

BE 1500 – Homework #5

Submit this assignment as a PDF to the link on Blackboard

Copy and paste your MATLAB commands and final answers for each problem into a word document. For excel portions, copy the contents of any calculated cells into the document with the cell reference also include a screen shot of the excel file. A detailed explanation of how to do this is available on Blackboard in the Homework folder. In addition to the PDF submission submit any script files that the assignment asks you to create and any excel files you create.

Plotting, If-Else, fprintf

1. Write a Matlab script name **spheres** that will calculate the surface area and volume of five spheres. The script should prompt the user to enter one vector containing 5 numbers (diameters) and return a two-dimensional matrix containing the surface area and volume of five spheres. Calculate the surface area and volume for spheres with diameter of 1, 2, 3, 4, and 5 cm.
2. Plot the following equation using the command “meshgrid” and “mesh”.
$$Z = \sin(r) / r$$

$$r = \sqrt{x^2 + y^2}$$
 x and y are both between -10 and 10

3. In a Matlab Script, for $-2\pi \leq x \leq 2\pi$ create a vector and then plot the following functions. Add label, legend and title to your plot. Be sure to select an appropriate step size for your vector.

$$\begin{aligned} &\sinh(x) \\ &(e^x - e^{-x})/2 \end{aligned}$$

4. Assuming you have a doughnut (perfect shape like a torus) with the **inner radius a** and the **outer radius b**. The volume (V) and area (A) can be calculated by these formula:

$$V = \frac{1}{4}\pi^2(a + b)(b - a)^2 \quad A = \pi^2(b^2 - a^2)$$

- a. Create a script that asked for the value of a and b and computes area and volume.
- b. Suppose that the outer radius is constrained to be 1.5 in. greater than the inner radius. Write a another script file that plots A and V versus a for $0.25 \leq a \leq 4$ in.

5. Write a script that prompts the user to enter a number (x) from 0 to 100 and displays the corresponding letter grade giving by the following table.

- A: $x \geq 90$
- B: $80 \leq x \leq 89$
- C: $70 \leq x \leq 79$
- D: $60 \leq x \leq 69$
- F: $x < 60$

6. Extra Credit: Create a formula (in a single cell) in Excel that will do the same thing as #5. You should be able to enter the number value in one cell and have the grade display in another. This can be done with either nested if functions or through vlookup.

7. Create a script that for $x=[1:0.25:5]$ calculate following functions.

$$Y=4\log(x^2)$$

$$Z=x^3+2Y$$

then by using `fprintf` command show the results in a table format with the following headers. Adjust the space between the columns so it looks good. Use format short.

x	Y	Z
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8. Display the following data by using `fprintf`

`X=1:5;`

`Y=X^2;`

to show the following strings:

- 1 squared 1
- 2 squared 4
- 3 squared 9
- 4 squared 16
- 5 squared 25