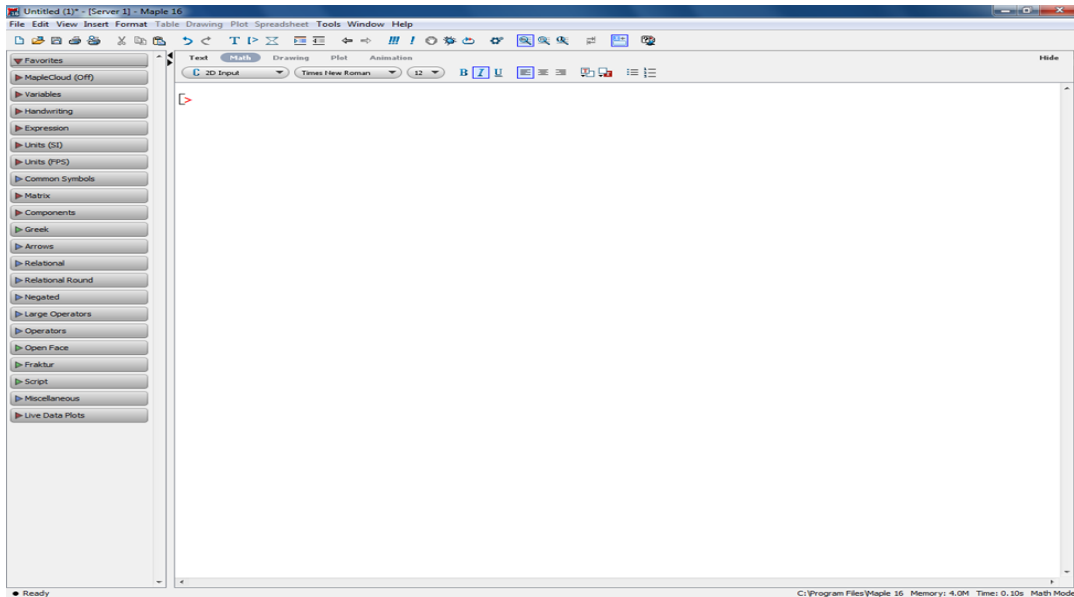


GETTING ON

To begin, log on to the campus network using your username and password.

A. To run Maple 16 on a networked computer in one of the labs, click on the *Start* button in the lower left corner of the screen, move up to *Programs*, over to *Course Applications*, and over to *Maple 16*. After Maple opens and you close the Startup and Quick Help windows, your screen should look like the following:



B. **Running Maple 16 from your own computer** (through Windows) on campus: IT has set up a Windows 2008 server to run Maple with the ability to launch it from a web page. There are some differences for launching Maple based on the OS and browser you are using. Instructions for Windows/IE, Windows/Firefox and OSX/Safari are included at <http://smccourseapp01.mikenet.smcvt.edu/>. NOTE: This only works from on-campus.

When Maple comes up, you will see smaller "Startup" and "Quick Help" windows (which you can close) and a larger window labelled Maple 16 - Untitled (1)-[Server 1]. This is your new Maple worksheet, in *DOCUMENT* mode and "Math" format; you can toggle to "Text" format by selecting the "Text" button in the toolbar above the worksheet. Click on the prompt [$>$] in the top toolbar to change to *WORKSHEET* mode and insert a new Maple execution group, in which you can input various commands. (Also, see EDITING YOUR WORKSHEET below.)

PRINTING

To print out your worksheet, you can click on the *Print Preview* icon (fifth from left on the toolbar) to review your document and then click on *Print* to print out your worksheet to the default printer. If you wish to print elsewhere, you can also connect to other networked printers. You can do this as follows: click on the *Run* tab off of the *Start* tab, then type `\\vps`, and then right-click and select "Connect..." to the appropriate printer.

If you go back to the Maple window, you can now print your worksheet to the newly connected printer.

SAVING WORKSHEET/ ENDING the SESSION

You should regularly save your Maple work to ensure that you don't lose any of it, in case your session is interrupted. These directions will allow you to save Maple files to your Z: drive:

- 1) Open the file menu at the top of the worksheet by clicking on File and click on "Save as".
- 2) Set it to the appropriate Drive. (Z: for personal network drive, C: for storage on your own computer).
- 3) In the File name box, type **name.mw** and hit Enter. (The **.mw** identifies the document as a Maple worksheet.)

