ECE-1304-001 Spring – 2020

Homework #**1**
Due Date: **01/31/2020** (11:59 PM)

Note: This assignment **MUST** be uploaded on Blackboard as a single file (***pdf*** format)

1. What are the outputs of the following command lines?

```
a=3 ; b=-2 ; c=4;
a+2*b*c
(a+2)*b*c
(a+2*b)*c
```

2. Convert each of the mathematical formula to a MATLAB expression:

(a) $\frac{x(2y^2-5)}{z+3}$ (b) $\frac{2x-3x+7}{(x-5)^2}$ (c) $\frac{x-3}{\sqrt{x^2-3x+5}}$

3. Which of the following is(are) **valid** MATLAB assignment statement(s)?
(assume variables **a**, **b**, **c**, **q**, **x**, **y** and **z** were initialized)

(a) y + z = x;
(b) y = b * -c;
(c) x = q - (y * z);
(d) x = x**2 + y**2;
(e) x = a b;
(f) a=((b+1)^2+(c-1)^2)^(0.5)

4. Write the **MATLAB commands** that generate each of the following matrices:

(a) $A=\begin{bmatrix} 0 & 9 \\ 4 & 6 \\ 5 & -1 \\ -11 & 8 \end{bmatrix}$ (b) $B=\begin{bmatrix} -3 \\ 5 \\ 7 \end{bmatrix}$ (c) $C=\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

5. Write the **MATLAB commands** that generate **automatically** the following one-dimensional arrays:

(a) 0.1000 0.4000 0.7000 1.0000 1.3000 1.6000 1.9000 2.2000 2.5000

(b) 1.0000 1.2833 1.5667 1.8500 2.1333 2.4167 2.7000

6. Consider the matrix below:

$$A=\begin{bmatrix} 2 & -5 & 6 \\ 3 & 1 & 7 \\ 0 & 4 & -2 \end{bmatrix}$$

Using the MATLAB command window determine the **trace**, **maximum**, **minimum**, **determinant**, **transpose** and **inverse** (if exists) of matrix A. **Show** the commands you used to obtain these parameters.

7. What are the final values of the matrices **A** and **B** after executing the following commands:

```
A=[-1,1,2 ; 1,-3,4 ; 5,9,7];
B=A(1,1) : A(2,1) : A(3,3);
A(1,2)=-6 ; A(3,2)=0 ; A(1,2)=8;
```

8. Consider the following matrices:

$$A=\begin{bmatrix} 2 & 0 \\ -1 & 5 \\ 3 & 4 \end{bmatrix} \quad ; \quad B=\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \quad ; \quad C=\begin{bmatrix} 9 & 0 & 5 \\ 8 & 6 & -3 \\ 2 & 1 & 4 \end{bmatrix}$$

Which of the following matrix multiplications are valid: **A*B** , **A*C**, **B*A**, **B*C**, **C*A**, **C*B**. **If** the multiplication is valid provide the corresponding result.

9. Consider the complex numbers:

Z1=2-3j
Z2=1+6j

a) Calculate the **magnitude** and **phase** **(**or **angle)** of each complex number. Express the **phase** **(**or **angle)** in both **degrees** and **radians**. **Show the commands** used to perform these operations.

b) Using the **Matlab command** window calculate: **Z1*Z2** and **Z1/Z2**

10. Using Matlab matrix analysis, determine the solution of the linear system of equations below. **Show the command lines** used to obtain the solutions.

(a) $\begin{cases} 2x+z=5 \\ -3x+2y=0 \\ 4x-3y+5z=15 \end{cases}$

(b) $\begin{cases} 2x+y-5z+t=3 \\ x-3y-6t=2 \\ 2y-z+2t=0 \\ x+y-z+6t=4 \end{cases}$