```
> 12 + 4 - 5
```

$$11 \tag{1}$$

```
> 2^10
```

$$1024 \tag{2}$$

```
> sin(0.1)
```

$$0.09983341665 \tag{3}$$

```
> expand((a + b)·(a - b))
```

$$a^2 - b^2 \tag{4}$$

```
> diff(3 x^3 + 2 x^2 - 5, x)
```

$$9 x^2 + 4 x \tag{5}$$

```
> diff(sqrt(1 + x^4), x)
```

$$\frac{2 x^3}{\sqrt{x^4 + 1}} \tag{6}$$

```
> diff(exp(x)sin(x) cos(x), x)
```

$$e^x \sin(x)\ \cos(x) + e^x \cos(x)^2 - e^x \sin(x)^2 \tag{7}$$

```
> int(3 x^3 - 2 x^2 - 5, x = 0..1)
```

$$-\frac{59}{12} \tag{8}$$

```
> int(1/x^2, x = 0 .. infinity)
```

$$\infty \tag{9}$$

```
> int(exp(-x^2), x = -infinity..infinity)
```

$$\sqrt{\pi} \tag{10}$$

```
> limit(sin(x)/x, x = 0)
```

$$1 \tag{11}$$

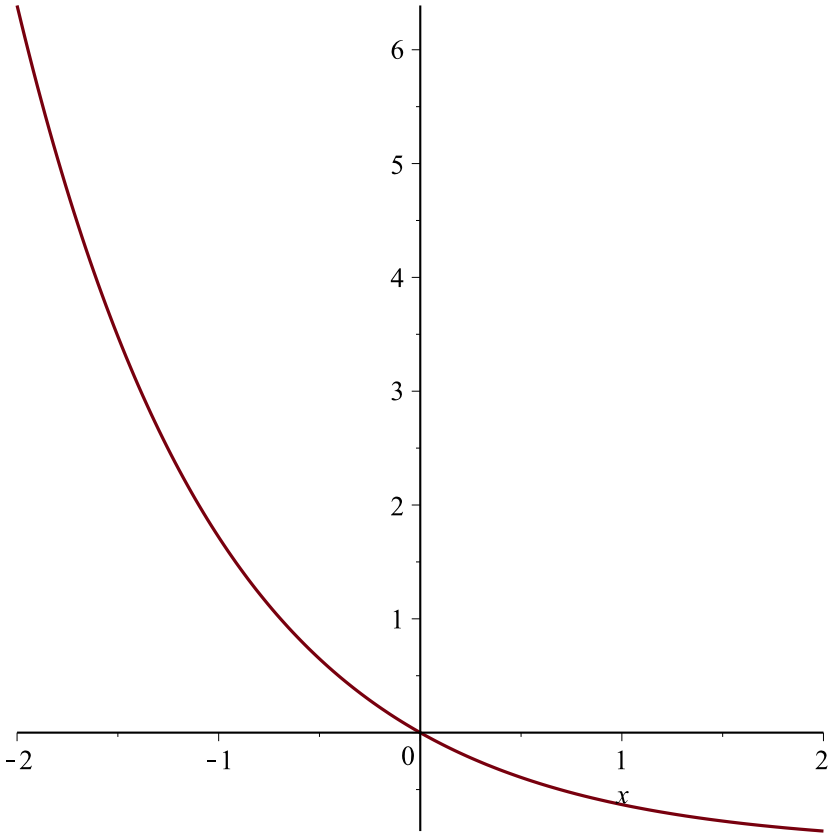
```
> limit((x^3 + 3 x^2 - 5)/(2 x^3 - 7 x), x = infinity)
```

