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

$$11 \quad (1)$$

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

$$11 \quad (2)$$

```
> 2^10
```

$$1024 \quad (3)$$

```
> sin(0.1)
```

$$0.09983341665 \quad (4)$$

```
> (a+b)*(a-b)
```

$$(a+b)\,(a-b) \quad (5)$$

```
> expand((a+b)*(a-b))
```

$$a^2 - b^2 \quad (6)$$

```
> y:=x->3*(x^3)+2*(x^2)-5
```

$$y := x \mapsto 3\cdot x^3 + 2\cdot x^2 - 5 \quad (7)$$

```
> diff(y(x),x)
```

$$9\,x^2 + 4\,x \quad (8)$$

```
> y:=x->sqrt(1+x^4)
```

$$y := x \mapsto \sqrt{1+x^4} \quad (9)$$

```
> diff(y(x),x)
```

$$\frac{2\,x^3}{\sqrt{x^4+1}} \quad (10)$$

```
> y:=x->(exp(x))*(sin(x))*(cos(x))
```

$$y := x \mapsto e^x\cdot\sin(x)\cdot\cos(x) \quad (11)$$

```
> diff(y(x),x)
```

$$e^x \sin(x)\cos(x) + e^x \cos(x)^2 - e^x \sin(x)^2 \quad (12)$$

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

$$-\frac{43}{12} \quad (13)$$

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

$$\infty \quad (14)$$

```
> int(exp((-1)*x^2),x =-infinity..infinity)
```

$$\sqrt{\pi} \quad (15)$$

```
> evalf(%)
```

$$1.772453851 \quad (16)$$

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

$$1 \quad (17)$$

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

$$\frac{1}{2} \quad (18)$$

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

$$0 \qquad (19)$$

```
> 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, listcontplot3d, listdensityplot, listplot, listplot3d, loglogplot, logplot, matrixplot, multiple, odeplot, pareto, plotcompare, pointplot, pointplot3d, polarplot, polygonplot, polygonplot3d, polyhedra_supported, polyhedraplot, rootlocus, semilogplot, setcolors, setoptions, setoptions3d, shadebetween, spacecurve, sparsematrixplot, surfdata, textplot, textplot3d, tubeplot*] (20)

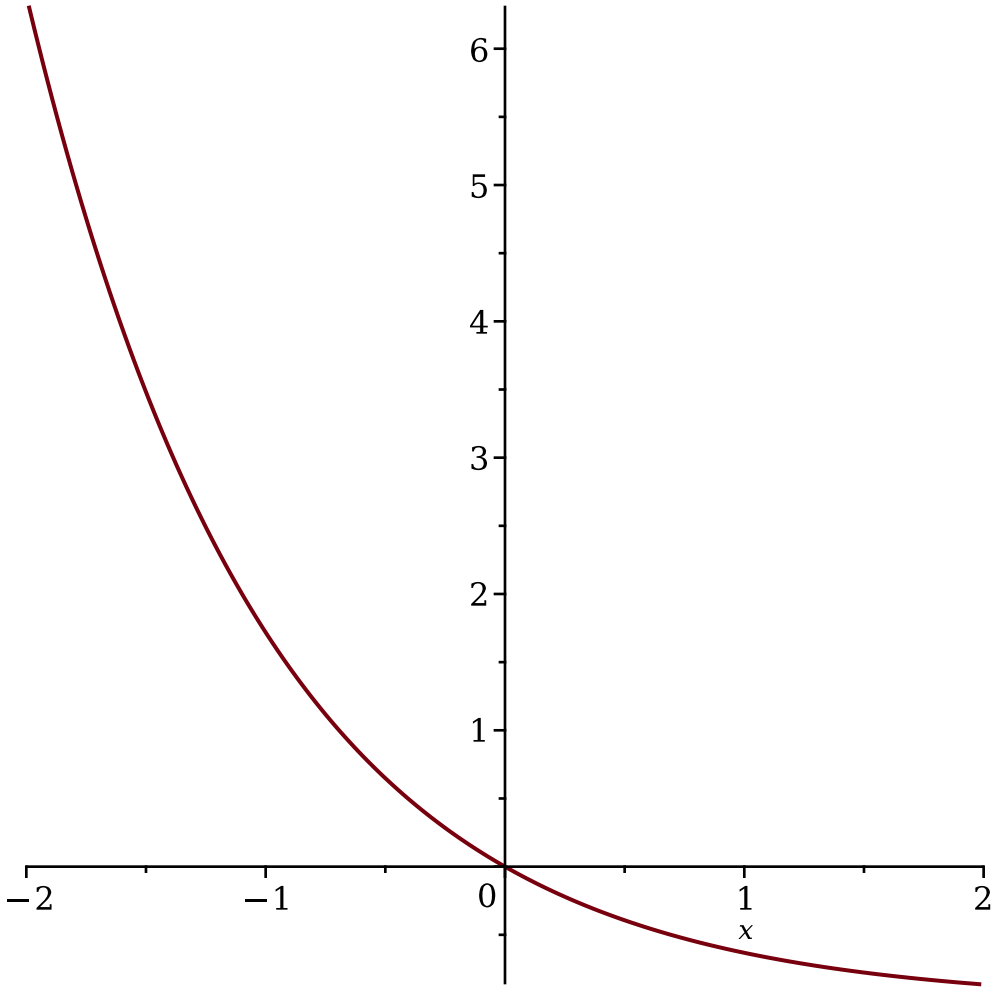
```
> f:=x->exp(-x)-1
```

$$f := x \mapsto e^{-x} - 1 \qquad (21)$$

```
> 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, listcontplot3d, listdensityplot, listplot, listplot3d, loglogplot, logplot, matrixplot, multiple, odeplot, pareto, plotcompare, pointplot, pointplot3d, polarplot, polygonplot, polygonplot3d, polyhedra_supported, polyhedraplot, rootlocus, semilogplot, setcolors, setoptions, setoptions3d, shadebetween, spacecurve, sparsematrixplot, surfdata, textplot, textplot3d, tubeplot*] (22)

