LEARN A BIT OF MAPLE

Maple is a powerful piece of software that many of you might find useful later in your college years and beyond. It is to algebraic expressions what a calculator is to arithmetic. It can plot in two and three dimensions. It can solve difficult algebraic problems as well as ones involving calculus. It is more than likely that it can solve all the problems I pose to you except, of course, for word problems (which I will stress in the course). But once these word problems are put into mathematical language, *Maple* will burn through their solutions.

Here I will take you through some simple steps by which you may familiarize yourselves with *Maple*.

First go to the computer lab in Stanger Hall. Make sure to get a computer connected to the print server as I would like you to print out what you do.

Start a computer and log in. Then with the finder (if you wish) locate *Maple 6* and double-click on the executable or the *shortcut* to launch.

You should get a window with *Maple 6* in the upper left-hand corner. Now you can look in the help (the syntax is *?topic*) and go it alone, but I would suggest you get an idea of the power of the software as follows:

At a > prompt, type *100!;* . The semicolon tells the machine you are finished with the command. Now < Return >. This is the factorial of one hundred, i.e. $100 \times 99 \times 98 \times \cdots \times 3 \times 2 \times 1$. For integer manipulations, *Maple* can work with a precision of about 500,000 digits, memory of the computer permitting.

Maple uses the usual symbols for the basic arithmetical operations: $+, -, *, /$. While experimenting remember to end your commands with a semicolon. It also can tell the difference between exact and approximate expressions: *Maple* calls π *Pi*. Do $sin(\pi)$. Now try with 3.141592653.

Maple also knows how to do exponentials. For $f(t) = e^t$ you should write *f(t):=exp(t);* . The ":=" means *define it to be*. To substitute in a value for t, use *subs(t=whatever, f(t));*. You might also like to plot f: *plot(f(t), t=-10..10);* should do it.

As I pointed out, *Maple* is strong in algebra. Try these: $factor(x^2 - 1)$; Now replace the x^2 with x^{55} or x^{100}. Make it work for a living. You think you could do that with pencil and paper?

Do $simplify((x^3 + 1)(x^2 - 1))$;. Make sense of it?

How about the following: $g(s,t) := sin(s) * t^2$;

$plot3d(g(s,t), s = -10..10, t = -10..10)$;

Understand?

Now enter *?solve* and use the instructions there to solve something challenging for a human. Here's an example:

$solve(\{a*x^2+b*x+c = 0\}, \{x\})$; will give you something you know and love and know the proof of. What does *Maple* say to do about cubic and quartic equations? Higher? What about specific cases (putting in nice numbers for the coefficients a, b, c ...)?

OK, you got the idea. Enough for today. Print your worksheet and delete it from the harddisk.