To exit Maple, click on File, then click on Exit.

RETRIEVING a MAPLE SESSION

To resume work on a session you have saved on a disc, first get into Maple as above. Then,

- 1) Click on File and then on Open.
- 2) Use the mouse to change to the appropriate Drive.
- 3) A list of the "*.mw" files on your disc will be displayed. Select the desired file by clicking on it.
- 4) Click on OK and the Maple file should appear in your worksheet window, just as you saved it.

After retrieving a saved worksheet, Maple doesn't "remember" the commands from a previous session until it executes them again. If you want to do additional calculations with some of the expressions or functions you have defined in your worksheet, **you must have Maple go through all the steps again**. This can be done by hitting the "Execute the Worksheet" button, which is the *triple exclamation point* on the righthand corner of your lower toolbar. This will re-execute all commands in your sheet, so that you can pick up where you left off.

EDITING YOUR WORKSHEET

A Maple worksheet has two basic modes: *DOCUMENT* mode (offering "Text" or "Math" formats) or *WORKSHEET* mode (offering "Input" format to enter commands after a prompt > and "Output" format for Maple-generated responses).

You can switch to *WORKSHEET* mode by inserting a prompt [> from the upper toolbar. In this mode, you can insert characters and delete characters/sections by highlighting the area and using the "backspace" or "delete" keys. You can delete an entire Maple "Output" region by highlighting it (left click on the mouse and drag) and then hitting the "delete" key.

You can switch to *DOCUMENT* mode by clicking on the *Format* tab at the top of your worksheet and then selecting "Create Document Block." In this mode, you can use the toolbar to toggle to "Text" format and then type comments into your worksheet. You can begin a new line in this format by hitting Enter.

You can copy portions of your worksheet in either mode as follows: highlight it, press "copy to clipboard" button (seventh from left on top toolbar), move cursor to desired location, and press "copy from clipboard" button (eighth from left).

GRAPHS

Graphs will appear on the worksheet in response to plotting commands. See the end of this packet for information on plotting expressions and functions.

SOME BASIC MAPLE INFO and TIPS

If Maple doesn't carry out one of your commands as you expect, you should check for errors in what you have typed. Sometimes it is helpful to go back to the beginning of your section and re-execute the commands leading up to the one in question. To re-execute a command, put your cursor anywhere in the body of the command, and then press Enter.

If you want to start over, close your session by clicking on File, then on Close. You can start a new session by clicking on File, then on New. If you have named and saved the old session, you can retrieve it later if you wish. Or you can replace it with the new session. If you retrieve an old session, then begin by clicking on the triple exclamation point (!!!) button in the top toolbar to re-execute all commands on your worksheet.

The leftmost button at the top toolbar (looks like a blank page) creates a new worksheet while keeping the old one with all of the work you have done. It can be useful having multiple worksheets open, but it can slow down computations.

To assign variables, use := as follows:

```
> x := 5
```

`x := 5` (1)

Maple remembers the assigned value for the rest of the session.

```
> 7x + 1
```

36 (2)

If you want to use x for something else, you can get it back by "unassigning" it:

```
> unassign('x')
```

```
> x
```

`x` (3)

SOME USEFUL FUNCTIONS and CONSTANTS

Maple knows Pi -- with a capital P, and works with it as an exact number. The command `evalf(constant)` gives you its decimal approximation, where "evalf" stands for "evaluate as a floating point decimal":

> π , `evalf(π)`

$$\pi, 3.141592654 \quad (4)$$

(If you write "pi", Maple thinks of it as a symbol with no specific value.)

> π , `evalf(π)`

$$\pi, \pi \quad (5)$$

Maple knows "e" as well, provided you call it `exp(1)`. e^2 is `exp(2)` and e^x is `exp(x)`:

> `exp(1)`, `exp(2)`, `evalf(exp(1))`

$$e, e^2, 2.718281828 \quad (6)$$

Maple knows trigonometric functions -- be sure to use parentheses and an argument. (If the argument is a number, Maple assumes it is in radians.)