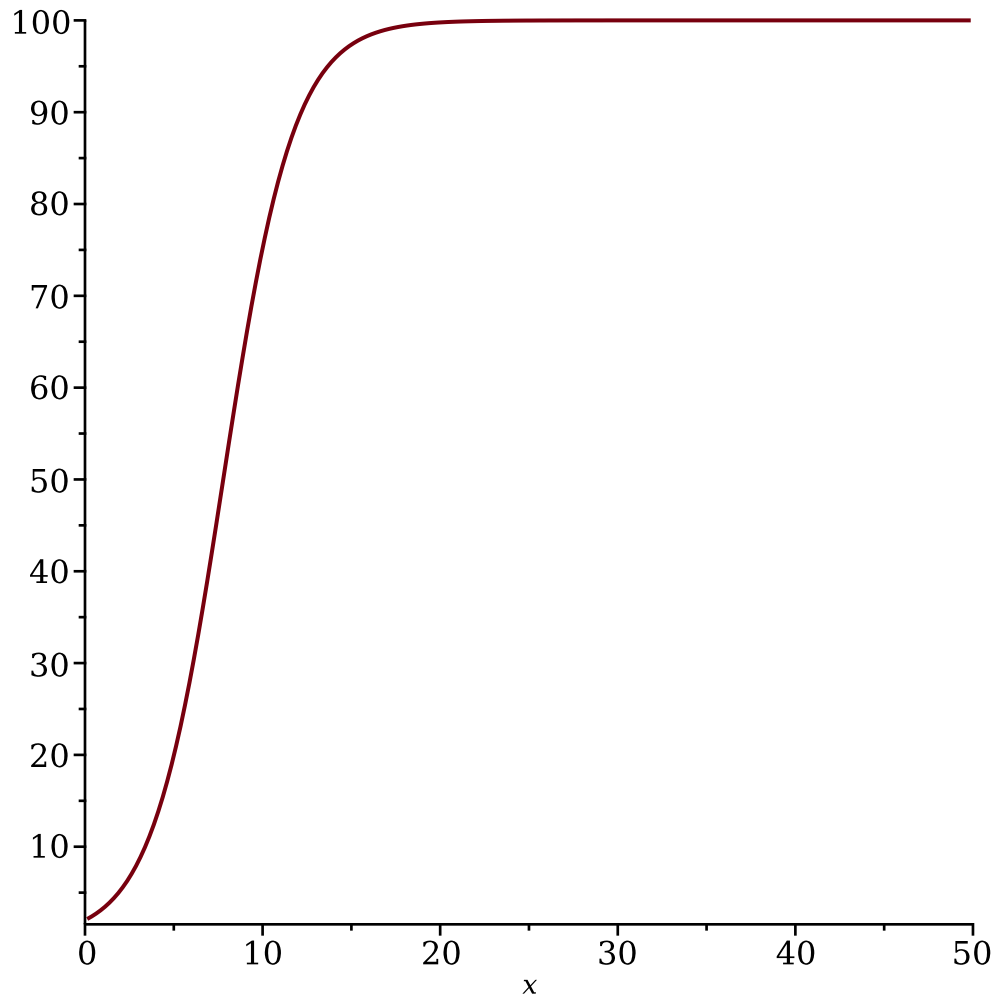
```
> plot(f(x),x=-2..2)
```




```
> f:=(x,r)->(200*exp(r*x))/(2*(exp(r*x)-1)+100)
```

$$f := (x, r) \mapsto \frac{200 \cdot e^{r \cdot x}}{2 \cdot e^{r \cdot x} + 98} \qquad (23)$$

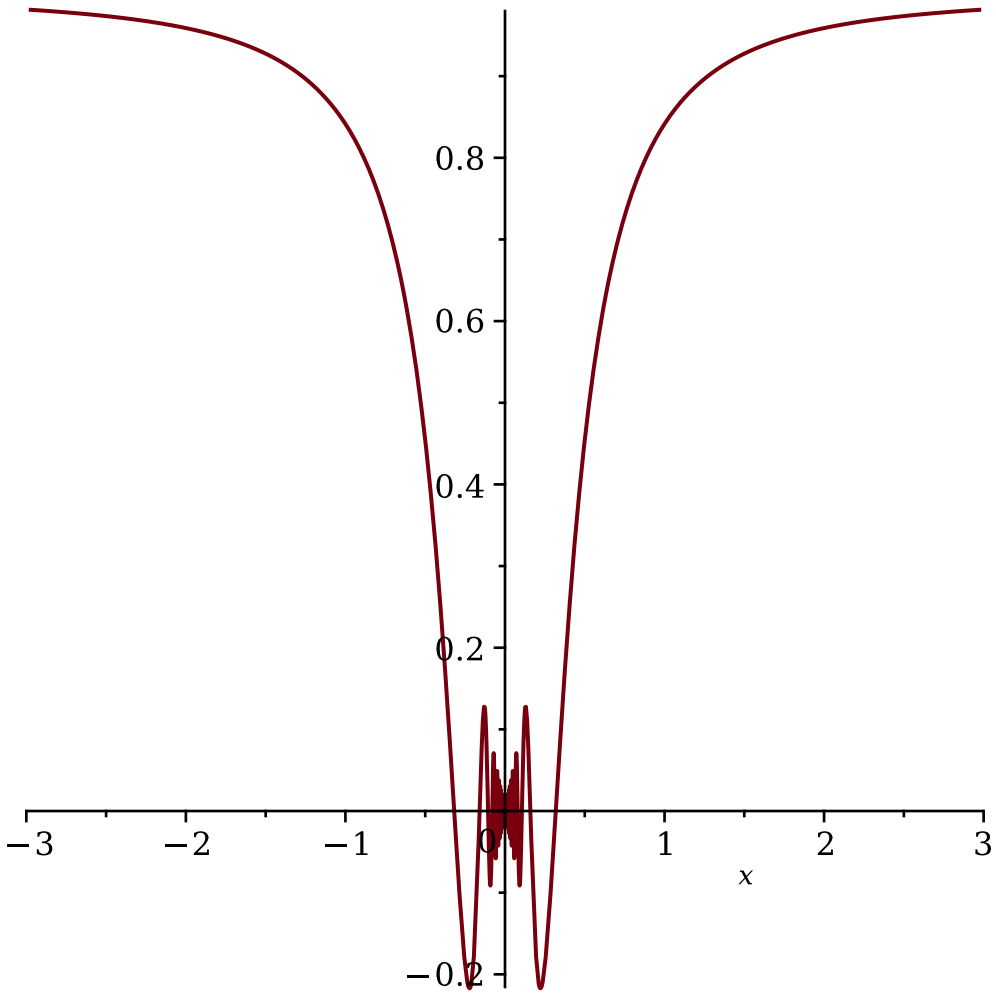
```
> plot(f(x,0.5),x=0..50)
```




```
> f:=x->x*sin(1/x)
```

$$f := x \mapsto x \cdot \sin\left(\frac{1}{x}\right) \tag{24}$$

```
> plot(f(x),x=-3..3)
```