$$\frac{1}{2} \tag{12}$$

```
> limit((cos(x) + 1)/(x - Pi), x = Pi)
```

$$0 \tag{13}$$

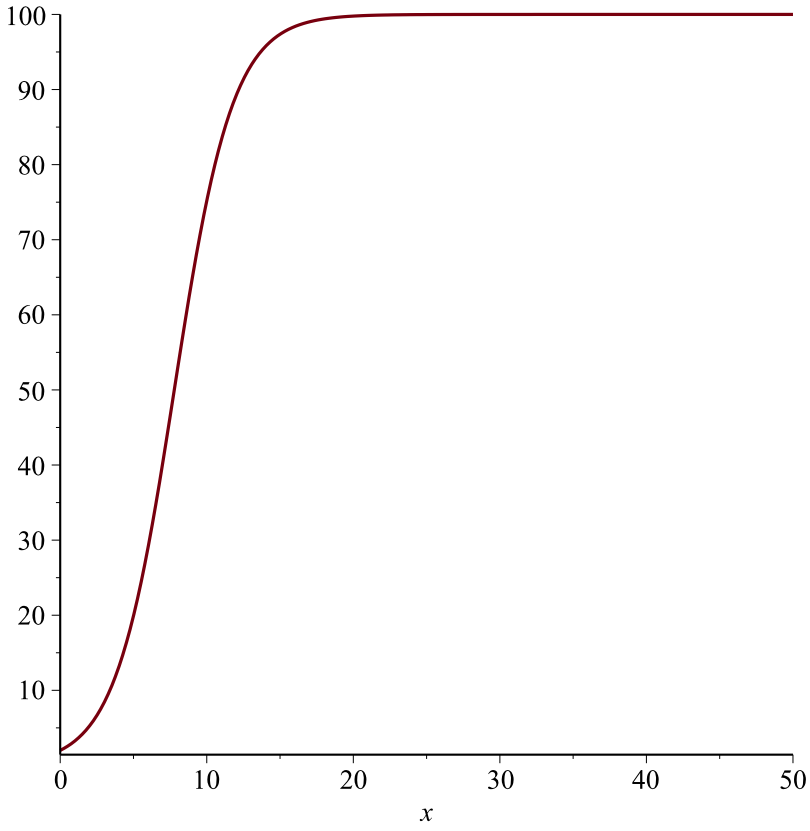
```
> plot(exp(-x) - 1, x = -2..2)
```



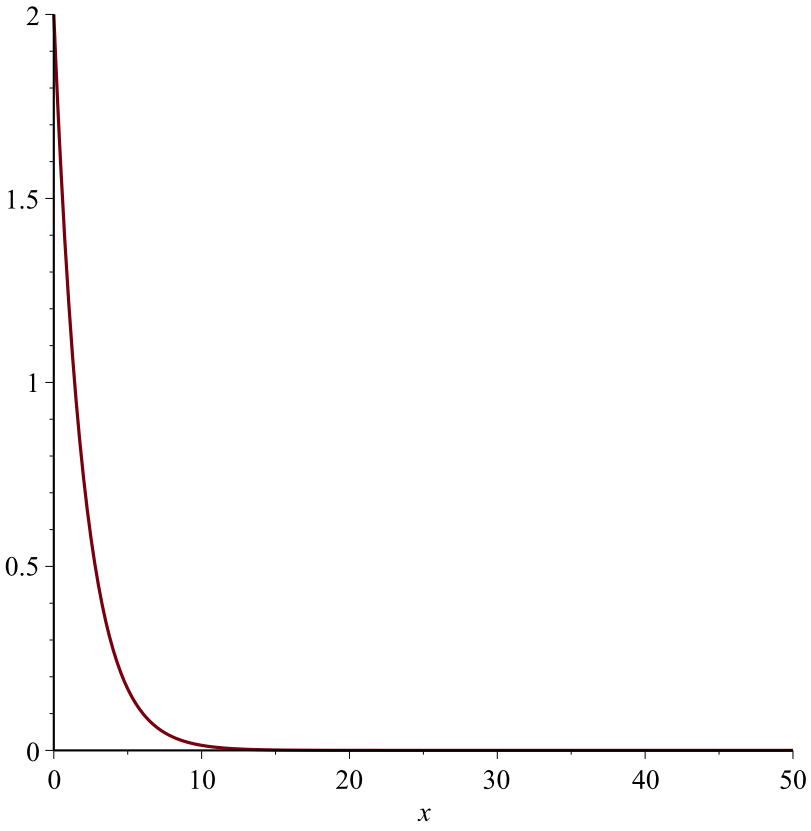
> $f := (x, r) \rightarrow \dfrac{(200 \cdot \exp(r \cdot x))}{2(\exp(r \cdot x) - 1) + 100}$

$$f := (x, r) \rightarrow \frac{200\, e^{r x}}{2\, e^{r x} + 98} \qquad \textbf{(14)}$$

