September 5, 2013

Introduction to Maple[1]

Maple is a computer algebra system. It can do essentially everything a graphing calculator can do as well as much more. Additionally, computers have much more processing power than calculators, so Maple is much faster than a calculator when performing difficult computations. Today, you will discover how maple can be useful for arithmetic, algebra, calculus, and graphing.

Arithmetic

1. Type `2+3;[RETURN]` to add 2 and 3. Try other numbers (including more than just two numbers). Also try subtraction (`-`), multiplication (`*`), and exponentiation (`^`).
2. Type `2/3;[RETURN]` to divide 2 by 3. What happens? Type `evalf(%);[RETURN]`. What is the output now? What does the `%` symbol do?
3. The Maple procedure for square root is `sqrt`. Try to get Maple to produce a decimal approximation of $\sqrt{5}$.

Algebra

1. Type `(a+b)^5;[RETURN]`. What happens? Type `expand(%);[RETURN]`. What is the output now?
2. Type `a:=1;b:=2;[RETURN]` and then type `(a+b)^5;[RETURN]`. What happens now?
3. Type `solve(x^2+2x+1=0,x);[RETURN]`. Try solving other equations this way. Try using the `factor` procedure to factor $x^2 + 2x + 1$ and other polynomials.

Calculus

1. Type `diff(x*sin(x),x);[RETURN]` to differentiate the function $x \sin x$. Try differentiating other functions.
2. Type `int(sec(x),x);[RETURN]` to compute the antiderivative of $\sec x$. Try integrating other functions. Try computing definite integrals by replacing the `x` argument with an expression of the form `x=-1..1` (e.g. to integrate from -1 to 1).

Graphing

1. Choose your favorite function of x. Graph it by typing `plot(f(x),x);[RETURN]` (where you replace $f(x)$ by your function). Try assigning a range to x like you did when computing a definite integral. What happens?

When you are done with these exercises, try working through the longer tutorials found at http://math.rutgers.edu/courses/251/maple_new/maple0.html.

[1]This document created by Nathan Fox for Sections 25, 26, and 27 of Math 251 in Fall Semester 2013