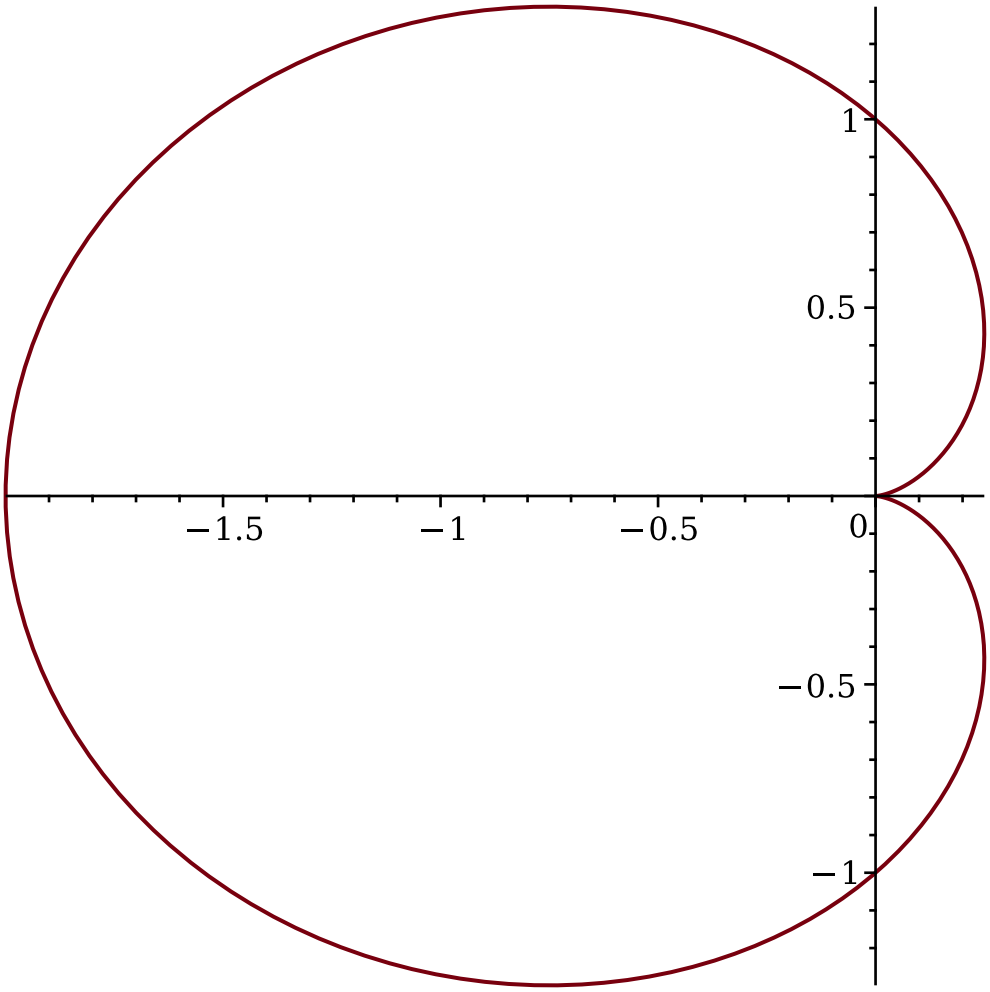

```
> x:=t->(1-cos(t))*cos(t)
```

$$x := t \mapsto (1 - \cos(t)) \cdot \cos(t) \qquad (25)$$

```
> y:=t->(1-cos(t))*sin(t)
```

$$y := t \mapsto (1 - \cos(t)) \cdot \sin(t) \qquad (26)$$

```
> plot([x(t),y(t),t=0..2*Pi])
```