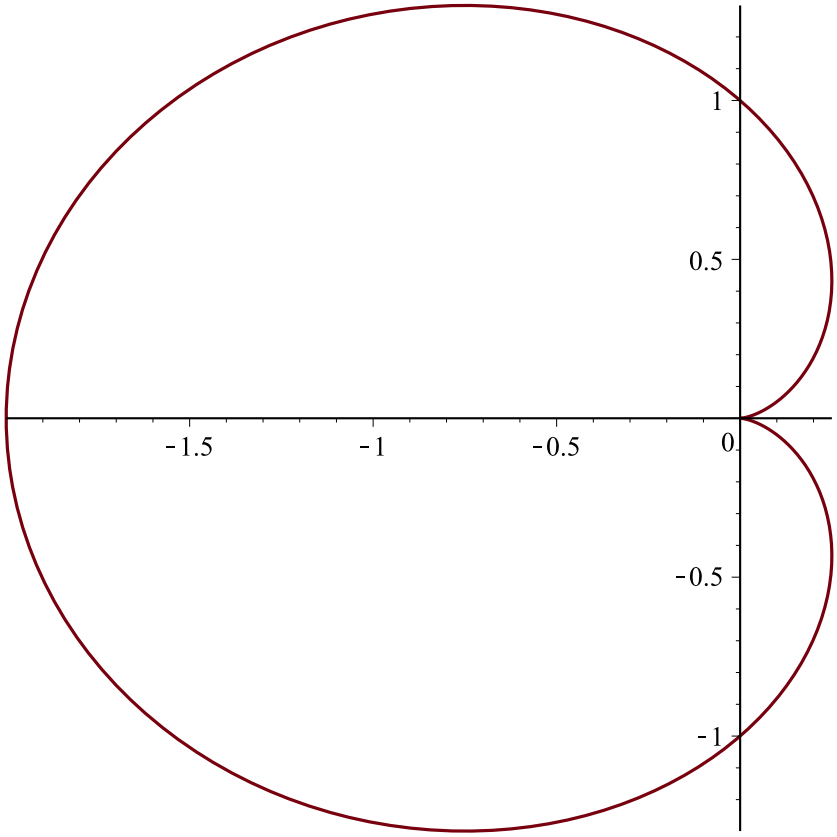
> $plot(f(x, 0.5), x = 0..50)$



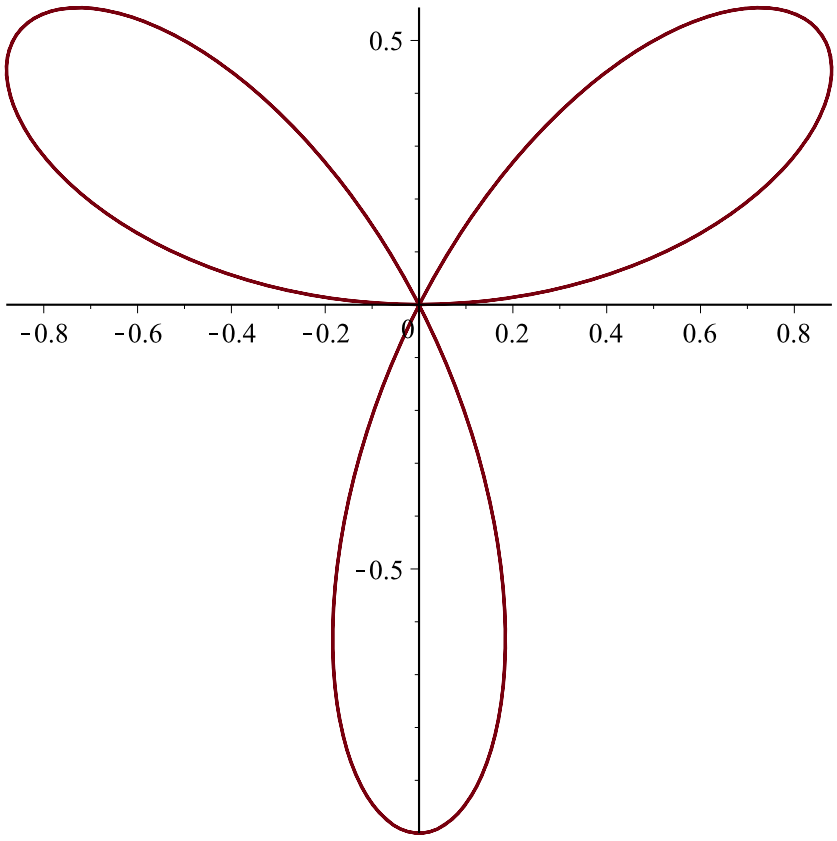
> $plot(f(x,-0.5), x=0..50)$



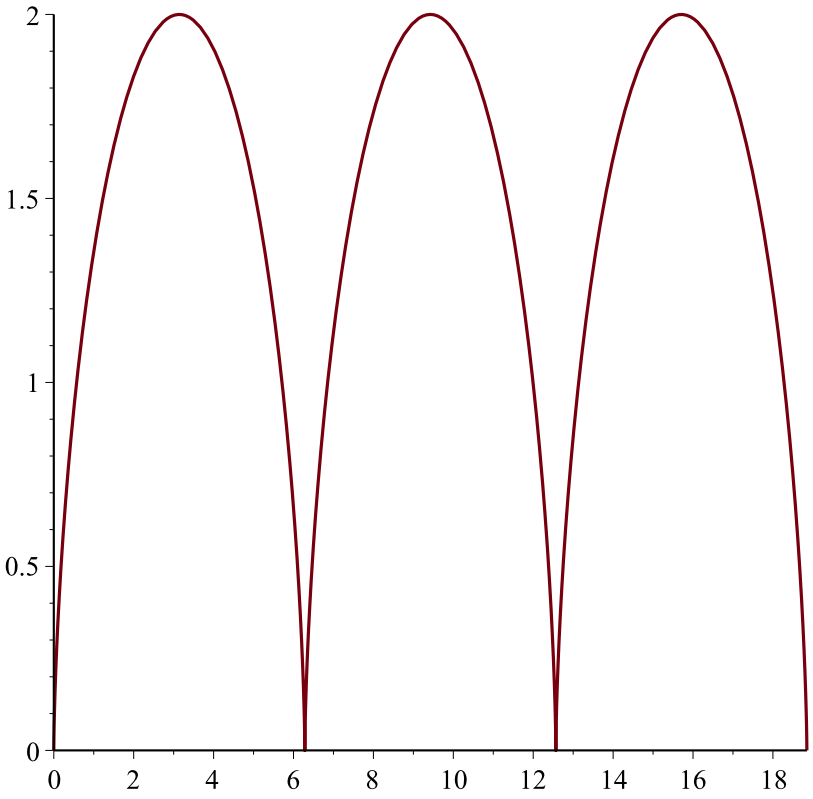

```
> plot([(1 - cos(t))cos(t), (1 - cos(t))sin(t), t = 0..2 Pi])
```



> $plot([\sin(3t)\cos(t), \sin(3t)\sin(t), t = 0..2\,\mathrm{Pi}])$



