

Maple 11: A Quick Reference

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(Earlier editions for Maple 9, Maple 8, Maple 7, Maple 6, Maple V, Release 5, and Maple V, Release 4)

Symbols and Abbreviations

Symbol	Description	Example
<code>:=</code>	assignment	<code>f := x^2/y^3;</code>
<code>;</code>	terminate command; display result	<code>int(x^2, x);</code>
<code>:</code>	terminate command; hide result	<code>int(x^2, x):</code>
<code>..</code>	specify a range or interval	<code>plot(t*exp(-2*t), t=0..3);</code>
<code>{ }</code>	set delimiter (a set is an unordered list)	<code>{ y, x, y };</code>
<code>[]</code>	list delimiter (lists are ordered)	<code>[y, x, y];</code>
<code>%</code>	refers to previous result (percent) <i>Note:</i> Was " until Maple V, Release 5	<code>Int(exp(x^2), x=0..1):</code> <code>% = evalf(%);</code>
<code>" "</code> (see <code>?strings</code>)	string delimiter (double quote) <i>Note:</i> Changed in Maple V, Release 5 (see <code>%</code>)	<code>plot(sin(10*x) + 3*sin(x), x=0..2*Pi,</code> <code>title="An interesting plot");</code>
<code>` ``</code> (see <code>?names</code>)	name delimiter (back quote)	<code>`A name` := `This is a name.`;</code>
<code> </code> (see also <code>?cat</code>)	concatenate string or name <i>Note:</i> Was <code>.</code> prior to Maple 6	<code>a 3;</code> <code>a (1..3);</code>
<code>' '</code> (see <code>?uneval</code>)	delayed evaluation (single quote)	<code>x := 'x';</code>
<code>-></code> (see <code>?-></code> and <code>?proc</code>)	mapping (procedure) definition	<code>f := (x,y) -> x^2*sin(x-y);</code> <code>f(Pi/2,0);</code>
<code>@</code>	composition operator	<code>(cos@arcsin)(x);</code>
<code>@@</code>	repeated composition operator	<code>(D@@2)(ln);</code>

Mathematical Operations, Functions, and Constants

Symbol	Description	Example
<code>+</code> , <code>-</code> , <code>*</code> , <code>/</code> , <code>^</code>	add, subtract, multiply, divide, power	<code>3*x^(-4) + x/Pi;</code>
<code>sin</code> , <code>cos</code> , <code>tan</code> , <code>cot</code> , <code>sec</code> , <code>csc</code>	trigonometric functions	<code>sin(theta-Pi/5) - sec(theta^2);</code>
<code>arcsin</code> , <code>arccos</code> , <code>arctan</code> , <code>arccot</code> , <code>arcsec</code> , <code>arccsc</code>	inverse trigonometric functions	<code>arctan(2*x);</code>
<code>exp</code>	exponential function	<code>exp(2*x);</code>
<code>ln</code>	natural logarithm	<code>ln(x*y/2);</code>
<code>log10</code>	common logarithm (base 10)	<code>log10(1000);</code>
<code>abs</code>	absolute value	<code>abs((-3)^5);</code>
<code>sqrt</code>	square root	<code>sqrt(24);</code>
<code>!</code>	factorial	<code>k!;</code>
<code>=</code> , <code><></code> , <code><</code> , <code><=</code> , <code>></code> , <code>>=</code>	equations and inequalities <i>Note:</i> <code>E</code> no longer exists; use <code>exp(1)</code>	<code>diff(y(x), x) + x*y(x) = F(x);</code> <code>exp(Pi) > Pi^exp(1);</code>
<code>Pi</code> , <code>I</code>	π , i (mathematical constants) <i>Note:</i> Maple is case-sensitive	<code>exp(Pi*I);</code>
<code>infinity</code>	infinity (∞)	<code>int(x^(-2), x=1..infinity);</code>

NOTES:

- The PDF version of this document is available on the World Wide Web at <http://www.math.sc.edu/~meade/maple/maple-ref.pdf>.
- Please send comments, corrections, and suggestions for improvements to meade@math.sc.edu.