> `sin(x)`, `cos(3x)`, `sin($\frac{\pi}{4}$)`, `tan(1)`, `evalf(tan(1))`

$$\sin(x), \cos(3x), \frac{1}{2}\sqrt{2}, \tan(1), 1.557407725 \quad (7)$$

WORKING with FUNCTIONS and EXPRESSIONS

Maple distinguishes between two kinds of algebraic quantities, **expressions** and **functions**. We will work with both during the semester. A Maple **expression** is easy to define (where exponentiation is done using the ^ key):

> `g := x2 - x + 1`

$$g := x^2 - x + 1 \quad (8)$$

However, to put in numerical values for x, you need to "substitute" them like this:

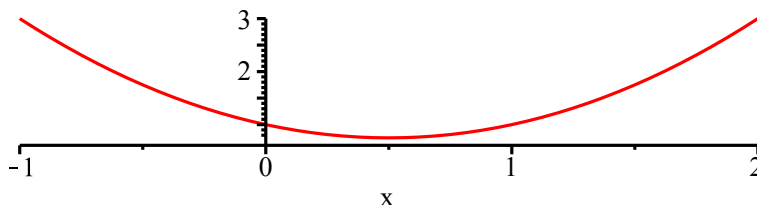
> `subs(x=2, g)`

$$3 \quad (9)$$

`g(2)` will NOT work for an expression g.

To plot the graph of an expression on a specific domain interval like $[-1, 2]$:

> `plot(g, x = -1..2)`



To change the size of the graph on your worksheet, click on the graph to produce a rectangular plot window surrounding the graph. By clicking on any one of the eight squares at the edge of this window and dragging, you can change the size of the window and then Maple will redraw the graph accordingly.

To create a **function**, you need to tell Maple the name of the function and the variable. The command:

> `f := x → 3x2 - 1`

$$f := x \rightarrow 3x^2 - 1 \quad (10)$$

creates the function which "takes" x to $3x^2 - 1$ where the arrow joins the \rightarrow and $>$ signs. Note the difference between functions and expressions.

You can now evaluate:

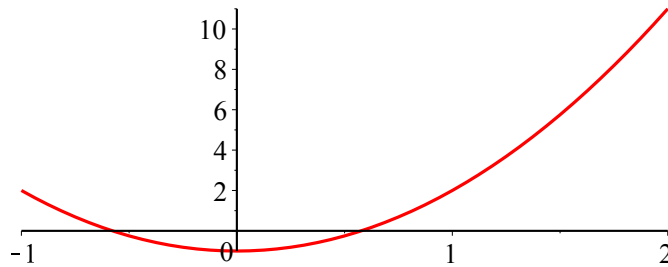
```
> f(1), f(3), f(2 t)
```

2, 26, $12t^2 - 1$

(11)

and plot on the interval $[-1, 2]$:

```
> plot(f, -1 ..2)
```



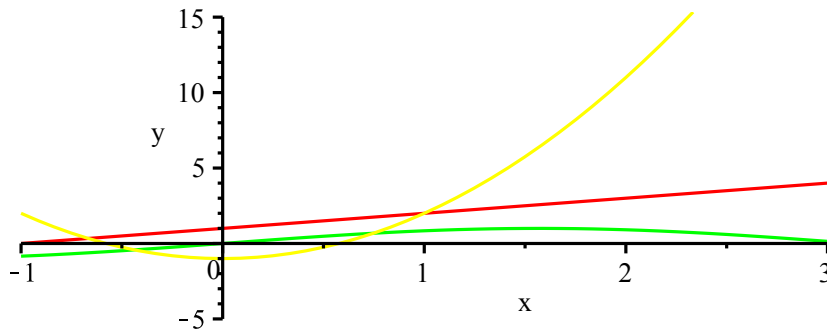
Notice that Maple knows the variable without being told. The command

```
> plot(f(x), x = -1 ..2)
```

is longer, but it yields the same output as the previous plot command.

To plot several expressions on one set of axes with a specific range interval such as $[-5, 15]$, enclose the list of expressions in set brackets:

```
> plot({f(x), sin(x), x + 1}, x = -1 ..3, y = -5 ..15)
```



You should try to determine which graph corresponds to which of the original 3 expressions.

REFERENCES

The easiest way get assistance is through Maple "Help," which you can click on atop the window to obtain a list of options. If you are looking for a specific topic, the "Topic Search" under "Help" is the quickest way to find it. There is also a "New User's Tour" available in the "Help" menu.

Some reference works are:

Maple, A Comprehensive Introduction by R. Nicolaides and N. Walkington.

Introduction to Maple by Andre Heck.

Experimental mathematics with Maple by Franco Vivaldi.