Test Suite for the Maxima Plugin Maxima

$t_0 := time(0)$

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

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

Test functions

Maxima version

$T := Test\left(\text{Maxima}("\$args(build\_info())\$"); \begin{matrix}"5.34.1"\\"2014-11-11\ 09:57:09"\\"i686-pc-mingw32"\\"GNU\ Common\ Lisp\ (GCL)"\\"GCL\ 2.6.11"\end{matrix}\right)$ pass T

Alternatives for internal functions

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

$T := Test\left(Diff(sech(x)); -sech(x)\cdot tanh(x)\right)$ pass T

$T := Test\left(Diff(sech(x); x); -sech(x)\cdot tanh(x)\right)$ pass T

$T := Test\left(Diff(sech(x); x; 2); (tanh(x)-sech(x))\cdot(tanh(x)+sech(x))\cdot sech(x)\right)$ pass T

$T := Test\left(Int(sin(x); x); -cos(x)\right)$ pass T

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

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

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

$T := Test\left(Sum(j; j; 1; n); \frac{n\cdot(1+n)}{2}\right)$ pass T

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

$\text{Maxima}(sech(x)') = -sech(x)\cdot tanh(x)$

MaximaLog(■)= "Request: diff(sech(x),x,1);
Answer:
(%o47) -sech(x)*tanh(x)
(%i48)
Received bytes: 32
SMath get: "

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

MaximaLog(■)= "Request: -sech(x)*tanh(x);
Answer:
(%o49) -sech(x)*tanh(x)
(%i50)
Received bytes: 32
SMath get: "

$\text{Maxima}\left(\int sin(x)\,dx\right) = -cos(x)$

MaximaLog(■)= "Request: integrate(sin(x),x);
Answer:
(%o51) -cos(x)
(%i52)
Received bytes: 23
SMath get: "

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

MaximaLog(■)=
"Request: 20*%unitkg/(%units^2); SMath, wrong
Answer:
(%o53) 20*%unitkg/%units^2
(%i54)
Received bytes: 35
SMath get: "

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

MaximaLog(■)=
"Request: integrate(q,x,0,b); Maxima
Answer:
(%o57) b*q
(%i58)
Received bytes: 19
SMath get: "

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

MaximaLog(■)=
"Request: limit((x^2)/x,x,inf); Maxima
Answer:
(%o59) inf
(%i60)
Received bytes: 19
SMath get: "

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

MaximaLog(■)=
"Request: determinant(a*matrix([1,2],[b,3]));
Answer:
(%o61) 3*a^2-2*a^2*b Maxima
(%i62)
Received bytes: 29
SMath get: "

$$\sum_{j=1}^{n} j = ■$$

MaximaLog(■)=
"Request: determinant(a*matrix([1,2],[b,3]));
Answer:
(%o61) 3*a^2-2*a^2*b
(%i62) Maxima is not
Received bytes: 29 called at all
SMath get: "

lastError="n - not defined."

Unit handling

T:=Test(∫(2 m; 0; 10 N/m dx); 20 N) Fail due to wrong evaluation by SMath fail T

T:=Test(∫(2 m + 3 km); 3002 m) pass T

T:=Test(Solve(a + 3 m = 500 cm; a); (a = 2 m)) pass T

$x_0 := 10\,mm$ $y_0 := 50\,mm$ $\varepsilon_0 := 0{,}05$ $\varepsilon(x) := \varepsilon_0\cdot\left(\frac{x}{x_0}\right)$ $y(x) := y_0\cdot\left(\frac{x}{x_0}\right)^2$