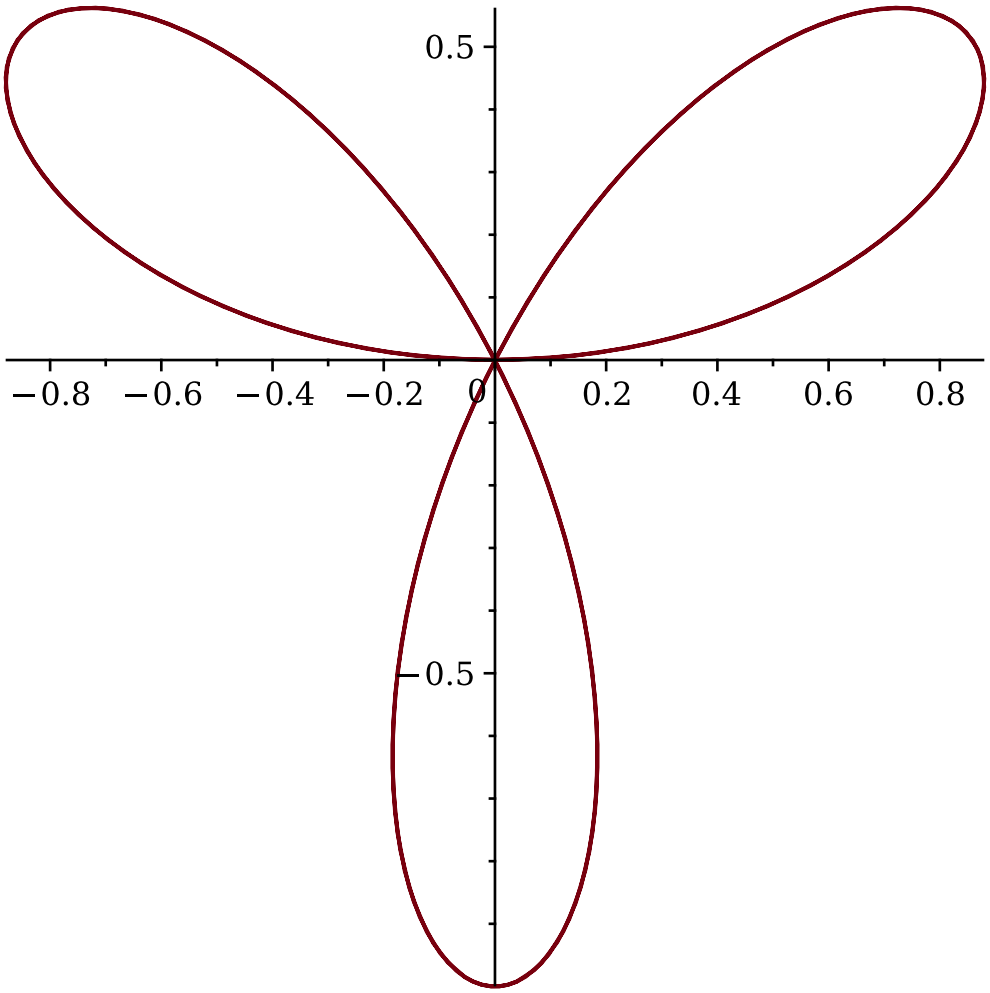

```
> x:=t->sin(3*t)*cos(t)
```

$$x := t \mapsto \sin(3 \cdot t) \cdot \cos(t) \qquad (27)$$

```
> y:=t->sin(3*t)*sin(t)
```

$$y := t \mapsto \sin(3 \cdot t) \cdot \sin(t) \qquad (28)$$

```
> plot([x(t),y(t),t=0..2*Pi])
```



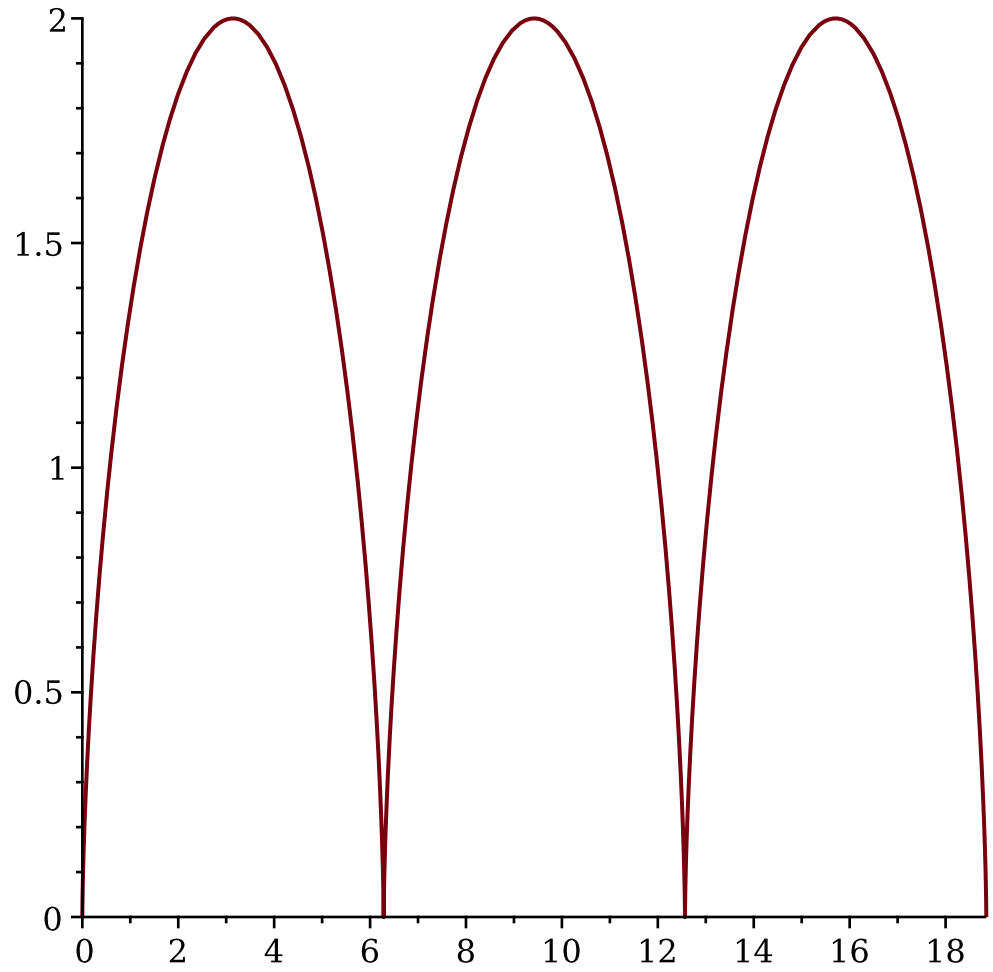

```
> x:=t->t-sin(t)
```

$$x := t \mapsto t - \sin(t) \qquad (29)$$

```
> y:=t->1-cos(t)
```

$$y := t \mapsto 1 - \cos(t) \qquad (30)$$

```
> plot([x(t),y(t),t=0..6*Pi])
```




```
> f:=(t,s)->(s*cos(4*t)*cos(t))/sqrt(1-s^2*cos(4*t)^2*sin(t)^2)
```

$$f := (t, s) \mapsto \frac{s \cdot \cos(4 \cdot t) \cdot \cos(t)}{\sqrt{1 - s^2 \cdot \cos(4 \cdot t)^2 \cdot \sin(t)^2}} \quad (31)$$

