```
> f := sin(x);
```

$$f := \sin(x) \tag{1}$$

```
> evalf(Pi, 15);
```

$$3.14159265358979 \tag{2}$$

```
> evalf(exp(1));
```

$$2.718281828 \tag{3}$$

```
> f1 := a·x^2 + 2·x - 1;
```

$$f1 := a\,x^2 + 2\,x - 1 \tag{4}$$

```
> subs(x = 1, f1);
```

$$a + 1 \tag{5}$$

```
> subs(a = 2, x = 1, f1);
```

$$3 \tag{6}$$

```
> f2 := exp(a + ln(b·exp(c)));
```

$$f2 := e^{a + \ln(b\,e^{c})} \tag{7}$$

```
> simplify(f2);
```

$$b\,e^{c + a} \tag{8}$$

```
> f3 := 4^(1/2);
```

$$f3 := \sqrt{4} \tag{9}$$

```
> simplify(f3, power);
```

$$2 \tag{10}$$

```
> f4 := sin(x)^2 + cos(x)^2;
```

$$f4 := \sin(x)^2 + \cos(x)^2 \tag{11}$$

```
> simplify(f4, trig);
```

$$1 \tag{12}$$

```
> f5 := sqrt(x^2);
```

$$f5 := \sqrt{x^2} \tag{13}$$

```
> simplify(f5)
```

$$\mathrm{csgn}(x)\,x \tag{14}$$

```
> simplify(f5, assume = real);
```

$$|x| \tag{15}$$

```
> simplify(f5, assume = positive);
```

$$x \tag{16}$$

```
> bin1 := (a + b)^3
```

$$bin1 := (a + b)^3 \tag{17}$$

```
> res := expand(bin1);
```

$$res := a^3 + 3\,a^2\,b + 3\,a\,b^2 + b^3 \tag{18}$$

> $factor(res)$

$$(a + b)^3 \tag{19}$$

> $ec1 := a \cdot x^2 + b \cdot x + c;$

$$ec1 := a\,x^2 + b\,x + c \tag{20}$$

> $solve(ec1, x);$

$$\frac{-b + \sqrt{-4\,a\,c + b^2}}{2\,a}, \; -\frac{b + \sqrt{-4\,a\,c + b^2}}{2\,a} \tag{21}$$