T:=Test(∫(0; x0; ε(x)·√(1+(d/dx y(x))^2) dx); m·(-1+101)^(3/2)/600000) pass T

Translation tests

T:=Test(∫(ΑΓΔΘΛΞ_ΠΣΦΨΩ); ΑΓΔΘΛΞ_ΠΣΦΨΩ) pass T

T:=Test(∫(αβγδεζηθικ_λμνξοπρστυφχψω); αβγδεζηθικ_λμνξοπρστυφχψω) pass T

T:=Test(∫("a b\\c"; abc); "a b\\c"; abc) pass T

T:=Test(∫("äöüß°"); "äöüß°") pass T

T:=Test(∫("a+b"); "a+b") pass T

T:=Test(∫(strrep("a\b"; "\"; "/")); "a/b") pass

T := Test(ML("a\\b"); "a\\b") pass T

T := Test(ML("$"a\\b"$"); "a\\b") pass T

T := Test(ML(a + "b_c" + d); d + b_c + a) pass T

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

T := Test(ML("$[[x=1,y=2],[x=2,y=3]]$"); $\begin{Bmatrix} \begin{Bmatrix} x = 1 \\ y = 2 \end{Bmatrix} \\ \begin{Bmatrix} x = 2 \\ y = 3 \end{Bmatrix} \end{Bmatrix}$) pass T

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

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

T := Test(ML(2·π); 2·π) pass T

T := Test(ML(sin(i)); i·sinh(1)) pass T

T := Test(ML($e^{i \cdot e^{i}}$); $e^{i \cdot e^{i}}$) pass T

T := Test(ML(2,3·π); 2,3·π) pass T

T := Test(ML(dummy(a ; b)); dummy(a ; b)) pass T

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

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

T := Test(ML(v_k); v_k) Vector indices pass T

T := Test(ML($M_{j\,k}$); $M_{j\,k}$) Matrix indizes pass T

T := Test(ML(a≤b); a≤b) Boolean and relational operators pass T

T := Test(ML(a≥b); a≥b) pass T

T := Test(ML((a≠b)); (a≠b)) pass T

T := Test(ML(a∧b); a∧b) pass T

T := Test(ML(a∨b); a∨b) pass T

T := Test(ML($\begin{bmatrix} \begin{Bmatrix} x = 1 \\ y = 2 \end{Bmatrix} & \begin{Bmatrix} x = 2 \\ y = 3 \end{Bmatrix} \end{bmatrix}$); $\begin{bmatrix} \begin{Bmatrix} x = 1 \\ y = 2 \end{Bmatrix} & \begin{Bmatrix} x = 2 \\ y = 3 \end{Bmatrix} \end{bmatrix}$) matrices of lists pass T

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

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

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

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

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

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

$T := \text{Test}\left(\text{ODE}_2\left(\left(\frac{d^2}{dt^2}w(t) + \omega^2 \cdot w(t) = 0\right); w(t); t\right); \begin{cases}\text{"ω is assumed to be positive."}\\ w(t) = k1 \cdot e^{(i\cdot\omega\cdot t)} + k2 \cdot e^{-(i\cdot\omega\cdot t)}\end{cases}\right)$ — pass — T

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

$T := \text{Test}\left(\text{Assign}\left(\text{ODE}_2\left(\left(\frac{d^2}{dt^2}w(t) + \omega^2 \cdot w(t) = 0\right); w(t); t\right); k1\cdot\sin(\omega\cdot t) + k2\cdot\cos(\omega\cdot t)\right)\right)$ — pass — T

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

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

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

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

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

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

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

Cross product with scaled vectors

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

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

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

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

$\text{Clear}(a;b;c) = 1$

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

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

pass

T

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

pass

T

Back-translation of at()

