General Description	**Maple command**	*Example* *Input*	*Output*
Basic mathematical operations and constants			
Command termination	`;`	`>2+2;`	4
Suppressing output	`:`	`>2+2:`	
Math operations (**never** omit the multiplication symbol)	`+, -, *, /`	`>2*3+9^2;` `>33/6;`	87 $\frac{11}{2}$
Conversion to decimals	`evalf()`	`>evalf(33/6);`	5.500000000
π	`Pi`	`>evalf(Pi);`	3.141592654
e	`exp(1)`	`>evalf(exp(1));`	2.718281828
Elementary functions			

$\sqrt{x}, \sin(x), \cos(x), e^x, \ln(x)$, etc.	`sqrt(x),`
	`sin(x),`
	`cos(x),`
	`exp(x),`
	`ln(x),...`
		`>sqrt(18);`
		`>evalf(sqrt(18));`
		`>sin(3*Pi/4);`
		
		`>arcsin(sqrt(2)/2);`
			$3\sqrt{2}$
			4.242640686
			$\frac{1}{2}\sqrt{2}$
			
			$\frac{1}{4}\pi$

Defining your own functions and expressions			

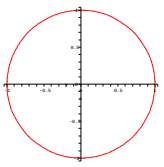
Expressions	`:=`	`>y:=x^2;`
		`>y;`
		`>eval(y,{x=2});`
		`>subs({x=-3},y);`
			x^2
			x^2
			4
			9

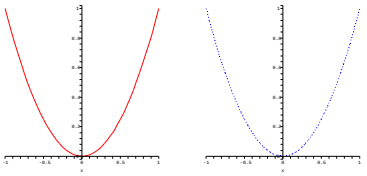
Functions	`->`	`>f:=x->x^2;`
		`>f(x);`
		`>f(4);`
			x^2
			x^2
			16

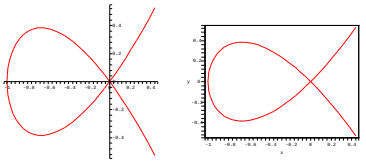
Differentiation and integration			

Differentiation	`diff`	`>diff(x^2,x);`
		`>diff(x^2 + y^3,x);`
		`>diff(x^2 + y^3,y);`
			$2x$
			$2x$
			$3y^2$

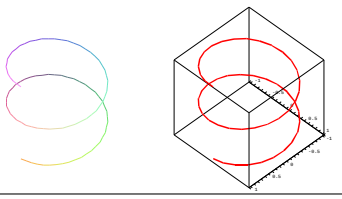
Integration
Definite: $\int_0^{\pi} x \sin x \, dx$
Iterated: $\int_0^1 \int_0^{x^2} y \, dy \, dx$
	`int`	`>int(sin(x),x);`
		`>int(x*sin(x),x=0..Pi);`
		
		`>int(int(y,y=0..x^2),x=0..1);`
			$-\cos(x)$
			π
			
			$\frac{1}{10}$

Solving equations and systems of equations			
Equations Systems: $\begin{cases} x+y &= 3 \\ x-y &= 7 \end{cases}$	`solve`	`>solve(x^2=4,x);` `>solve({x+y=3,x-y=7},{x,y});`	$2, -2$ $\{x=5, y=-2\}$
Defining the intervals of change of variables (for plotting, integration, etc)			
$a \le x \le b$	`..`	`>x:=a..b;`	$a..b$
Working with packages (e.g., many plotting functions are in the `plots` *package)*			
Including the `plots` package	`with`	`>with(plots):`	
Plotting plane curves			
Equations Useful options: `color` (`red`, `blue`, `green`, `yellow`, etc), `axes` (`boxed` or `normal`), `thickness`, `linestyle` (`solid`, `dot`, `dash`, `dashdot`), `scaling`, `labels`, `title`, etc.	`implicitplot`	`>implicitplot(x^2+y^2=1,` `x=-1..1,y=-1..1);`	

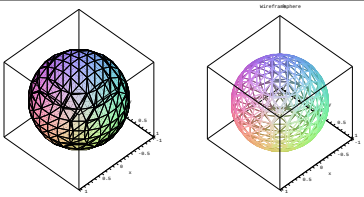
Graphs
Useful options: `color` (`red`, `blue`, `green`, `yellow`, etc), `axes` (`boxed` or `normal`), `thickness`, `linestyle` (`solid`, `dot`, `dash`, `dashdot`), `scaling`, `labels`, `title`, etc.
	`plot`
	
	`color`
	`thickness`
	`linestyle`
		`>plot(x^2, x=-1..1);`
		`>plot(x^2,x=-1..1,color=blue,`
		`thickness=2,`
		`linestyle=DASHDOT);`
			

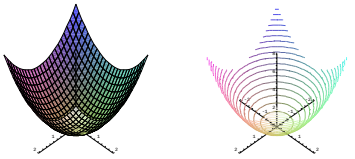
Parametric curves
Useful options: `color` (`red`, `blue`, `green`, `yellow`, etc), `axes` (`boxed` or `normal`), `thickness`, `linestyle` (`solid`, `dot`, `dash`, `dashdot`), `scaling`, `labels`, `title`, etc.
	`plot`
	
	`scaling`
	`axes`
	`labels`
		`>plot([t^2-1,t^3-t,`
		`t=-1.2..1.2]);`
		`> plot([t^2-1,t^3-t,`
		`t=-1.2..1.2],`
		`scaling=constrained,`
		`axes=boxed,labels=["x","y"]);`
			

