

Name: _____ Date: _____ Section: _____

PSL-1: Math Technology Lab – Using Mathematica and Excel

Instructions: This laboratory focuses on your *Mathematica* and *Excel* automation proficiency. Each of the tasks presented are key to your successful performance in class and during WPRs. This laboratory is organized by objective. Each objective is listed with several corresponding problems. Spend as much time as you believe necessary to ensure your proficiency. (In other words, if you only need to work one of the given problems, then only work one. If you feel you need additional help, then work more problems.)

On your desktop create a folder called MA103. Inside the folder, place four folders labeled:

Block I-PS and Modeling with Functions

Block II-Matrix & Vector Operations

Block III-Recursion Equations

Block IV-Introduction to Calculus

Mathematica as a calculator:

I. Calculate – For each of the operations below, use *Mathematica* to determine the result.

a. $613 \cdot 439$

b. $\frac{1,247,391}{282}$ (to simplify your answer try adding a //N after the expression)

c. $5478 - 1749$

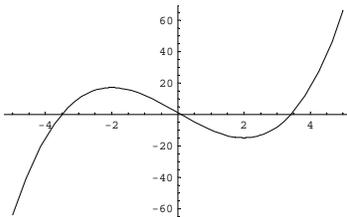
d. $310,031 + 289,969$

Mathematica and Functions:

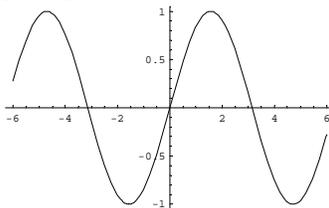
II. Define and Plot Functions – For each of the functions shown below, define the function and plot the function on the closed interval shown.

a. $f(x) = x^3 - 12x + 1$ on interval $[-5, 5]$

f [x_] = x^3 - 12 x + 1
Plot [f [x] , {x, -5, 5}]



b. $j(x) = \sin(x)$ on interval $[-6, 6]$



III. Evaluate each of the functions above for the following values: $x = 1, 2,$ and 3

$$f[1] \\ -10$$

a. $f(2) = -15$ $f(3) = -8$

b. $j(1) = 0.8415,$ $j(2) = 0.9093,$ $j(3) = 0.1411$

IV. Find the roots of the following functions:

a. $k(x) = x^2 - 2x - 15$

Solve [k [x] == 0, x] //N

b. $l(x) = x^3 - 2x^2 - 12$

V. Find the value of x when $\sin(x) = 2.$

VI. Save this file as *Key Mathematica Tools*

Excel as a mathematical tool:

VII. Enter, Create Patterns and Copy Numbers– For each of the operations below, use *Excel* to create the requirement.

a. Create a worksheet which has a column containing the numbers 1-10. Place a heading above it of $x.$

b. Create a second column which squares the numbers from the first column. Label this column $f(x)=x^2.$

VIII. Create a graph in an excel spreadsheet.

a. Use the chart tool to create a scatterplot of this function.

IX. Learn how to Create a formula and Copy a Formula

a. Use the *sum* command to add all of the numbers in the first column. Copy this formula to find the sum of all of the numbers in the second column.

b. Create a third column to find the slope of this function on every interval. In other words, determine the change in $f(x)$ for every change in $x.$

X. Save your file and label it *Squares Plot.*