text{Test}\left(\left(\sin\left(x^2\right)\right)'; 2\cdot x\cdot\cos\left(x^2\right)\right)$$

pass

T

Function calls

$f(a) := a^2$

$T := Test\left(\text{aM}\left(f(b\ mm)\right) ; m^2 \cdot \frac{b^2}{1000000}\right)$ pass T

$T := Test\left(\text{aM}\left(f((b\ mm))\right) ; m^2 \cdot \frac{b^2}{1000000}\right)$ pass T

$T := Test\left(\text{aM}\left(a\_b\_c\_d\right) ; a\_b\_c\_d\right)$ pass T

$T := Test\left(\text{aM}\left(string(a\_b\_c\_d)\right) ; "a\_b\_c\_d"\right)$ pass T

$T := Test\left(\text{aM}\left(a_{b,c,d}\right) ; a_{b,c,d}\right)$ pass T

$T := Test\left(\text{aM}\left(string\left(a_{b,c,d}\right)\right) ; "a\_\%\_b\_\%\_c\_\%\_d"\right)$ pass T

$T := Test\left(\text{aM}\left(a_{b,c}\right) ; a_{b,c}\right)$ pass T

$T := Test\left(\text{aM}\left(string\left(a_{b,c}\right)\right) ; "a\_\%\_b\_\%\_c"\right)$ pass T

$T := Test\left(\text{aM}\left(\begin{Bmatrix}1,2\\2,3\end{Bmatrix}\right) ; \begin{Bmatrix}1,2\\2,3\end{Bmatrix}\right)$ pass T

Loading of abs_integrate

$f(x) := x^3 - \left(6 \cdot x^2\right) + 8 \cdot x$

$T := Test\left(\int_0^3 \left|f(x)\right| dx ; \frac{23}{4}\right)$ pass T

Definition in SMath and Maxima

$T := Test\left(MaximaDefine(A ; 3) ; 3\right)$ pass T

$T := Test(A ; A)$ Variable A wird in SMath nicht definiert. pass T

$T := Test\left(\text{aM}\left("\$A\$"\right) ; 3\right)$ pass T

Transfer of an existing SMath-Definition to Maxima

$C := \begin{Bmatrix}2\\3\end{Bmatrix}$ $D := 4$ $E := 12$ Definition in SMath

$T := Test\left(MaximaDefine(C ; D) ; \begin{Bmatrix}\begin{Bmatrix}2\\3\end{Bmatrix}\\4\end{Bmatrix}\right)$ pass T

$T := Test\left(MaximaDefine(E) ; 12\right)$ pass T

$T := Test(E ; 12)$ pass T

$Clear(D ; C) = 1$ Clear the definition in SMath

$T := STest(D \cdot C ; "D*C")$ pass T

$T := Test\left(\text{aM}\left(D \cdot C\right) ; \begin{Bmatrix}8\\12\end{Bmatrix}\right)$ Still available in Maxima pass

T

$T := Test(aM(kill(D ; C)) ; done)$ Clear the definitions in Maxima — pass — T

$T := Test(aM(D \cdot C) ; C \cdot D)$ — pass — T

$T := Test(MaximaDefine(fpprec ; 40) ; 40)$ — pass — T

$T := Test(aM(bfloat(\pi)) ; 3,1415926535897932384626433832795028841971 \cdot 10^{0})$ — pass — T

$T := Test(MaximaDefine(fpprec ; 16) ; 16)$ — pass — T

$T := Test(aM(bfloat(\pi)) ; 3,141592653589793 \cdot 10^{0})$ — pass — T

$T := Test(aM(split("a,b" ; ",")) ; \begin{cases} "a" \\ "b" \end{cases})$ — pass — T

$T := Test(aM("$at(diff(delta(y),y),y=0)$") ; \frac{d}{dy} delta(y)\Big|_{y=0})$ — pass — T

$T := Test(aM(\frac{d}{dy} delta(y)\Big|_{y=0}) ; \frac{d}{dy} delta(y)\Big|_{y=0})$ — pass — T

$T := Test(aM(x^{0,5}) ; x^{0,5})$ — pass — T

$T := Test(aM("$%$") ; x^{0,5})$ — fail — T

Access to Lapack functions

$msg := aM(load(lapack))$

$M := \begin{bmatrix} 1 & 2 & 3 \\ 3,5 & 0,5 & 8 \\ -1 & 2 & -3 \\ 4 & 9 & 7 \end{bmatrix}$ $T := Test(aM(dgesvd(M ; true ; true))_1 ; \begin{cases} 14,47444340493696 \\ 6,386367492469741 \\ 0,452546537278426 \end{cases})$ — pass — T

$T := Test(aM(laplace(\sum_{n=0}^{\infty} ((-1)^n \cdot unit\_step(t - n \cdot \pi) \cdot sin(t)) ; t ; s)) ; \frac{e^{\pi \cdot s}}{(-1 + e^{\pi \cdot s}) \cdot (s - i) \cdot (s + i)})$

$time(0) - t_0 = 21,353\ s$ — pass — T