> $plot([t-\sin(t), 1-\cos(t), t=0..6\,\mathrm{Pi}])$



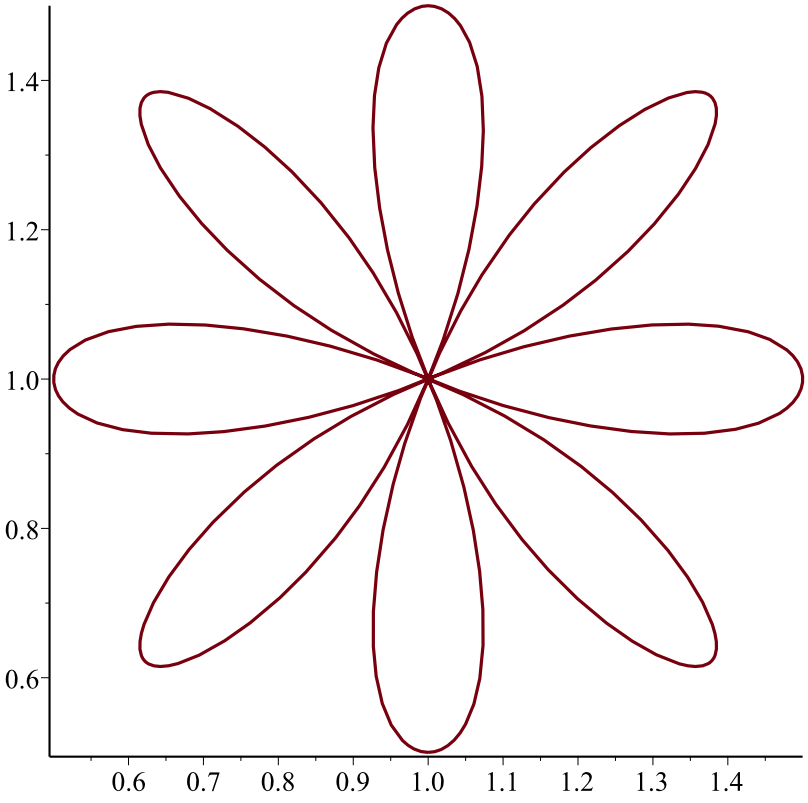
> $f := (t, s) \to 1 - \dfrac{(s \cdot \cos(4\,t) \cdot \cos(t))}{\mathrm{sqrt}(1 - s^2 \cdot \cos^2(4\,t) \cdot \sin^2(t))}$

$$f := (t, s) \to 1 - \frac{s \cos(4\,t)\ \cos(t)}{\sqrt{1 - s^2 \cos(4\,t)^2 \sin(t)^2}} \tag{15}$$