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

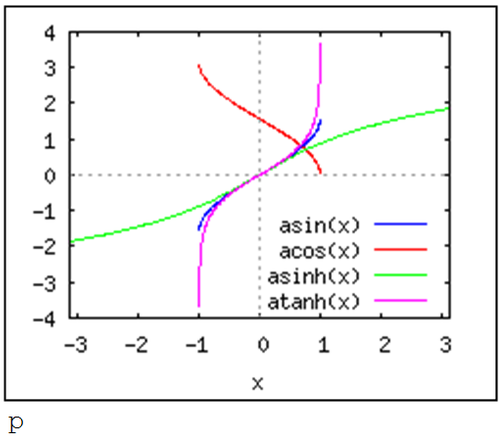
pass

T

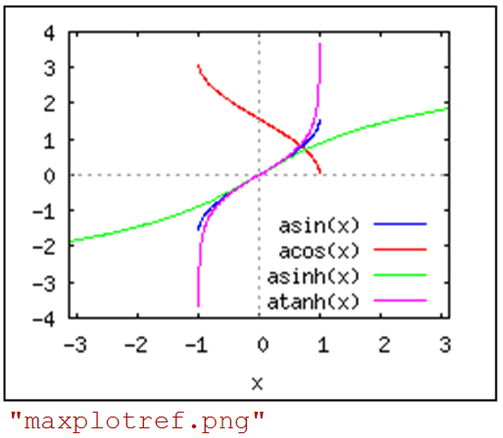
Plotting with plot2d

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

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



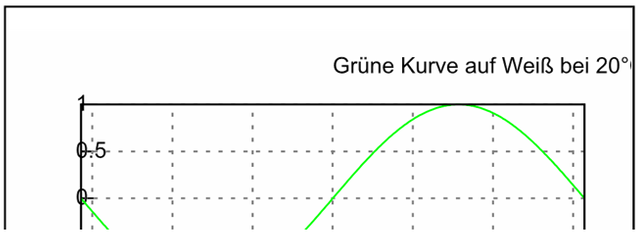
p

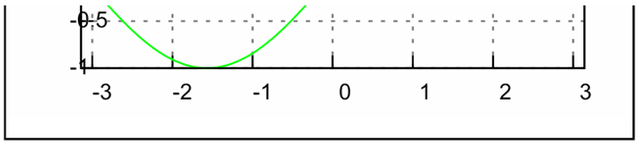


"maxplotref.png"

Draw2D() with special characters and automatic temporary filename

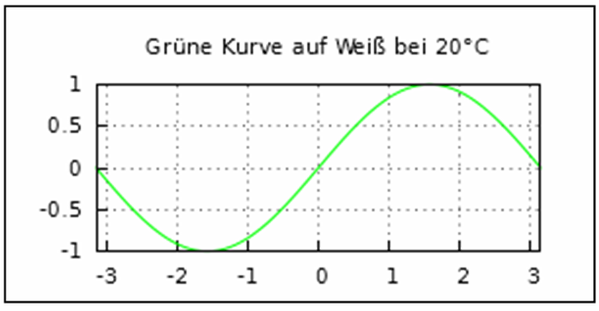
$$p := \text{Draw2D}\left(\left\{\begin{matrix}\text{title} = \text{"Grüne Kurve auf Weiß bei 20°C"}\\ \text{color} = \text{green}\\ \text{explicit}(\sin(x)\ ;\ x\ ;\ -\pi\ ;\ \pi)\\ \text{grid} = \text{true}\end{matrix}\right\}\ ;\ \left\{\begin{matrix}300\\ 150\end{matrix}\right\}\right)$$





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)

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

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

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

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

$T := Test\left(\text{aM}\left(\int_0^3 |f(x)|\, dx\right) ; \frac{23}{4}\right)$ This is numerically integrated by SMath before Maxima can have it. fail T

$T := Test\left(Int\left(|f(x)| ; x ; 0 ; 3\right) ; \frac{23}{4}\right)$ 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

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

T

$T := Test\left(\text{ML}(kill(D ; C)) ; done\right)$ Clear the definitions in Maxima — pass

T

$T := Test\left(\text{ML}(D \cdot C) ; C \cdot D\right)$ — pass

T

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

T

$T := Test\left(\text{ML}(bfloat(\pi)) ; 3,1415926535897932384626433832795028841970 \cdot 10^{0}\right)$ — pass

T

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

T

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

T

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

T

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

T

$T := Test\left(\text{ML}\left(\frac{d}{d\,y} delta(y)\Big|_{y=0}\right) ; \frac{d}{d\,y} delta(y)\Big|_{y=0}\right)$ — pass

T

$T := Test\left(\text{ML}\left(x^{0,5}\right) ; x^{0,5}\right)$ — pass

T

$T := Test\left(\text{ML}("\$\%\$") ; x^{0,5}\right)$ — fail

T

Access to Lapack functions

$msg := \text{ML}(load(lapack))$

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

T

$time(0) - t_0 = 22,351\ s$