

CIEG 675
LAB #1 Due **Monday January 11, 2021 by 5pm**

In a m-file do the following and verify it works by running your m-file. Then publish the script and print out to turn in. *Please suppress the output of problems that ask you to create vectors with many elements by inserting a semicolon (;) at the end of the line.*

- 1) Make a row vector that starts at 1 and ends at 10 with spacing of 0.02.
- 2) Make a 3 x 3 2D matrix that has the numbers 1 through 9 for entries.

NOTE: Use array indexing to access specific elements in the following 4 problems:

- 3) Define a variable from question 2 data that consists of the diagonal elements. (multiple ways to do this, explore)
- 4) Define a second variable from question 2 data that consists of the elements in the corners of the matrix.
- 5) Define a third variable from question 2 data that consists of the middle row.
- 6) Define a fourth variable from question 2 data that consists of the last column.
- 7) MATLAB can also handle multi-dimensional variables (i.e. a 3D matrix). As an example, a 3D matrix is good for bathymetry data interpolated to a grid that has been collected over time. To define 3D data, MATLAB uses (row, column, layer) where layer is my term that specifies that depth of the matrix (e.g. think of a Rubik's cube).

Given the following three bathymetry data sets develop a single variable comprised of them that is a 3D matrix, with size 2 x 2 x 3.

```
Survey1 = [1 2; 3 4]; % survey 1
Survey2 = [5 6; 7 8]; % survey 2
Survey3 = [9 10; 11 12]; % survey 3
```

- 8) Define a variable that has entries extending from 1 to 8 and then also includes entries extending from 15 through 24.
- 9) Make a time vector that extends from 0:100 by $\frac{1}{4}$ s intervals. (*Suppress output*)
- 10) Make a column vector that extends from -30 to 30 by increments of 0.2. (*Suppress output*)
- 11) Make a column vector that goes from 100 to 0 in descending order. (*Suppress output*)
- 12) Make a sine wave of your choice and plot it as a function of time (or you can use the sine wave from question 5).

13) Make a parabola of your choice ($y = ax^2$) and plot it. Then overlay two more parabolas on the same axes using $0.5a$ and $2a$. Change the Color and LineType for each. Add a legend to the plot.

14) Write commands to generate the figure shown below. You may not use any built in matlab function for generating circles. You are likely to need some other functions though. Perhaps `fliplr`, `fill`, and the attribute `facealpha` might help. The circle centers are at $(-1,1)$, $(1,1)$, and $(0,-1)$. The radius is 2. The linewidth is 3.