> $f2 := (t, s) \to f\left(t - \dfrac{\mathrm{Pi}}{2}, s\right)$

$$f2 := (t, s) \to f\left(t - \frac{1}{2}\ \pi, s\right) \tag{16}$$

> $plot([f2(t, 0.5), f(t, 0.5), t = 0 .. 2\ \mathrm{Pi}])$



> $listf := f\left(t, \frac{s}{10}\right)\$s = 1..10$

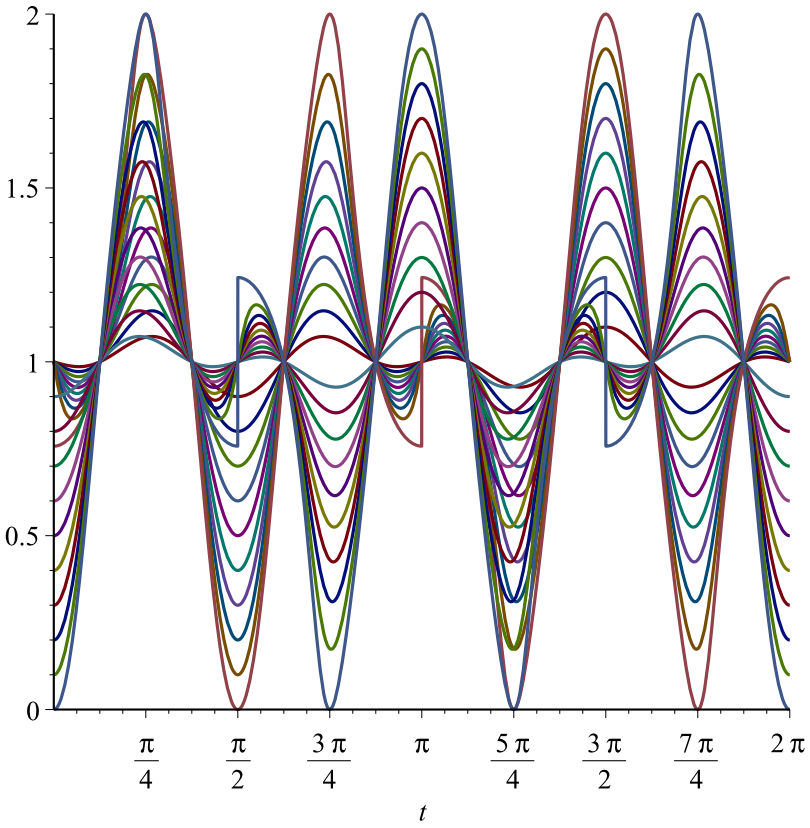
$$listf := 1 - \frac{\cos(4t)\cos(t)}{\sqrt{100 - \cos(4t)^2\sin(t)^2}}, 1 - \frac{2\cos(4t)\cos(t)}{\sqrt{100 - 4\cos(4t)^2\sin(t)^2}}, 1 - \frac{3\cos(4t)\cos(t)}{\sqrt{100 - 9\cos(4t)^2\sin(t)^2}}, 1 - \frac{4\cos(4t)\cos(t)}{\sqrt{100 - 16\cos(4t)^2\sin(t)^2}}, 1 - \frac{5\cos(4t)\cos(t)}{\sqrt{100 - 25\cos(4t)^2\sin(t)^2}}, 1 - \frac{6\cos(4t)\cos(t)}{\sqrt{100 - 36\cos(4t)^2\sin(t)^2}}, 1 - \frac{7\cos(4t)\cos(t)}{\sqrt{100 - 49\cos(4t)^2\sin(t)^2}}, 1 - \frac{8\cos(4t)\cos(t)}{\sqrt{100 - 64\cos(4t)^2\sin(t)^2}}, 1 - \frac{9\cos(4t)\cos(t)}{\sqrt{100 - 81\cos(4t)^2\sin(t)^2}}, 1 - \frac{10\cos(4t)\cos(t)}{\sqrt{100 - 100\cos(4t)^2\sin(t)^2}} \quad \textbf{(17)}$$

> $listf2 := f2\left(t, \frac{s}{10}\right)\$s = 1..10$

(18)

$$listf2 := 1 - \frac{\cos(4t)\sin(t)}{\sqrt{100 - \cos(4t)^2\cos(t)^2}}, 1 - \frac{2\cos(4t)\sin(t)}{\sqrt{100 - 4\cos(4t)^2\cos(t)^2}}, 1 - \frac{3\cos(4t)\sin(t)}{\sqrt{100 - 9\cos(4t)^2\cos(t)^2}}, 1 - \frac{4\cos(4t)\sin(t)}{\sqrt{100 - 16\cos(4t)^2\cos(t)^2}}, 1 - \frac{5\cos(4t)\sin(t)}{\sqrt{100 - 25\cos(4t)^2\cos(t)^2}}, 1 - \frac{6\cos(4t)\sin(t)}{\sqrt{100 - 36\cos(4t)^2\cos(t)^2}}, 1 - \frac{7\cos(4t)\sin(t)}{\sqrt{100 - 49\cos(4t)^2\cos(t)^2}}, 1 - \frac{8\cos(4t)\sin(t)}{\sqrt{100 - 64\cos(4t)^2\cos(t)^2}}, 1 - \frac{9\cos(4t)\sin(t)}{\sqrt{100 - 81\cos(4t)^2\cos(t)^2}}, 1 - \frac{10\cos(4t)\sin(t)}{\sqrt{100 - 100\cos(4t)^2\cos(t)^2}}$$ **(18)**

