EML3035 **Programming Concepts for Mechanical Engineers**

Problems from Chapter 5-9

What to Submit: Hard copy of affidavit sheet given at
http://numericalmethods.eng.usf.edu/EML3035/Independent_affidavit_sheet.pdf
as first page followed by hard copy of published output.

Follow the same format as given at
http://www.eng.usf.edu/~kaw/class/EML3035/homework/sample_homework.htm
Look under Sample HW for assignments for **HW#2 and#3**

How is the submission different from HW#1?
Because there are several problems assigned to you and hence to reduce the time required to complete the project, no comments are required except in the identification part. Each problem gets cell formatted by simply writing comments as
%% Chapter 5 Exercise 4
All outputs need to displayed using fprintf or/and disp statements. There is no need to display inputs.

Chap 5: Exercise 4

Given,

$$[P]=\begin{bmatrix} 4 & 0 & -3 & 7 \\ 9 & 7 & 4 & 2 \\ 0 & 1 & -9 & 6 \\ 3 & 2 & 7 & 1 \end{bmatrix}$$

Using MATLAB, find the

a) row and column dimensions using the `size` command.
b) norm of [*P*] (max column sum).
c) trace of [*P*].
d) inverse of [*P*], and name the matrix, `Q`.

For parts (a), (b) and (c), display only the results using the `fprintf` command. For (d) use the `disp` command to display `Q`.

Chap 7: Exercise 2

Plot the lift and drag forces exerted on an airfoil as a function of velocity. Use velocity values going from 0 to 45 m/s on a log-linear plot (log-scale on the y axis). The working fluid density (ρ) is 1.423 kg/m^3, the exposed airfoil area (A) is 129 m^2, and the coefficients of drag (C_D) and lift (C_L) are 0.178 and 0.896, respectively. Recall that the equations for drag and lift forces are

$$F_D = \frac{1}{2} C_D \, A \, \rho \, V^2,$$

$$F_L = \frac{1}{2} C_L \, A \, \rho \, V^2 .$$

Your plot should display an appropriate legend, title and axis labels and should include units. The line width of the two lines should be adequately sized. There is no need to display the inputs.

Chap 8: Exercise 1

Given that $a = 7,\ b = 2,$ and $c = 11$, using MATLAB find the values of

a) $\log_{10}(b)$
b) $b \ln(c)$
c) $e^{-\frac{a}{2}}$
d) $\log_2(a)$

Output each solution to the command window using fprintf statements, and check your results using a calculator.

Chap 8: Exercise 3

Given are two angle measurements,

$$\theta_1 = \frac{\pi}{8} \text{ and } \theta_2 = 34°,$$

and a length measurement of 4 inches, *x*. Complete using MATLAB:

a) $\sin(\theta_1)\cos(\theta_1)$
b) $x \tan(\theta_1)$
c) $\cos^{-1}(x)$
d) $7 \csc(\theta_2)$

Output each solution to the command window. Use the `fprintf` statement or `disp` command to display your program outputs in the command window. There is no need to display the inputs.

Chap 9: Exercise 1

In a single mfile, display the expression in all the parts below in the command window.

a. $y = \frac{2}{3} x^2 + x + x^{1/2}$
b. $z = \dfrac{x^2 y}{x+1}$
c. $P = \dfrac{mRT}{V}$
d. $x = \dfrac{M_v}{(M_v + M_l)}$

Output each solution to the command window. Make sure to use the `fprintf` statement or `disp` command to display your program outputs in the command window. There is no need to display the inputs.