Miscellaneous

`Enter` or `Shift+Enter` evaluates a cell

`;`   End of command/Show output

`$`   End of command/Suppress output

`%`   Most recent output

`%th(5)`   5th previous output

`:`   Assignment e.g. $x: 2$ or $f: x^2 + 1$

`:=`   Function definition e.g. $f(x) := \sin(x)$

`'`   Prevents evaluation

`/* ... */`   Comments

`kill(...)`   Delete variables or expressions

Constants

`%pi` $\pi = 3.14159\ldots$

`%e` $e = 2.71828\ldots$

`%gamma`   Euler's constant, $\gamma = 0.5772\ldots$

`%i`   Imaginary unit, $i = \sqrt{-1}$

`%phi`   Golden ratio, $\phi = 1.618\ldots$

`inf`   Infinity, ∞

`minf`   Negative infinity, $-\infty$

Numerics

`float(x)`   Decimal form, 16 digits

`fpprec`   Floating-point precision

`bfloat(x)`   Decimal form, `fpprec` digits

Equations

`solve( x^2-3*x+2=0, x )`

`find_root( cos(x)=x, x, 0, 1 )`

`linsolve( [x+y=0, 2*x+3*y=2], [x,y] )`

`ode2( 'diff(y,x) = -x*y, y, x )`

`rhs( x^2+x=cos(x) )`   Right-hand side

Simplifying

`factor( x^2-3*x+2 )`

`expand( (x+3)*(2*x+1)^3 )`

`partfrac( 1/(x^2-x), x )`

`ratsimp( 1/x + 1/(x-1) )`

`radcan( sqrt(135) )`

`trigsimp( sin(5)^2 + cos(5)^2 )`

`trigreduce( cos(x)^3 )`

Evaluation/Substitution

`f(x):=x*sin(x); f(2)`

`subst( 2, x, f )`

`at( f, x=2 )`

Calculus

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

`limit( abs(x)/x, x, 0, plus )`

`diff( f, x )`

`diff( f, x, 2 )`

`depends( y, x ); diff( x*y=sin(x), x );`
`        solve( %, 'diff( y, x ) )`

`integrate( g, x )`

`integrate( g, x, 0, 5 )`

`sum( 1/k, k, 1, 25 )`

`taylor( exp(x), x, 0, 6 )`

Vectors & the vect1 package

Must load vect1 package

`u: [1,2,3];  v: [-1,0,3]`

`norm( u )`   Magnitude

`normalize( u )`   Unit vector

`dot( u, v )`

`cross( u, v )`

`angle( u, v )`

`proj( u, v )` $\operatorname{proj}_v u$

Plotting

`plot2d( sin(x), [x,-5,5] )`

`plot2d( [sin(x),cos(x)], [x,-3,3] )`

`plot3d( x^2-3*sin(x)*y, [x,-5,5], [y,-5,5] )`

Matrices & lists

`x: [3,6,9,12,15]`

`x[2]`   Element 2 of list x

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

`A[i][j]` ij-element of A

`A+B`   Matrix addition

`A.B`   Matrix multiplication

`A^^(-1)`   Matrix inverse

`determinant(A)`