MTP 290 Computing Laboratory Assignment-I

1. Form with MATLAB the matrices:
   $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$
   $B = \begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$
   $C = \begin{bmatrix} 7 & 2 & 3 \\ 1 & 5 & 3 \end{bmatrix}$
   Compute the following matrix computations:
   $AB, BA, A+B, A+C, BC, CC, CC^T$
   Which of the computations could not be computed?

2. The distance between the two points (x_1, y_1) and (x_2, y_2) on a cartesian coordinate plane is given by the equation $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$
   Write a program to calculate the distance between any two points specified by the user.

3. Write a MATLAB script file to count the number of occurences of a number n in a vactor of numbers v.For example, the number of occurence of 4 in [1,3,4,5,1,4] is 2.

4. Write a MATLAB function to calculate the factorial of a number N. Make sure you handle the case 0! Report an error if N is negative.

5. Write a MATLAB program to check arbitrary number whether it is prime or not?

6. Consider the following functions. $f_1(n) = 100n^2$ and $f_2(n) = 10n^3$ Plot the functions for different values of n.Hence find the minimum value of n for which $f_2 > f_1$.

7. Represent the polynomial $f = s^3 - 5s^2 - 45s - 23; g = x^5 + 3x - 4$ in MATLAB.
   Find the roots of the equation:$s^3 - 5s^2 - 45s - 23 = 0$

8. Let $f(x) = 9x^3 - 5x^2 + 3x + 7$ and $g(x) = 6x^2 - x + 2$
   Find $f(x)g(x)$ and $\frac{f(x)}{g(x)}$

9. Write a MATLAB program to find the roots of a second order polynomial equation of the form $ax^2 + bx + c = 0$.

10. Consider the system of linear equations
$x_1 + 2x_2 + 3x_3 = 5$
$2x_1 + 5x_2 + 3x_3 = 3$
$x_1 + 8x_3 = 17$

Write a Matlab program to determine the unknowns x_1,x_2 and x_3 by matrix inversion.

11. Given the matrices
$A = \begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$
$S = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$
Write a Matlab program which calculates $D = S^{-1}AS$ and computes the determinants of D and A.