> $ec2 := x \cdot \ln(x) + 5 \cdot x = 0;$

$$ec2 := x\,\ln(x) + 5\,x = 0 \tag{22}$$

> $solve(ec2, x);$

$$\frac{1}{e^5} \tag{23}$$

> $ec3 := (x - 3 \cdot I) \cdot (x + 3 \cdot I);$

$$ec3 := (x - 3\,\mathrm{I})\,(x + 3\,\mathrm{I}) \tag{24}$$

> $expand(ec3);$

$$x^2 + 9 \tag{25}$$

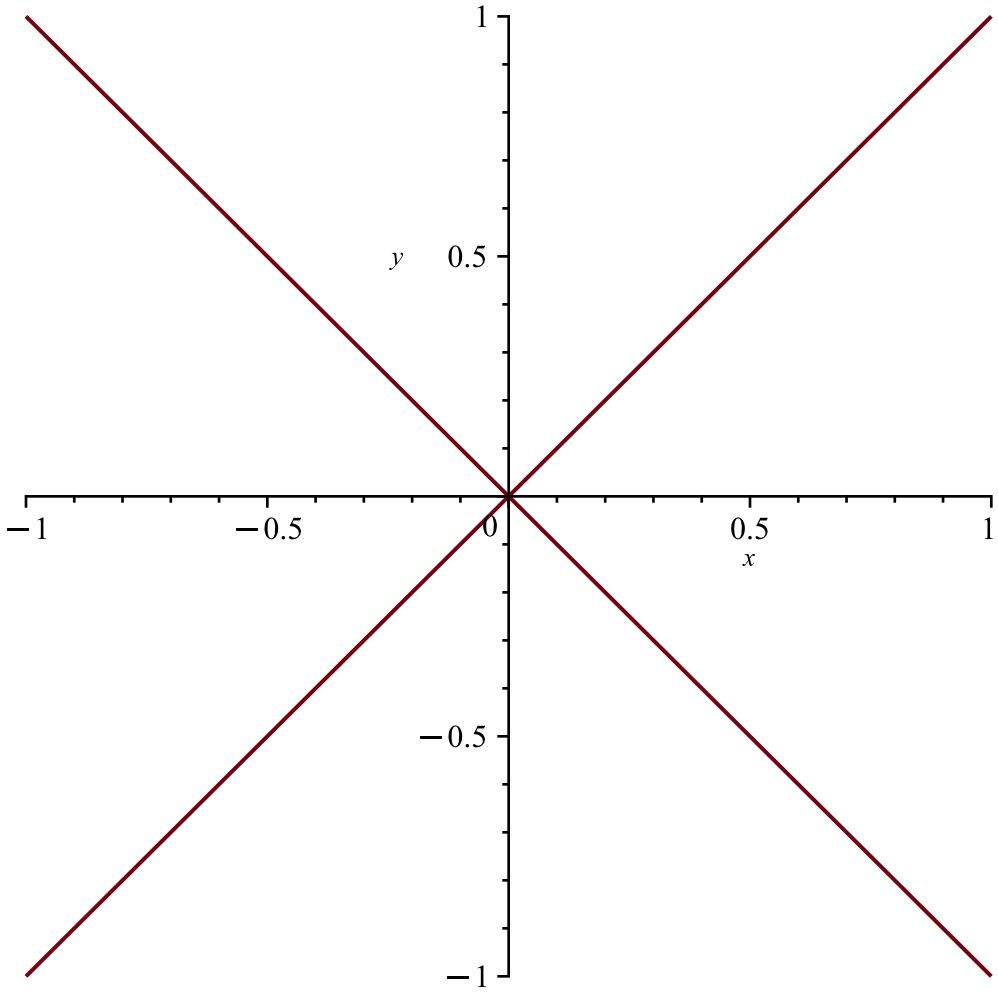
> $\ln(-3);$

$$\ln(3) + \mathrm{I}\,\pi \tag{26}$$

> $with(plots);$

[*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*] (27)

> $implicitplot(x^2 = y^2, x = -1..1, y = -1..1);$




```
> 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*] **(28)**

```
> v1 := [1, 2, 3];
```

$$v1 := [1, 2, 3] \quad \textbf{(29)}$$

```
> v2 := [1, 4, 2];
```

$$v2 := [1, 4, 2] \quad \textbf{(30)}$$

```
> pc := crossprod(v1, v2);
```

$$pc := \begin{bmatrix} -8 & 1 & 2 \end{bmatrix} \tag{31}$$

```
> pp := dotprod(v1, v2);
```

$$pp := 15 \tag{32}$$

```
> norm(v1, 2);
```

$$\sqrt{14} \tag{33}$$

```
> 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*] **(34)**

```
> f6 := x^4 + y^4 + 4·x·y
```

$$f6 := x^4 + y^4 + 4\,x\,y \tag{35}$$

```
> H := hessian(f6, [x, y]);
```

$$H := \begin{bmatrix} 12\,x^2 & 4 \\ 4 & 12\,y^2 \end{bmatrix} \tag{36}$$

```
> H;
```

$$H \tag{37}$$

```
> evalm(H);
```

$$\begin{bmatrix} 12\,x^2 & 4 \\ 4 & 12\,y^2 \end{bmatrix} \tag{38}$$

```
> H1 := subs(x = 1, y = -1, evalm(H) );
```

$$H1 := \begin{bmatrix} 12 & 4 \\ 4 & 12 \end{bmatrix} \tag{39}$$

```
> valores := eigenvalues(H1);
```

$$valores := 16, 8 \tag{40}$$

```
> f7 := x→piecewise(x ≥ 0 and x < 1, x, x > 1 and x < 2, 2 - x, 0);
```

(41)

$$f7 := x \mapsto \begin{cases} x & 0 \le x < 1 \\ 2 - x & 1 < x < 2 \\ 0 & otherwise \end{cases} \tag{41}$$