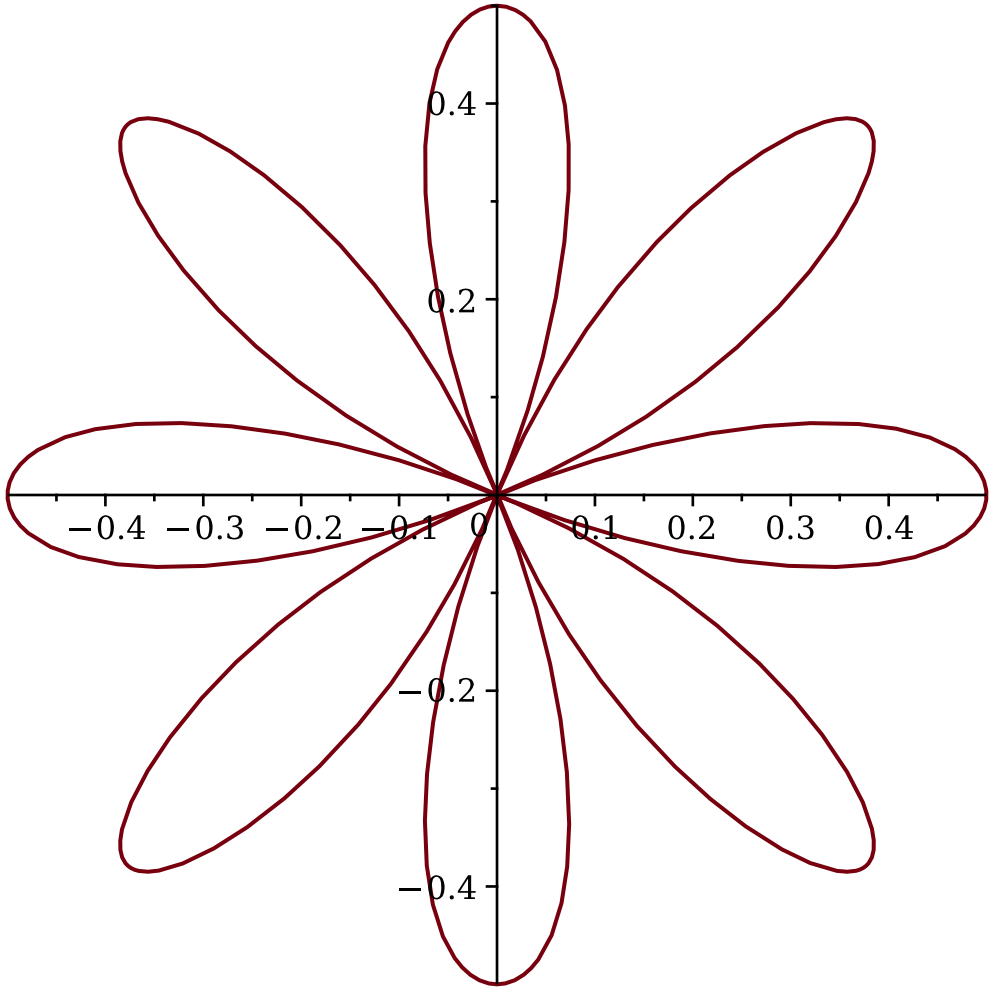
```
> x:=t->f(t-Pi/2,0.5)
```

$$x := t \mapsto f\left(t - \frac{\pi}{2}, 0.5\right) \quad (32)$$

```
> y:=t->f(t,0.5)
```

$$y := t \mapsto f(t, 0.5) \quad (33)$$

```
> plot([x(t),y(t),t=0..2*Pi])
```




```
> list_f:=[f(t-Pi/2,s/10),f(t,s/10),t=0..2*Pi]$s=1..10;
```

$$list\_f := \left[\frac{\cos(4t)\sin(t)}{\sqrt{100-\cos(4t)^2\cos(t)^2}}, \frac{\cos(4t)\cos(t)}{\sqrt{100-\cos(4t)^2\sin(t)^2}}, t=0..2\pi\right], \quad (34)$$

$$\left[\frac{2\cos(4t)\sin(t)}{\sqrt{100-4\cos(4t)^2\cos(t)^2}}, \frac{2\cos(4t)\cos(t)}{\sqrt{100-4\cos(4t)^2\sin(t)^2}}, t=0..2\pi\right],$$

$$\left[\frac{3\cos(4t)\sin(t)}{\sqrt{100-9\cos(4t)^2\cos(t)^2}}, \frac{3\cos(4t)\cos(t)}{\sqrt{100-9\cos(4t)^2\sin(t)^2}}, t=0..2\pi\right],$$

$$\left[\frac{4\cos(4t)\sin(t)}{\sqrt{100-16\cos(4t)^2\cos(t)^2}}, \frac{4\cos(4t)\cos(t)}{\sqrt{100-16\cos(4t)^2\sin(t)^2}}, t=0..2\pi\right],$$

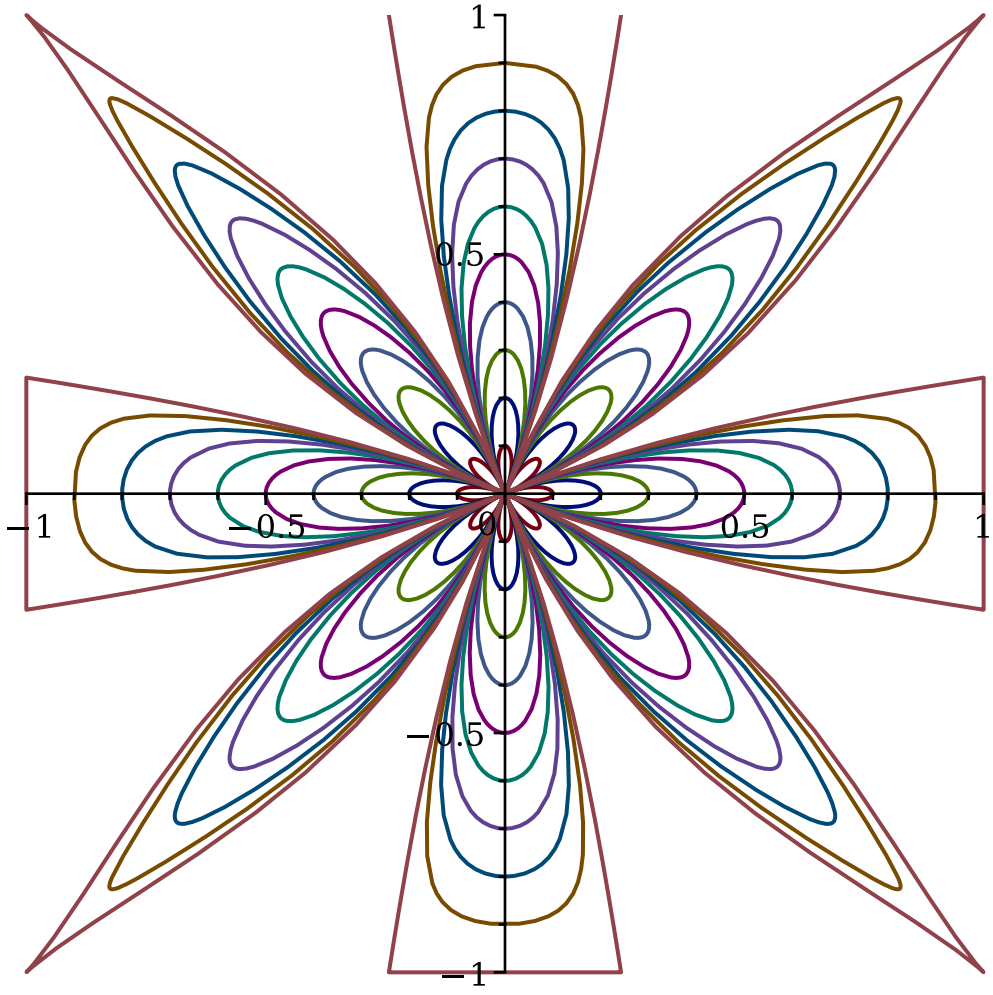
$$\left[\frac{5\cos(4t)\sin(t)}{\sqrt{100-25\cos(4t)^2\cos(t)^2}}, \frac{5\cos(4t)\cos(t)}{\sqrt{100-25\cos(4t)^2\sin(t)^2}}, t=0..2\pi\right],$$

