

Maple Help

1. General :

- (a) To type a text such as Your Name , A comment , or an Explanation , click on the " T " on the menu bar on top. to resume typing Mathematics click on the " [> " on the menu bar on top.
- (b) Each mathematical command must starts with a cursor , namely the symbol > and must ends in a semi colon namely the symbol ;
- (c) Make sure that each pair of Parentheses : (,) is opened and closed properly.
- (d) When typing mathematics , No Spaces Necessary.
- (e) At any time : To clear Maple's internal memory use the command " restart ":

Simply type **restart** after the **cursor** > followed by the semi colon ; then press enter.

2. The Basic Operations :

Addition (+) , Subtraction (-) , Multiplication (*) , Division (/) , and Powers (^).

Now the function $f = \frac{x^3 - 6x - 4}{9 + 5x^{\frac{3}{4}}}$ must be typed in Maple as follows:

> f := (x^3 - 6 * x - 4) / (9 + 5 * x^(3/4)); then press enter.

If your typing is correct you must get : $f := \frac{x^3 - 6x - 4}{9 + 5x^{\frac{3}{4}}}$.

3. Special Notations:

(a) The Square Root Function:

In Maple you may type a square root of an expression in two ways.

For example $\sqrt{2 - 5 \sin(x)}$ may be typed as :

Either $(2 - 5 * \sin(x))^{(1/2)}$, Or $\text{sqrt}(2 - 5 * \sin(x))$

(b) Exponential Functions:

In Maple an exponential function such as e^{1-3x} must be typed as

$\text{exp}(1 - 3 * x)$

(c) Inverse Trigonometric Functions:

An inverse trigonometric function such as say $\tan^{-1}(x)$ must be typed as $\text{arctan}(x)$.

(d) The Number π must be typed in Maple as Pi (with Capital P)!!

4. The Basic Maple Commands:

(a) The evalf command :

This command is used to evaluate functions :

An Example Find $\ln(4)$,correct to 5 decimal places

`evalf(ln(4),6);` or `evalf[6](ln(4));`

Now press enter you get :

1.38629

(b) The *diff* command:

This command is used to find the derivative of a function with respect to a specified variable.

Here is an example : Find the derivative of $g(x) = \sin^{-1}(3 - 4x^2) - e^{-\sqrt{2-5x}}$.

`> g(x) := arcsin(3 - 4 * x^2) - exp(-sqrt(2 - 5 * x));`

Now press enter you get :

$$g(x) := -\arcsin(-3 + 4x^2) - e^{(-\sqrt{2-5x})}$$

Let us name the derivative say $h(x)$. To find $h(x)$ we proceed as follows:

`> h(x) := diff(g(x), x);`

Now if you press enter you get:

$$h(x) := -\frac{4x}{\sqrt{-2 + 6x^2 - 4x^4}} - \frac{5}{2} \frac{e^{(-\sqrt{2-5x})}}{\sqrt{2-5x}}$$

(c) The *int* command :

The command is used to compute indefinite and definite integrals.

Here is an example : Find (1) $\int x^5 e^{x^2} dx$ (2) $\int_{-3}^1 \frac{1}{\sqrt{55 - 6x - x^2}} dx$

For #1 proceed as follows :

`> y := x^5 * exp(x^2); int(y, x);`

Press enter you get:

$$\frac{1}{2}x^4 e^{(x^2)} - x^2 e^{(x^2)} + e^{(x^2)}$$

No need to name integrand as y but it is recommended for a beginners example # 2

we do it faster!!

For # 2 proceed as follows :

`> int(1 / sqrt(55 - 6 * x - x^2), x = -3..1);`

Now press enter you get :

$$\frac{\pi}{6}$$

(d) The *fsolve* command:

This command is used to solve equations in a specified variable with or without restrictions.

Here are a couple of examples:

(a) Find all critical points of the function $y = x^4 - 20x^3 - 74x^2 - 8x + 10$.

(b) Find all critical points of the function y on the interval $[-1, \infty)$.

For part (a) no restrictions given. Of course we need to solve the equation $y' = 0$.

Proceed as follows:

```
> y := x^4 - 20 * x^3 - 74 * x^2 - 8 * x + 10;
```

```
> z := diff(y,x);
```

```
> fsolve(z = 0,x);
```

Now press enter to get :

-2.107337569 , -0.05529831490 , 17.16263588

For part (b) replace the last statement by:

```
> fsolve(z = 0,x = -1..infinity);
```

Now press enter to get :

-0.05529831490 , 17.16263588

(e) The *simplify* command:

This command is used to simplify your answers.

Here is an example:

Find the derivative of $y = \frac{x^2}{2} \sin^{-1}(x) + \frac{1}{4} \cos^{-1}(x) + \frac{x\sqrt{1-x^2}}{4} - 27$. Simplify your answer.

Proceed as follows:

```
> y := (x^2/2) * arcsin(x) + arccos(x)/4 + x * sqrt(1 - x^2)/4 ;
```

```
> z := diff(y,x);
```

```
> simplify(z);
```

Now press enter to get :

$x \arcsin(x)$

(f) The (two dimensional) *plot* command.

This command is used to plot the graph of a function of a single variable.

Example (a) sketch graph of $y = 2x^3 - 7x + 23$, $x \in [-4,4]$.

Proceed as follows:

```
> y := 2 * x^3 - 7 * x + 23;
```

```
> plot(y,x = -4..4);
```

Now press enter , your graph is displayed in the specified domain.

There are other interesting features that you may want to explore your self.

Just type `?plot` then press enter you get a page of help!

Note for graphing a piecewise function a certain procedure must be followed (depending on Maple version you have!!).

To sketch a piecewise function a " Procedure " may be used as illustrated in the example below:

Sketch the graph of $y = \begin{cases} x^2 & \text{if } -3 < x < 2 \\ x + 2 & \text{if } 2 \leq x \leq 3 \\ 5 \sin\left[\frac{\pi(x-2)}{2}\right] & \text{if } 3 < x \leq 4 \end{cases}$

```
> y := proc(x) if x < 2 then x^2 elif x >= 2 and x <= 3 then x + 2 else  
5*sin(Pi * (x - 2)/2) end if end proc ;
```

```
> plot (y, -3..4) ;
```

Now press enter, your graph is displayed!!

Refer to Maple work Sheet for all examples presented in this help sheet!

Good Luck To All.