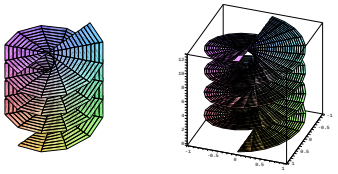
Plotting space curves			

Parametric curves
Useful options: `color` (`red`, `blue`, `green`, `yellow`, etc), `axes` (`boxed` or `normal`), `thickness`, `linestyle` (`solid`, `dot`, `dash`, `dashdot`), `scaling`, `labels`, `title`, etc.
	`spacecurve`
	
	`color`
	`thickness`
	`axes`
		`>spacecurve([cos(t),sin(t),t], t=0..4*Pi);`
		`>spacecurve([cos(t),sin(t),t], t=0..4*Pi, thickness=3, color=red,axes=boxed);`
			

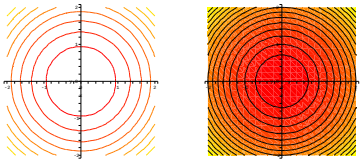
Plotting surfaces			

Equations
Useful options: `color`, `axes`, `style` (`wireframe`, `patchnogrid`, `contour`, `patchcontour`), `scaling`, `numpoints`, `orientation`, `labels`, `title`, etc.
	`implicitplot3d`
	
	`axes`
	`style`
	`title`
		`>implicitplot3d(x^2+y^2+z^2=1, x=-1..1,y=-1..1,z=-1..1, axes=boxed);`
		`>implicitplot3d(x^2+y^2+z^2=1, x=-1..1,y=-1..1, z=-1..1, axes=boxed, style=wireframe, title="Wireframe sphere");`
			

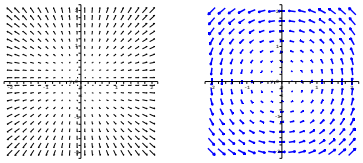
Graphs
Useful options: `color`, `axes`, `style` (`wireframe`, `patchnogrid`, `contour`, `patchcontour`), `scaling`, `numpoints`, `orientation`, `labels`, `title`, etc.
	`plot3d`
	
	`axes`
	`style`
		`>plot3d(x^2+y^2,x=-2..2, y=-2..2,axes=normal);`
		`>plot3d(x^2+y^2,x=-2..2, y=-2..2,axes=normal, style=contour,contours=20);`
			

Parametric surfaces
Useful options: `color`, `axes`, `style` (`wireframe`, `patchnogrid`, `contour`, `patchcontour`), `scaling`, `numpoints`, `orientation`, `labels`, `title`, etc.
	`plot3d`
	
	`axes`
	`numpoints`,
	`orientation`
		`>plot3d([u*cos(v),u*sin(v),v], u=-1..1,v=0..4*Pi);`
		`>plot3d([u*cos(v),u*sin(v),v], u=-1..1,v=0..4*Pi, axes=boxed, numpoints=2000, orientation=[20,60]);`
			

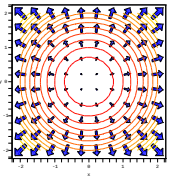
Plotting level curves			

Level curves
Useful options: `color`, `filled` (`true` or `false`), `contours` (either number of contours, `contours=20`, or level values, `contours=[-2,-1,0,3,5]`), etc.
	`contourplot`
	`contourplot3d`
	
	`contours`
	`filled`
		`>contourplot(x^2+y^2, x=-2..2,y=-2..2);`
		`>contourplot(x^2+y^2, x=-2..2,y=-2..2, contours=15,filled=true);`
			

Plotting vector fields			

Gradient fields ∇f
General vector fileds
Useful options: `color`, `scaling` (`constrained` or `unconstrained`), `arrows` (`LINE`, `THIN`, `SLIM`, `THICK`), `grid`, etc.
	`gradplot`
	`fieldplot`
	
	`contours`
	`filled`
		`>gradplot(x^2+y^2, x=-2..2,y=-2..2);`
		`>fieldplot([-y,x],x=-2..2, y=-2..2,grid=[15,15], thickness=3,arrows=SLIM, color=blue,scaling=constrained);`
			

Combining Plots			

Combining plots by first assigning them to expressions and then using the display command.
Important: Always use : when you assign plots to expressions.
Note: Both `[]` and {} can be used in the `display` command.
	`display`	`levels:=contourplot(x^2+y^2, x=-2..2,y=-2..2,contours=15):`
		`gf:=gradplot(x^2+y^2, x=-2..2, y=-2..2,color=blue, arrows=THICK,grid=[10,10]):`
		`>display([levels,gf],axes=boxed, scaling=constrained);`
			

It is also possible to combine plots directly in the `display` command.	`display`
	`display3d`
	
	`style`
	`color`
	`thickness`
	`axes`
	`scaling`
	`view`
	`orientation`
		`>display([`
		`plot3d(x^2-y^2,x=-2..2,y=-2..2, style=patchnogrid,color=yellow),`
		`implicitplot3d(x^2+y^2=1, x=-2..2,y=-2..2,z=-2..2, style=patchnogrid,color=green),`
		`spacecurve([cos(t),sin(t), cos(t)^2-sin(t)^2], t=0..2*Pi, color=red,thickness=4)],`
		`axes=boxed,scaling=constrained, view=[-2..2,-2..2,-2..2], orientation=[-55,65]);`