$$\left[\frac{6\cos(4t)\sin(t)}{\sqrt{100-36\cos(4t)^2\cos(t)^2}}, \frac{6\cos(4t)\cos(t)}{\sqrt{100-36\cos(4t)^2\sin(t)^2}}, t=0..2\pi\right],$$

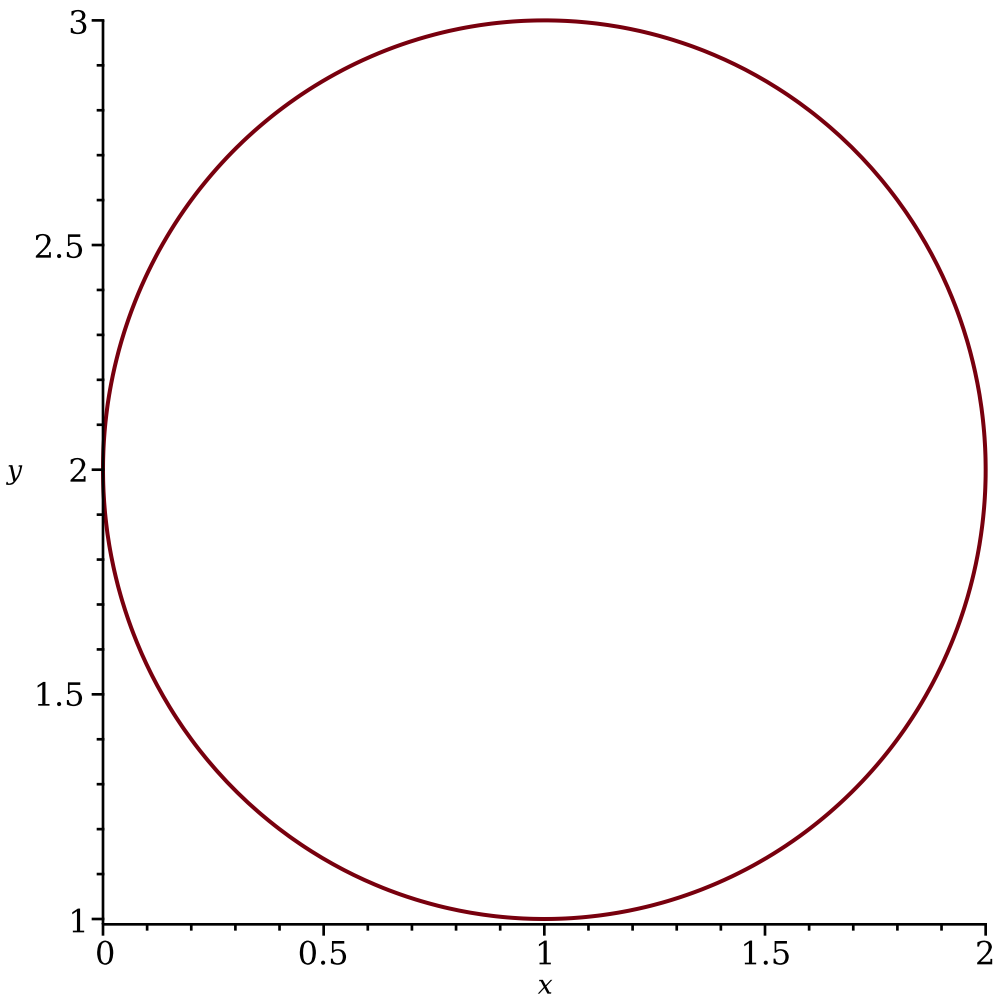
$$\left[\frac{7\cos(4t)\sin(t)}{\sqrt{100-49\cos(4t)^2\cos(t)^2}}, \frac{7\cos(4t)\cos(t)}{\sqrt{100-49\cos(4t)^2\sin(t)^2}}, t=0..2\pi\right],$$

$$\left[\frac{8\cos(4t)\sin(t)}{\sqrt{100-64\cos(4t)^2\cos(t)^2}},\frac{8\cos(4t)\cos(t)}{\sqrt{100-64\cos(4t)^2\sin(t)^2}},t=0..2\pi\right],$$
$$\left[\frac{9\cos(4t)\sin(t)}{\sqrt{100-81\cos(4t)^2\cos(t)^2}},\frac{9\cos(4t)\cos(t)}{\sqrt{100-81\cos(4t)^2\sin(t)^2}},t=0..2\pi\right],$$
$$\left[\frac{10\cos(4t)\sin(t)}{\sqrt{100-100\cos(4t)^2\cos(t)^2}},\frac{10\cos(4t)\cos(t)}{\sqrt{100-100\cos(4t)^2\sin(t)^2}},t=0..2\pi\right]$$

