# EGR 120 Due date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Introduction to Engineering

File: EGR120-MATLAB-A

**Homework Assignment #4 (MATLAB Assignment A)**

**Reading Assignment:**

Read Chapter 15 in Engineering Fundamentals – An Introduction To Engineering, 5E by Moaveni.

PowerPoint: EGR120-MATLAB-A

**Computer Assignment:**

* **Warning**: Your assignments must be your own work. You can ask other students questions, but sharing files is cheating. If any evidence of copied files is discovered, all parties involved will receive grades of 0 and may be subject to further disciplinary action.
* For **all problems**, begin all MATLAB programs (scripts or .m files) with the following information:

% John Doe (**your name**)

% EGR 120

% Homework Assignment #?, Problem ?

% Filename: YourFileName.m

% Instructions

* Use descriptive variable names
* Use ***format compact*** to reduce extra lines in the output.
* Use the disp( ) function to display your name and assignment number.
* See a Sample MATLAB Solution on the last page of this assignment.
* Print the program (script or .m file) and the results for each problem. If you post the results online, post both the program and the results.
* This assignment has 4 parts, so use 4 separate MATLAB programs. Do not combine them.

1. (45 pts – 3 pts per part) Write a single MATLAB program (script or .m file) to evaluate each of the following (put all parts of the problem in the same program).
   * Begin with the block of comments as described above.
   * Use the disp( ) function to display the problem number for each part before the answer.
   * Use variables for assigned values, not numbers. For example, if the problem is to find the area of a circle with a radius = 5, use

***disp(‘HW #4 – John Doe’)***

***disp(‘Problem 1A’)***

***Radius = 5.0;***

***Area = pi\*Radius^2 % Do not use Area = pi\*(5.0)^2***

* + Refer to Appendix A in the text for formulas for volume and surface area.

1. Find the radius of a circle if the area is 100.
2. Find the radius of a sphere if the volume is 250.
3. Find the area of a 7-sided polygon if the length of the side (b) is 2.5. See App. A for formula.
4. Find the height of a right circular cone if the surface area is 50 and the radius is 2.75. See App. A.
5. Find the volume of a right circular cone if the radius is 1.75 and the height is 4.25.
6. Given the law of cosines: A2 = B2 + C2 -2⋅B⋅Ccos(θ), find angle θ (in degrees) if A=6, B=4, and C=3.
7. Find y1 = 400sin(A) if A = 50 degrees.
8. Find y2 = 25e-1.25x if x = 0.875
9. Find y3 = 50⋅ln(3x) if x = 7.55.
10. Find  for x = 4.44 with the result expressed in radians.
11. Find  for x = 5.55 with the result expressed in degrees.

**H**

**A**

**B**

**β**

**α**

1. Find  for x = 6.66.
2. Find  for x = 7.77.
3. Find  for A = 18 degrees.
4. Find  for R1 = 30, R2 = 20, R3 = 36.

(Note: Only a minor deduction (10%) in each problem below if specified formatting with fprintf not used.)

1. (18 pts) Write a single MATLAB program (script or .m file) to analyze a right triangle and run the program 3 times for the 3 test cases shown below.
   * Prompt the user to enter sides A and B for a right triangle.
   * Calculate the hypotenuse, H, angle α and angle β (angles in degrees).
   * Use ***fprintf( )*** to display H using 3 digits after the decimal point (display name and value).
   * Use ***fprintf( )*** to display the angle name, angle value (with 1 digit after the decimal point) and units using the format shown the example below:

Example: (for A = 3, B = 4) ***H = 5.000***

***Alpha = 36.9 degrees***

***Beta = 53.1 degrees***

* + If you have trouble with the formatting, print the results in any form to receive most of the credit.
  + Run the program for the following 3 test cases:
    - 1. A = 3, B = 4 (same as the example above)
      2. A = 10, B = 10
      3. A = 12.25, B = 16.75

1. (18 pts) Write a single MATLAB program to convert temperature from degrees Fahrenheit to degrees Celsius and run the program3 times for the 3 test cases shown below.
   * Prompt the user to enter a temperature in Fahrenheit.
   * Calculate the corresponding temperature in Celsius.
   * Use ***fprintf( )*** to display each temperature with 1 digit after the decimal point using the format shown in the example below: Example: ***75.0 degrees F = 23.9 degrees C***
   * If you have trouble with the formatting, print the results in any form to receive most of the credit.
   * Run the program for the following 3 test cases:
     + 1. 75 degrees F (same as the example above)
       2. 39.5 degrees F
       3. 355 degrees F
2. (19 pts) Write a single MATLAB program to find the two real roots, x1 and x2, of a quadratic equation of the form Ax2 + Bx + C = 0 and run the program 4 times for the 4 test cases shown below.
   * Prompt the user to enter the values of A, B, and C.
   * Calculate the corresponding values of x1 and x2 (use the ***quadratic equation*** – one equation for x1 and another equation for x2).
   * Use a single ***fprintf( )*** command to display both results (with 3 digits after the decimal point) using the format shown in the example below: Example: ***x1 = -3.000, x2 = -4.000***
   * If you have trouble with the formatting, print the results in any form to receive most of the credit.
   * Run the program for the following 4 test cases:
     + 1. A = 1, B = 7, C = 12 (same as the example above)
       2. A = 1, B = 27, C = -90
       3. A = 2, B = 0.8, C = 0.075
       4. A = 1, B = 3.6E5, C = 2.88E10

**Sample MATLAB Problem**

Print the program (script or .m file) and the results. (Boxes not required.)

It might be easiest to copy the program and the results into a single Notepad file.

% John Doe

% EGR 120

% Homework Assignment #4, Problem 1

% Filename: MATLAB\_Example.m

% Description: Determine the

clc

format compact

disp('HW#4 - John Doe')

disp('Part 1A')

Area = 100; % Use variables for assigned values

Radius = sqrt(Area/pi) % Do not use Area = pi\*(5.0)^2

disp('Part 1B')

Volume = 250;

.

.

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HW#4 - John Doe

Part 1A

Radius =

5.6419

Part 1B

Area =

.

.

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