Mathematics 251: Lab 0 INTRODUCTION TO MAPLE

This lab is intended to introduce you to some of the basic features of Maple and to give you practice preparing a Maple worksheet. Most of the information you need to do this lab is contained in the handout **Instructions for Use of Maple in Mathematics 251**. You can also learn more about the relevant Maple commands by using the **Help** feature of Maple described in that document.

1. Use Maple's `evalf` command to evaluate the fraction $4/7$ to 20 decimal places.

2. Use Maple's `simplify` command to combine $a + b - 2ab/(a + b)$ into one fraction.

3. Let $y = (x + 1)(x^2 + 2)^3 + 4x$. Do the following:

a) First define a Maple expression for y and then use Maple's `factor` command to factor y^4.

c) Solve $y^4 = 2$ for x. To get all the roots, use the `complex` option of the `fsolve` commmand.

4. Use Maple's `plot` command to obtain a plot of the function x^x for $0 \leq x \leq 2$. Place the plot in your Maple worksheet.

5. Plot the functions x, x^2, and x^3 on the same set of axes for $0 \leq x \leq 1$. Place the plot in your Maple worksheet.

6. Find the first and second derivatives of the function $g(x) = \sin(x^2)$. (First define an expression for g and then use Maple's `diff` command.

7. Use Maple's `fsolve` command to find a root of the function $f(x) = x - \cos x$ in the interval $0 \leq x \leq 1$.

8. Use Maple's `int` command to find $\int x^2 \ln(x)\, dx$.

9. Maple does numerical integration by combining the `evalf` and `Int` commands. Use these commands to find $\int_0^1 (1 + x^4)\, dx$.

10. Maple's `plot` command can also be used to plot parametric equations, i.e., equations of the form

$$x(t) = 9\cos(t) - \cos(9t), \qquad y(t) = 9\sin(t) - \sin(9t)$$

Use this feature to plot the above for $0 \leq t \leq 2\pi$ and place the plot in your Maple worksheet.

11. To obtain three-dimensional plots it is first necessary to issue the Maple command `with plots:`. Use the Maple command `plot3d` to obtain a plot of the function $z = 5 - x^2 - y^2$ over the range $-3 \leq x \leq 3$, $-3 \leq y \leq 3$. Place the plot in your Maple worksheet.