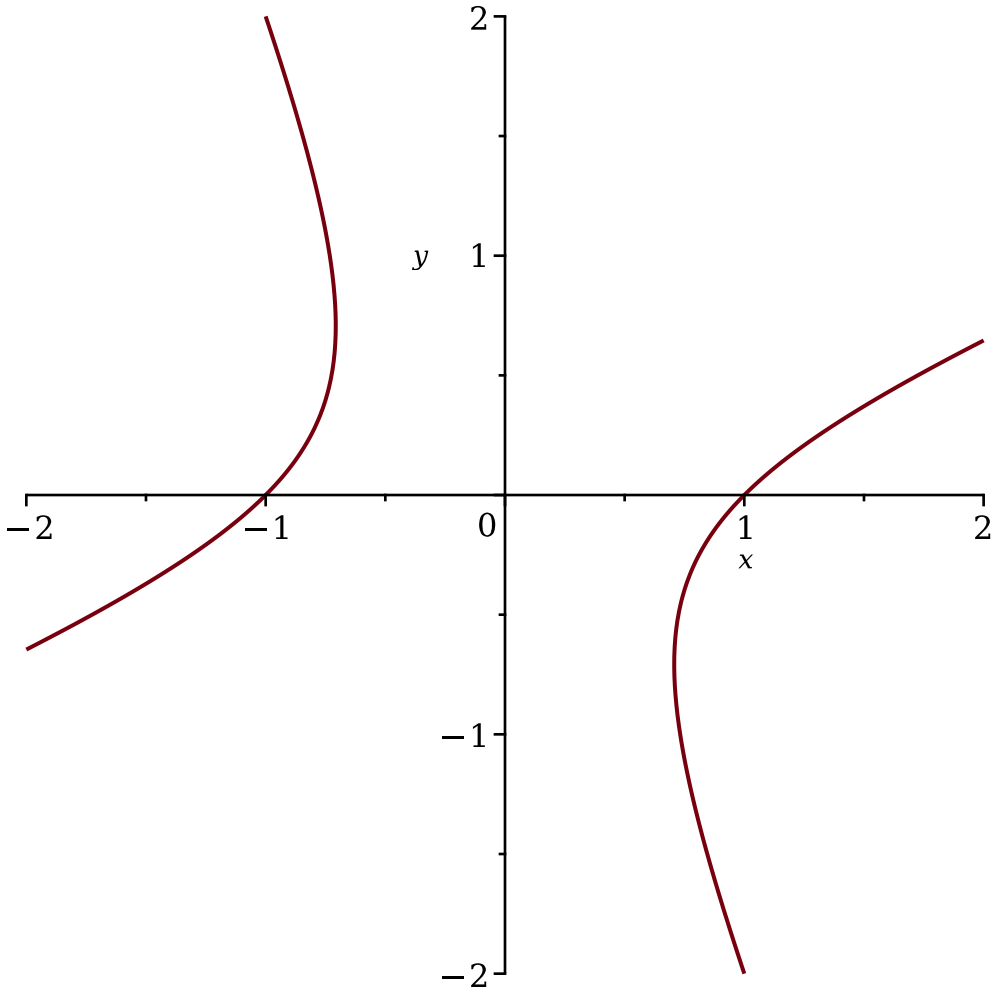
```
> plot([list_f]);
```




```
> implicitplot(x^2+y^2-2*x-4*y+4=0)
```



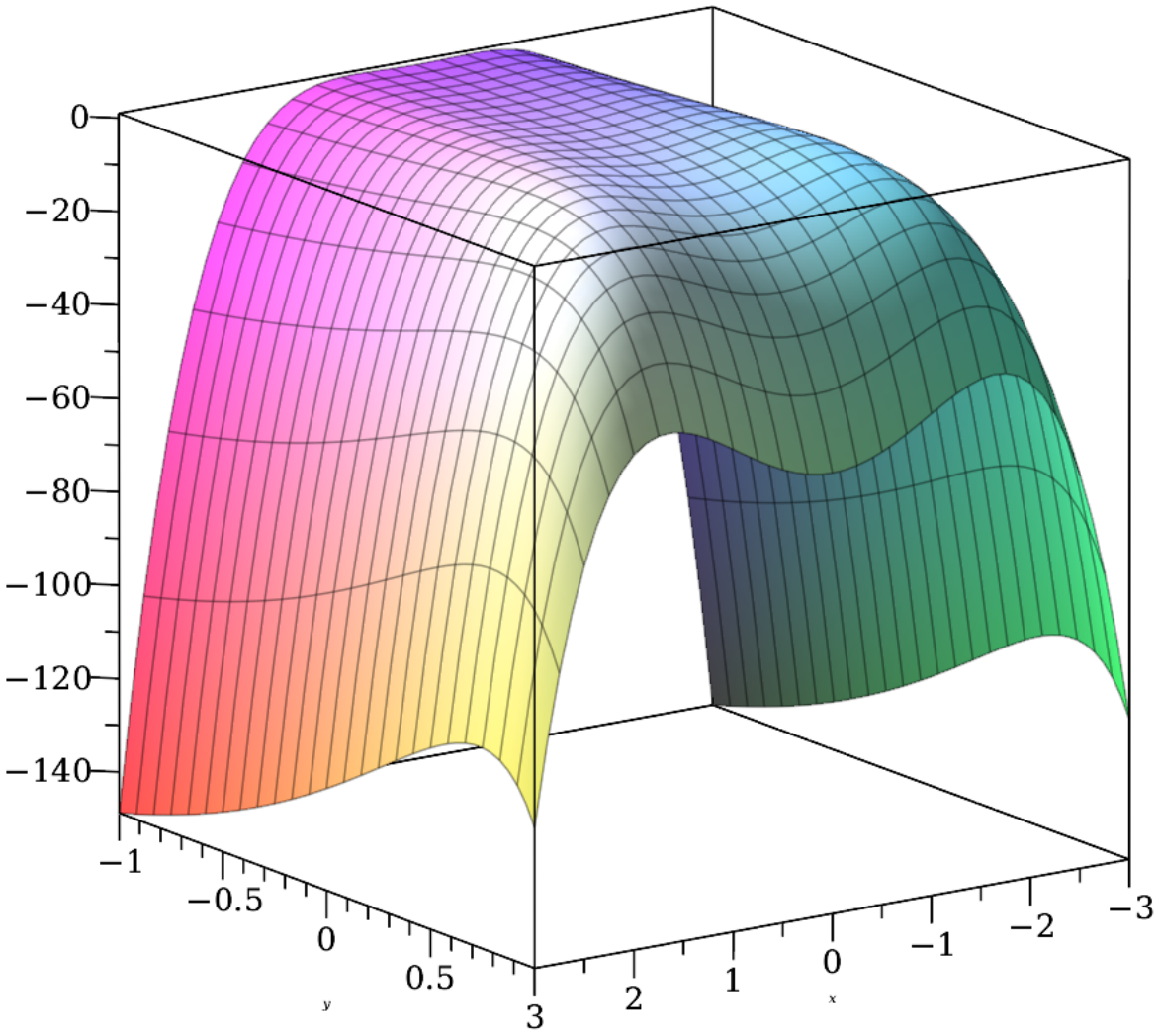

```
> implicitplot(x^2-2*x*y-y^2=1)
```




```
> z:=(x,y)->4*(x^2)*exp(y)-2*x^4-exp(4*y)
```

$$z := (x, y) \mapsto 4 \cdot x^2 \cdot e^y - 2 \cdot x^4 - e^{4 \cdot y} \qquad (35)$$

