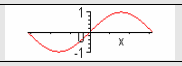
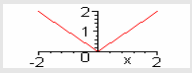
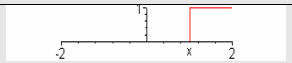
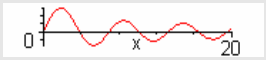
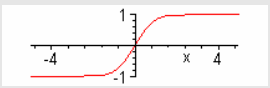
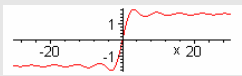
MAPLE*guide* **SYMBOLS AND OPERATORS**

SYMBOL	DESCRIPTION	EXAMPLE	RESULT
restart	clears all definitions	`> restart;`	
with	loads Maple packages: *linalg,plots,DEtools,PDEtools,student*	`> with(plots);` shows all commands in the package	*[animate,animae3d,...*
;	execute and show result	`> 2+3;`	5
:	execute and hide result	`> 5-2:`	
..	range or interval	`> plot(sin(x),x=-Pi..Pi);`	
( )	grouping in arithmetic expressions	`> (3+2)*5;`	25
[ ]	list delimiter	`> v:=vector([1,0,-2]);`	v:=[1,0,-2]
{ }	set delimiter	`> {f(x),g(x)};`	{f(x),g(x)};
:=	assigment	`> f(x):=cos(x);`	f(x):=cos(x);
=	equal	`> subs(x=Pi,cos(x));`	cos(π)
%	refers to previous result		
evalf	evaluate	`> evalf(cos(Pi));`	-1.
simplify	simplifies expressions	`> simplify(x^a*x^b,power);`	x^{a+b}
<, <= >, >= <>	less than, less than or equal greater than, greater than or equal not equal		
+	addition	`> 2+4;`	6
-	subtraction	`> 7-2;`	5
*	multiplication	`> 2*3;`	6
/	division	`> 10/2;`	5
^	exponentiation	`> x^2;`	x^2
->	defines function (mapping)	`> f:=x->sqrt(1-x)`	$f := x \to \sqrt{1-x}$
Pi,exp(1),infinity	mathematical constants	`> evalf(Pi);`	3.141592654
I	imaginary unit	`> sqrt(-1);`	I

FUNCTIONS

exp	natural exponential function	`> exp(x);`	e^x
ln log10, log[a]	natural logarithmic function logarithmic function base 10, base a	`> ln(2.0);` `> log10(2.0);`	.6931471806 .3010299957
sin,cos tan,cot sec,csc	trigonometric functions	`> sin(Pi/3);`	$\frac{\sqrt{3}}{2}$
arcsin, arcos arctan	inverse trigonometric functions	`> arcsin(1);`	$\frac{\pi}{2}$
sinh,cosh tanh,coth sech,csch	hyperbolic functions	`> cosh(2.5);`	6.132289480
sqrt	square root	`> sqrt(2.0);`	1.414213562
abs	absolute value function	`> plot(abs(x),x=-2..2);`	
Heaviside	Heaviside's function	`> plot(Heaviside(x-1,x=2..2);`	
BesselJ(n,x) BesselY(n,x) BesselI(n,x) BesselK(n,x)	Bessel functions of order n	`> plot(BesselJ(1,x),x=0..20);`	
Dirac	Dirac delta function	`> int(Dirac(x),x=-1..1);`	1
erf erfc	error function $erf(x)=\frac{2}{\sqrt{\pi}}\int_0^x e^{-t^2}dt$ complimentary $erfc(x)=1-erf(x)$	`> plot(erf(x),x=-5..5);`	
hypergeom	hypergeometric function		
factorial !	factorial of an integer	`> factorial(5);` `> 6!;`	120 720
Si	sine integral $Si(x)=\int_0^x \frac{\sin t}{t}dt$	`> plot(Si(x),x=-30..30);`	

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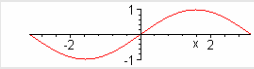
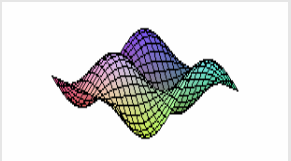
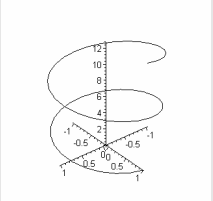
CALCULUS

SYMBOL	DESCRIPTION	EXAMPLE	RESULT
diff	derivative	`> diff(x*exp(x),x);`	$e^x + x\,e^x$
	n^{th} derivative	`> diff(x*exp(x),x$3);`	$3\,e^x + x\,e^x$
int	definite integral indefinite integral	`> int(sin(x),x=0..Pi/2);` `> int(ln(x),x);`	1 $x\ln(x) - x$
simplify	simplify expression		
subs	substitute	`> subs(t=0,u(x,t));`	$u(x,0)$
factor	factor a polynomial	`> factor(x^4-x^2);`	$x^2(x-1)(x+1)$
limit	limit	`> limit(sin(x)/x,x=0);`	1
Diff, Int, Limit, Sum value	inert form of operators evaluate an inert expression	`> Int(x^2,x);` `> value(%);`	$\int x^2\,dx$ $\frac{x^3}{3}$
convert	convert expression in		
	partial fractions	`> convert((x^2+1)/(x^3-x) parfrac,x);`	$-\frac{1}{x}+\frac{1}{x+1}+\frac{1}{x-1}$
	Euler formula	`> convert(exp(b*I),trig);`	$cos(b)+I\sin(b)$
sum	summation	`> sum(u[n](x),n=1..4);`	$u_1(x)+u_2(x)+u_3(x)+u_4(x)$
series	Macloren series	`> series(exp(x),x,4);`	$1+x+\frac{1}{2}x^2+\frac{1}{6}x^3+O(x^4)$
taylor	Taylor series	`> taylor(ln(x),x=1,3);`	$x-1-\frac{1}{2}(x-1)^2+O((x-1)^3)$

SOLVERS

solve	general equation solver	`> solve({x^2-a=0},{x});`	$\{x=\sqrt{a}\},\ \{x=-\sqrt{a}\}$
fsolve	numeric equation solver	`> fsolve(x*tan(x)=1,x=0..1);`	.8603335890
dsolve	solution of differential equation	`> s:=dsolve({diff(y(x),x)= x+1,y(0)=0});`	$s := y(x) = \frac{1}{2}x^2 + x$
unapply	produces the function from expression	`> f:=unapply(x^2/2+x,x);`	$f := x \to \frac{1}{2}x^2 + x$
assign	turns sign "=" in the solution set into ":=" does not create functions	`> assign(s);` `> y(x);`	$\frac{1}{2}x^2 + x$

PLOTS

plot	plot of function y=f(x)	`> plot(sin(x),x=-Pi..Pi);`	
	parametric plot plot([x(t),y(t),t=a..b])	`> plot([sin(x),cos(x),x=0..2*Pi]);`	
polarplot	polarplot($r(\theta), \theta = \alpha..\beta$)	`> polarplot(sin(2*x),x=0..2*Pi);`	
plot3d	plot3d(f(x,y),x=a..b,y=c..d)	`> plot3d(sin(x)*cos(y), x=0..2*Pi,y=0..2*Pi);`	
spacecurve	parametric curve	`> with(plots):` `> spacecurve([sin(t),cos(t),t], t=0..4*Pi,axes=normal,color=black);`