> $plot([listf2, listf], t = 0..2\,Pi)$

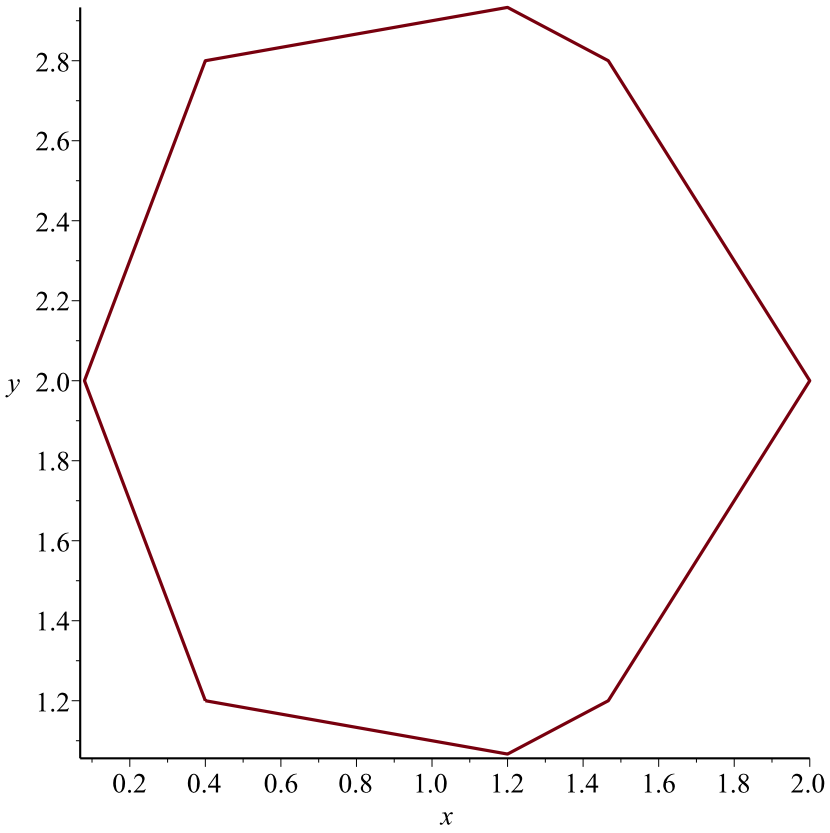


> $with(plots)$

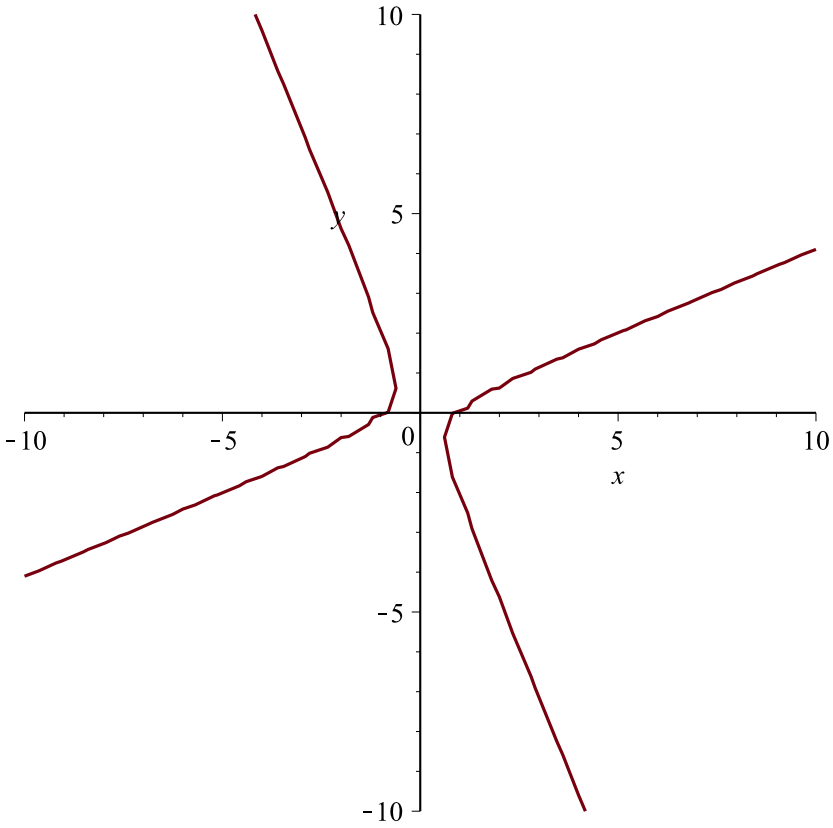
[*animate, animate3d, animatecurve, arrow, changecoords, complexplot, complexplot3d, conformal, conformal3d, contourplot, contourplot3d, coordplot, coordplot3d, densityplot, display, dualaxisplot, fieldplot, fieldplot3d, gradplot, gradplot3d, implicitplot, implicitplot3d, inequal, interactive, interactiveparams, intersectplot, listcontplot,* **(19)**