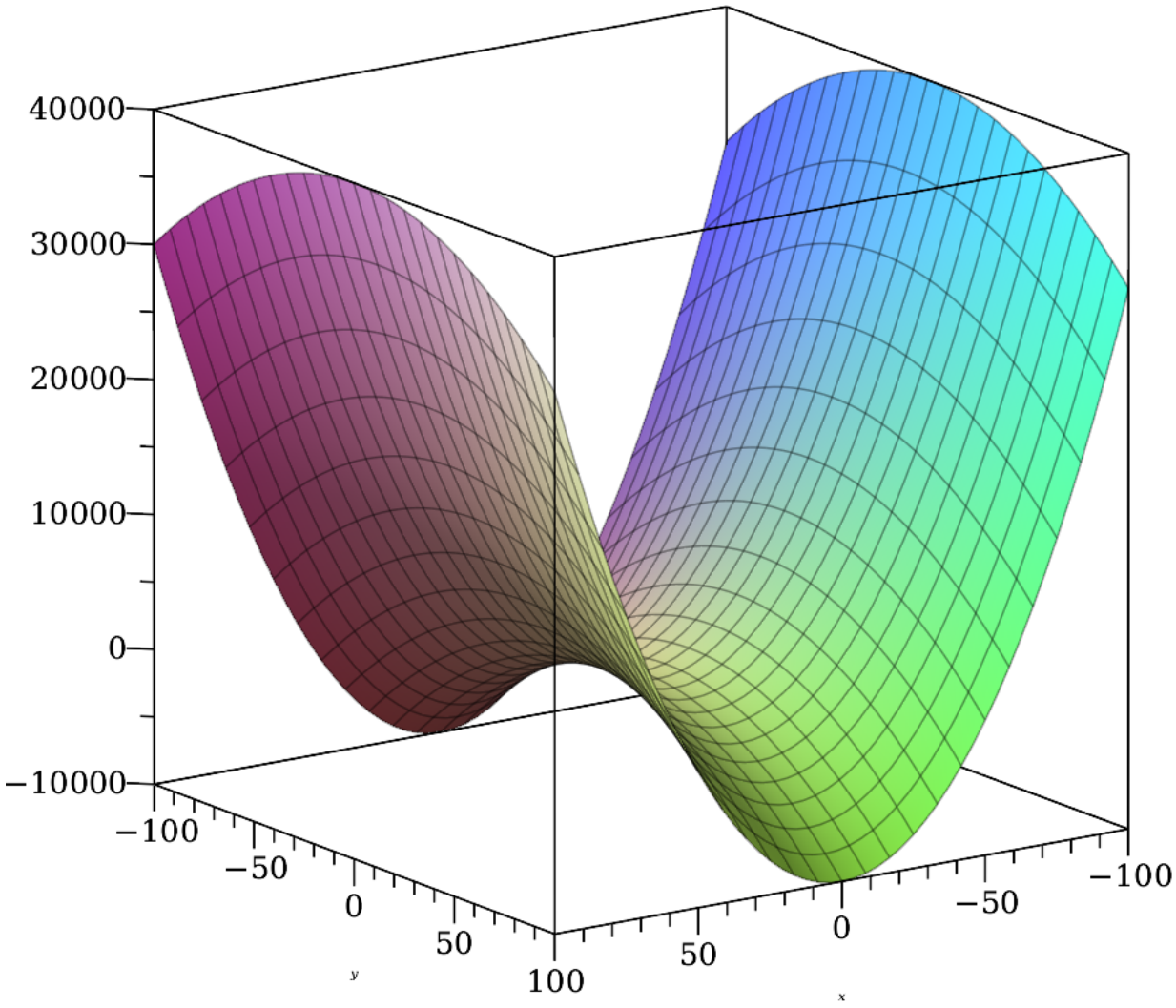
```
> plot3d(z(x,y),x=-3..3,y=-1..1)
```




```
> z:=(x,y)->4*x^2-y^2
```

$$z := (x, y) \mapsto 4 \cdot x^2 - y^2 \qquad (36)$$

```
> plot3d(z(x,y),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, colspan, 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,*

(37)

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]

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

$$A := \begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 0 \\ 3 & -1 & 2 \end{bmatrix} \quad (38)$$

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

$$B := \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 2 \\ 2 & 1 & 1 \end{bmatrix} \quad (39)$$

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

$$C := \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & -1 \\ 4 & 2 & 2 \end{bmatrix} \quad (40)$$

```
> evalm(2*A-B&*C)
```

$$\begin{bmatrix} -12 & -5 & -7 \\ -10 & -4 & -4 \\ -2 & -7 & 1 \end{bmatrix} \quad (41)$$

```
> evalm(B^(-1))
```

$$\begin{bmatrix} -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} \\ \frac{3}{2} & -\frac{5}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{3}{2} & -\frac{1}{2} \end{bmatrix} \quad (42)$$

```
> eigenvals(C)
```

$$0, 3, 2 \quad (43)$$

```
> eigenvects(C)
```

$$\left[2, 1, \left\{\left[\begin{matrix} 1 & -2 & 2 \end{matrix}\right]\right\}\right], \left[3, 1, \left\{\left[\begin{matrix} -1 & 1 & -2 \end{matrix}\right]\right\}\right], \left[0, 1, \left\{\left[\begin{matrix} -1 & 1 & 1 \end{matrix}\right]\right\}\right] \quad (44)$$