Commands

Command	Description	Example
<code>restart</code>	clear all Maple definitions	<code>restart:</code>
<code>with</code>	load a Maple package	<code>with(DEtools); with(plots):</code>
<code>help</code> (also <code>?</code>)	display Maple on-line help	<code>?DEplot</code>
<code>limit</code>	calculate a limit	<code>limit(sin(a*x)/x, x=0);</code>
<code>diff</code>	compute the derivative of an expression	<code>diff(a*x*exp(b*x^2)*cos(c*y), x)</code>
<code>int</code>	definite or indefinite integration	<code>int(sqrt(x), x=0..Pi);</code>
<code>Limit</code>	inert (unevaluated) form of <code>limit</code>	<code>Limit(sin(a*x)/x, x=0);</code>
<code>Diff</code>	inert (unevaluated) form of <code>diff</code>	<code>Diff(a*x*exp(b*x^2)*cos(c*y), x);</code>
<code>Int</code>	inert (unevaluated) form of <code>int</code>	<code>Int(sqrt(x), x=0..Pi);</code>
<code>value</code>	evaluate an inert expression (typically used with <code>Limit</code> , <code>Diff</code> , or <code>Int</code>)	<code>G := Int(exp(-x^2), x); value(G);</code>
<code>plot</code>	create a 2-dimensional plot	<code>plot(u^3, u=0..1, title="cubic");</code>
<code>plot3d</code>	create a 3-dimensional plot	<code>plot3d(sin(x)*cos(y),x=0..4*Pi,y=0..Pi);</code>
<code>display</code>	combine multiple plot structures into a single plot or modify optional settings in a plot (in <code>plots</code> package)	<code>F:=plot(exp(x), x=0..3, style=line); G:=plot(1/x, x=0..3, style=point); plots[display]([F,G], title="2 curves");</code>
<code>solve</code>	solve equations or inequalities	<code>solve(x^4 - 5*x^2 + 6*x = 2, { x });</code>
<code>fsolve</code>	solve using floating-point arithmetic	<code>fsolve(t/10 + t*exp(-2*t) = 1, t);</code>
<code>dsolve</code>	solve ordinary differential equations; see <code>?dsolve</code> for a list of available options	<code>dsolve(diff(y(x),x)-y(x)=1, y(x));</code>
<code>odeplot</code>	create 2D and 3D plots from solutions obtained by <code>dsolve</code> (with <code>type=numeric</code>); see <code>?odeplot</code> for more options (in <code>plots</code> package)	<code>S:=diff(x(t),t)=-y(t),diff(y(t),t)=x(t): IC:=x(0)=1,y(0)=1: P:=dsolve({S,IC}, {x(t),y(t)}, numeric): odeplot(P, [[t,x(t)],[t,y(t)]], 0..Pi); odeplot(P, [x(t),y(t)], 0..Pi);</code>
<code>DEplot</code>	create plot associated with an ODE or system of ODEs; see <code>?DEplot</code> for more information (in <code>DEtools</code> package)	<code>ODE := diff(y(x),x) = 2*x*y(x); DEplot(ODE, [y(x)], x=-2..2, y=-1..1, arrows=SMALL);</code>
<code>D</code>	differential operator (often used when specifying derivative initial conditions for <code>dsolve</code>)	<code>ODE := diff(y(x),x\$2) + y(x) = 1; IC := y(0)=1, D(y)(0)=1; dsolve({ ODE, IC }, y(x));</code>
<code>simplify</code>	apply simplification rules to an expression	<code>simplify(exp(a+ln(b*exp(c))));</code>
<code>factor</code>	factor a polynomial	<code>factor((x^3-y^3)/(x^4-y^4));</code>
<code>convert</code>	convert an expression to a different form	<code>convert(x^3/(x^2-1), parfrac, x);</code>
<code>collect</code>	collect coefficients of like powers	<code>collect((x+1)^3*(x+2)^2, x);</code>
<code>rhs</code>	right-hand side of an equation	<code>rhs(y = a*x^2 + b);</code>
<code>lhs</code>	left-hand side of an equation	<code>lhs(y = a*x^2 + b);</code>
<code>numer</code>	extract the numerator of an expression	<code>numer((x+1)^3/(x+2)^2);</code>
<code>denom</code>	extract the denominator of an expression	<code>denom((x+1)^3/(x+2)^2);</code>
<code>subs</code>	substitute values into an expression	<code>subs(x=r^(1/3), 3*x*ln(x^3));</code>
<code>eval</code>	evaluate an expression with specific values	<code>eval(3*x*ln(x^3), x=r^(1/3));</code>
<code>evalf</code>	evaluate using floating-point arithmetic	<code>evalf(exp(Pi^2));</code>
<code>evalc</code>	evaluate a complex-valued expression (returns a value in the form <code>a+I*b</code>)	<code>evalc(exp(alpha+I*omega));</code>
<code>evalb</code>	evaluate a Boolean expression (returns <code>true</code> or <code>false</code> or <code>FAIL</code>)	<code>evalb(evalf(exp(Pi) > Pi^exp(1)));</code>
<code>assign</code>	perform assignments (often used after <code>solve</code> or <code>dsolve</code>)	<code>S:=solve({x+y=1, 2*x+y=3}, {x,y}); assign(S); x; y;</code>
<code>seq</code>	create a sequence	<code>seq([0,i], i=-3..3);</code>
<code>for ... from ... to ... by ... in ... while ... do ... end do</code>	repetition statement; see <code>?do</code> for syntax (Note: <code>od</code> is an acceptable substitute for <code>end do</code>)	<code>tot := 0; for i from 11 by 2 while i < 100 do tot := tot + i^2 end do;</code>
<code>if ... then ... elif ... else ... end if</code>	conditional statement; see <code>?if</code> for syntax (Note: <code>fi</code> is an acceptable substitute for <code>end if</code>)	<code>if type(x,name) then 'f'(x) else x+1 end if;</code>
<code>assume</code>	inform Maple of additional properties of objects	<code>assume(t>0);</code>
<code>about</code>	check assumptions on Maple objects	<code>about(t);</code>