listcontplot3d, *listdensityplot*, *listplot*, *listplot3d*, *loglogplot*, *logplot*, *matrixplot*, *multiple*, *odeplot*, *pareto*, *plotcompare*, *pointplot*, *pointplot3d*, *polarplot*, *polygonplot*, *polygonplot3d*, *polyhedra_supported*, *polyhedraplot*, *rootlocus*, *semilogplot*, *setcolors*, *setoptions*, *setoptions3d*, *spacecurve*, *sparsematrixplot*, *surfdata*, *textplot*, *textplot3d*, *tubeplot*]

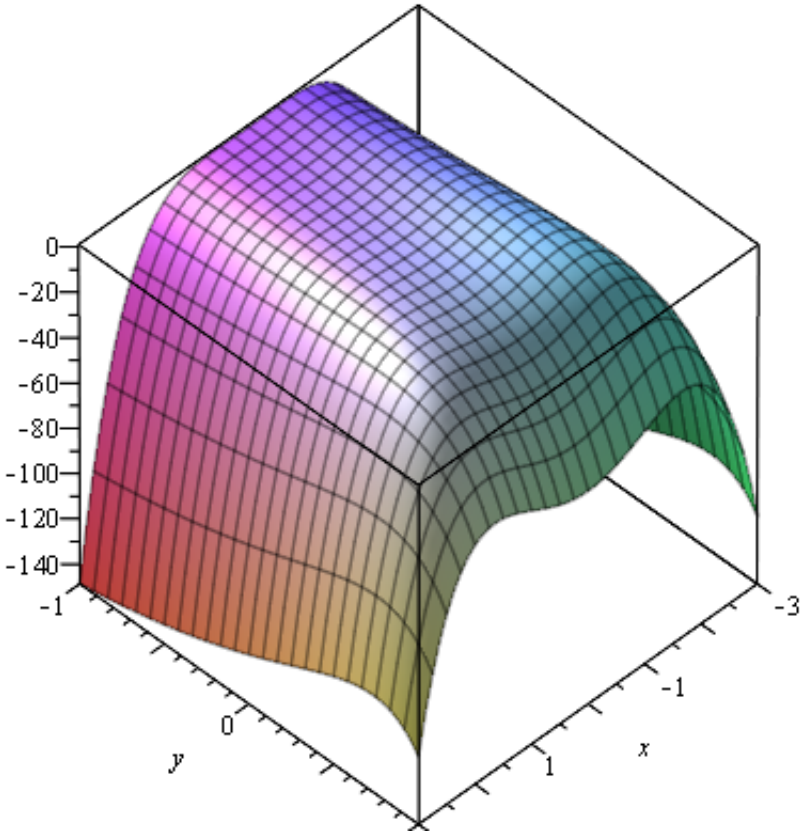
> $implicitplot(x^2 + y^2 - 2x - 4y + 4 = 0, x = -10..10, y = -10..10)$



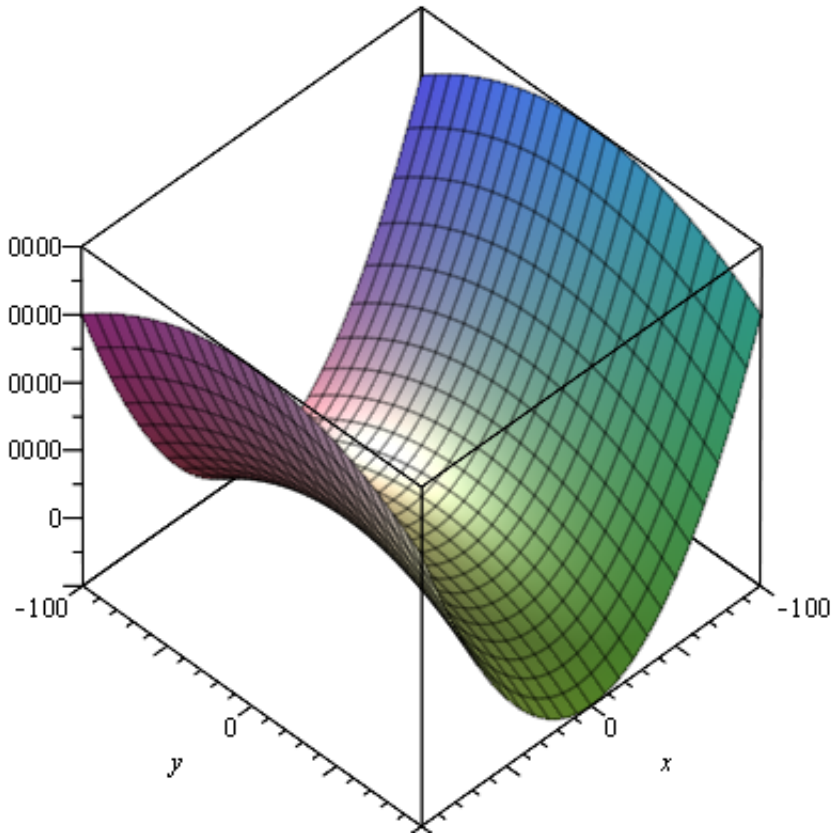
> $implicitplot(x^2 - 2x \cdot y - y^2 = 1, x = -10..10, y = -10..10)$



