Tutorial 1

Q1. Convert the following system of equations into matrix format

$$3x_1 + 2x_2 + 4x_3 = 14,$$
$$x_1 - 2x_2 = -7,$$
$$-x_1 + 3x_2 + 2x_3 = 2.$$

Q2. Two matrices A and B are defined as follows.

$$A = \begin{bmatrix} 3 & 7 & 1 \\ -2 & 1 & -3 \end{bmatrix}, \qquad B = \begin{bmatrix} 5 & -2 \\ 0 & 3 \\ 1 & -1 \end{bmatrix}$$

a) Can they be multiplied? If yes, calculate A*B and B*A in MATLAB.
b) Calculate $2A^T - 3B$ in MATLAB
c) Show in MATLAB that $(A*B)^T = B^T*A^T$

Q3. Solve the following system of 3 equations in 3 variables using Cramer's rule:

$$x + y + z = 2$$
$$2x + y + 3z = 9$$
$$x - 3y + z = 10$$

Carry out the solution first with pen and paper. Implement the same in MATLAB.

Q4. Solve the above problem by taking the inverse of the coefficient matrix.

Q5. Solve the above problem by MATLAB in-built functions? What is the algorithm behind the in-built function?

Q6. Write a code in MATLAB to convert the above coefficient matrix (A) in Q3 to a lower and upper triangular matrix without changing other elements.

Q7. Write a code in MATLAB to convert the above coefficient matrix (A) in Q3 to a column vector comprising the same 9 elements in order.