

Lab 9: This lab is not graded. The next and final lab (Lab 10) will be graded. If you complete this lab correctly, you will be ready for Lab 10, and the final exam.

MATLAB Basics

Please see lecture set 8 to set up MATLAB access on a Windows PC or a Mac. Please see lecture 12 on the Introduction to MATLAB.

Create a script (m) file to do the following. Note: these commands are not typed in the command window directly, but are listed in your script file, and run as a program.

1. Start your m file by clearing all previous variables in memory and to clear the command window. This takes two commands. Use the Help function to find out how.

2. Create a 3x3 matrix, where the first row is the month and date of your birthday, the second row is three random numbers in the range 0-1, and the third row are three random numbers in the range 0-100. Name the matrix your initials.

3. Create a matrix that is the transpose of the matrix in step 2, name it your initials_T.

4. Create the following non-singular 3x3 matrix (that is, a matrix that has an inverse)

$$NS = \begin{bmatrix} 3 & 4 & -1 \\ 4 & 3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$$

5. Create the inverse of the matrix in step 4.

6. Demonstrate that the matrix in step 4 multiplied by the matrix in step 5 yields the identity matrix.

7. Plot sin, cos, and tangent for two full cycles (720 degrees) on the same graph. To do this, you will need to:

a. Create a vector that represents degrees from 0 to 720, by 20. That is [0 20 40 60 80 ... etc.]

b. Create a corresponding radians vector. Note that "pi" is the symbol for pi.

c. Create corresponding sin, cos, and tangent vectors. Name them yourinitials_s, yourinitials_c, yourinitials_t.

d. Issue the figure(1) command, and then plot sin, cos, and tan on the same axis. To find out how to do this, start up the MATLAB help function, and search on "figure()", and "plot(x1,y1,x2,y2...".

8. Save the degrees, radians, _s, _c, and _t vectors to a data file named yourname.mat. Again, use the help function to find out how.

Note that a mat file contains variables and values but not your script. The m file contains your script, and when it runs, it automatically generates the mat file when it executes the SAVE command that creates and saves the variables in your mat file.

9. Create a vector X consisting of the numbers 1 through 10, a vector Y that is the transpose of X, and a 10x10 matrix Z of any numbers. Make a surface plot of x, y, and z. Call it figure(2).

10. Run the m file, and note the creation of all matrices, plots, and also the creation of a mat file containing your variables and values.