## UNIVERSITY OF UTAH ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT

#### ECE1020 N. E. Cotter

#### COMPUTING ASSIGNMENT 1 BASIC MATLAB<sup>®</sup> OPERATION

## <u>READING</u>

Matlab<sup>®</sup> Student Version: learning Matlab 6, Ch 1, 3, 4.1-4.13 Mastering Matlab<sup>®</sup> 6, Ch 1, 2, 3

## TOPICS

Essential commands in Matlab.	
Numerical expressions	
You will use several of the following Matlab commands:	
exit	exits Matlab program
ctrl-c	stops a calculation in progress (hold down ctrl and press c)
help	prints list of available help info for Matlab
help exp	print help info for Matlab command such as exp
clc	clears the command window
addpath c:\matlab\work	add path so Matlab will find (your) .m files in that directory
uparrow	gets last command line so you don't have to type it again
	three periods means continue expression on next line

### **OVERVIEW**

In this assignment, you will learn how to start and exit Matlab and enter expressions. The 'diary' command in Matlab opens a file that records everything you do. You will use this in every assignment to show what your code actually does.

Matlab is particularly good at processing arrays (i.e., lists) of numbers. For

### PROCEDURE

Launch Matlab by double clicking its icon on the PC startup screen (or desktop). You will see a window with three panes. You will work in the command window. Below are some commands that you are to type exactly as shown after the >> prompt in the Matlab command window. You type in only the parts of those lines after the >>!characters. Lines below that do not start with >> are instructions.

(Note: don't type the >> in front of each command, but <u>do type the comments</u>.)

+5 pts Diary Command (your TA will help you modify this command for the computer you are using) >>diary % This creates a diary file. (This a comment in Matlab. It starts with %)

**+10** pts Comment >> % I will e-mail the diary file to my TA when I am finished with this lab.

+10 pts Your Name >> % My name is (type in your name here).

### +10 pts Help Command

>>help % There should be a long output for this command. Please read it!

### +10 pts Line Continuation

>> 2 + ... % Long lines may be continued with three periods (space before periods) ... 2 % No prompt appeared because Matlab expected more input to finish line.

(Note: Unless you create a directory called mywork on the c: drive, the next command will cause an error. Causing an error is not a problem. Matlab will just tell you what the error is. You don't have to fix this error. Just move on to the next step.)

+10 pts Addpath Command and Error Message (your TA may instruct you to modify this command, depending on the system you are using)

>> addpath c:\mywork % Now Matlab can locate my files in directory c:\mywork

## +10 pts Matrix

The following command creates a matrix with two row and two columns. The numbers 1 and 2 are in the first row. The numbers 3 and 4 are in the second row.

>> A = [1 2; 3 4] % A matrix. It requires square brackets. Semicolon starts a new row.

## +5 pts Array Creation

This command creates an array called 'b' of two numbers and sets the second number equal to 4:

>> b(2) = 4 % Matlab creates arrays and resizes them automatically, when necessary.

# +5 pts Series

Matlab has many commands for creating arrays of numbers. The following command creates an array, called 'c', consisting of numbers, 0, 4, 8, and 12. From now on, when you use the variable c, you get all four of those numbers.

>> c = 0.4:13 % Colon operator creates array from 0 to 13 spaced by 4

# +5 pts Array Indexing

If we want to extract one or more of the numbers from the c array, then we use indexes. The index is like a street address used to find someone in a city. As this command illustrates, the index may also be an array. The 1:1:2 creates an array starting at 1, incrementing by 1, until it gets to 2. Thus, the array consists of the numbers 1 and 2. >> d = c(1:1:2) % d array = c(1) and c(2). Could also say d = c([1 2]) or d = [c(1) c(2)]. >> % Array indexing starts at 1, not zero.

### +5 pts Math Expression

The commands below calculate the following mathematical expressions:  $\theta = \pi/6$ 

 $value = 3 \cdot e^{\left(\sin(\sin(\theta)) - \log(\cos(\theta))\right)^2} / \sqrt{\theta}$ 

>> % See Student Version, Appendix A: Elementary Math Functions. >> % See Mastering Matlab 6, Chapter 2. >> theta = pi/6 % angles are in radians. >> Value = 3 \* exp((sin(sin(theta)) - log(cos(theta)))^2/sqrt(theta))

+10 pts Plots >> plot([1, 5, 2, 6]) % makes a simple line plot. Type 'help plot' for more info.

+5 pts End of Diary (you can look at the plain text diary file using the Notepad program on a Windows machine)

>> diary off % Closes the diary file. Look for the diary in e.g., c:\matlab\work directory.

Now exit Matlab in any of the following three ways:1) typing "exit" at the Matlab prompt2) selecting "exit" from the File menu for the Matlab window3) clicking on the X in the upper right-hand corner of the Matlab window

Find the diary file on your computer and make it the body text of an e-mail it to your TA. In the Subject line of your e-mail, be sure to put Your Name and "ECE1020 Comp1" Send the e-mail to your TA. See class web page for TA's address. Also print the diary file and turn it in to the ECE1020 locker.