> $plot3d\left(4\,x^{2}\cdot\exp(y)-2\,x^{4}-\exp(4\,y),\,x=-3\,..3,\,y=-1\,..1\right)$



> $plot3d(4x^2 - y^2, x = -100..100, y = -100..100)$




```
> with(linalg)
```

[*BlockDiagonal*, *GramSchmidt*, *JordanBlock*, *LUdecomp*, *QRdecomp*, *Wronskian*, *addcol*, *addrow*, *adj*, *adjoint*, *angle*, *augment*, *backsub*, *band*, *basis*, *bezout*, *blockmatrix*, *charmat*, *charpoly*, *cholesky*, *col*, *coldim*, *colspace*, *colspan*, *companion*, *concat*, *cond*, *copyinto*, *crossprod*, *curl*, *definite*, *delcols*, *delrows*, *det*, *diag*, *diverge*, *dotprod*, *eigenvals*, *eigenvalues*, *eigenvectors*, *eigenvects*, *entermatrix*, *equal*, *exponential*, *extend*, *ffgausselim*, *fibonacci*, *forwardsub*, *frobenius*, *gausselim*, *gaussjord*, *geneqns*, *genmatrix*, *grad*, *hadamard*, *hermite*, *hessian*, *hilbert*, *htranspose*, *ihermite*, *indexfunc*, *innerprod*, *intbasis*, *inverse*, *ismith*, *issimilar*, *iszero*, *jacobian*, *jordan*, *kernel*, *laplacian*, *leastsqrs*, *linsolve*, *matadd*, *matrix*, *minor*, *minpoly*, *mulcol*, *mulrow*, *multiply*, *norm*, *normalize*, *nullspace*, *orthog*, *permanent*, *pivot*, *potential*, *randmatrix*, *randvector*, *rank*, *ratform*, *row*, *rowdim*, *rowspace*, *rowspan*, *rref*, *scalarmul*, *singularvals*, *smith*, *stackmatrix*, *submatrix*, *subvector*, *sumbasis*, *swapcol*, *swaprow*, *sylvester*, *toeplitz*, *trace*, *transpose*, *vandermonde*, *vecpotent*, *vectdim*, *vector*, *wronskian*] **(20)**

```
> A := matrix([[1, 2, -1], [0, 1, 0], [3, -1, 2]])
```

(21)

$$A := \begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 0 \\ 3 & -1 & 2 \end{bmatrix} \quad (21)$$

> $B := matrix([[1, 2, 3], [1, 1, 2], [2, 1, 1]])$

$$B := \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 2 \\ 2 & 1 & 1 \end{bmatrix} \quad (22)$$

> $C := matrix([[2, 1, 1], [0, 1, -1], [4, 2, 2]])$

$$C := \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & -1 \\ 4 & 2 & 2 \end{bmatrix} \quad (23)$$

> $evalm(2 \cdot A - B \&* C)$

$$\begin{bmatrix} -12 & -5 & -7 \\ -10 & -4 & -4 \\ -2 & -7 & 1 \end{bmatrix} \quad (24)$$

> $evalm(B^{(-1)})$

$$\begin{bmatrix} -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} \\ \frac{3}{2} & -\frac{5}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{3}{2} & -\frac{1}{2} \end{bmatrix} \quad (25)$$

> $eigenvals(C)$

$$0, 3, 2 \quad (26)$$

> $eigenvects(C)$

$$[0, 1, \{[-1 \quad 1 \quad 1]\}], [2, 1, \{[1 \quad -2 \quad 2]\}], [3, 1, \{[-1 \quad 1 \quad -2]\}] \quad (27)$$

>