NPTEL course offered by IIT Madras
Computer methods of analysis of offshore structures
ASSIGNMENT – 0

1. This assignment is not considered for grading.
2. Participants should be able to solve this assignment by basic MATLAB operations

3. This assignment will make participants familiar of computer programming that is required for the course

1. Let $A=\begin{bmatrix}1 & 2 & 1\\ 4 & 1 & 3\\ 1 & 7 & 5\end{bmatrix}$, $B=\begin{bmatrix}1 & -1 & 1\\ 5 & 0 & -3\\ 1 & 2 & -4\end{bmatrix}$

Using MATLAB, evaluate the following:

a) Extract the first 2 x 2 sub-matrix from [A]
b) Replace the first 2 x 2 sub-matrix of [A] by first 2 x 2 matrix of [B]
c) Obtain A^TB.
d) Obtain A/B.
e) Element wise multiplication of [A] and [B].
f) Delete second row and second column of [B] and form a 2 x 2 matrix.

2. Write a computer program using MATLAB to solve the system of equations given below:

a) 4x + 3y + z = 9; x – 4y + 10z = 0; 2x + 3y - 5z = 4

b) 4x + 3y +3z – 6s + 7t = 48; 2x + 2y + z + 4s – t = 11; x + 3y – 5z + s - 4t = -46; 2x + 4y – z – s = -7; 3x – 2y + z – t = 5

(Hint: Frame the equations in matrix form AX=B, then X can be calculated by $X=A^{-1}B$. Use 'inv' command in MATLAB to get A^{-1})

3. Write a computer program using MATLAB to the following curves in a single figure with functions $y = 4x^2+2x-3$ and $z = 3x – 2$, where x varies from -5 to 5.

(Hint: Use 'plot' and 'hold' command)

4. Write a MATLAB program to find the sum of elements in a row vector {A} using 'for' statement.

{A} = {2 5 7 4 5 6 9 5 1 7 5 3}. Also find the average and print the results.

(Hint: Use 'fprintf' for getting the result)

5. Let $A=\begin{bmatrix}1 & 0 & 2\\ 6 & 4 & 5\\ 1 & 9 & 6\end{bmatrix}$, form a matrix [B] of size 12 x 12 by mapping [A] matrix diagonally to [B]; remaining elements in [B] matrix is zero. The output matrix should be as follows:

$$B=\begin{bmatrix}
1&0&2&0&0&0&0&0&0&0&0&0\\
6&4&5&0&0&0&0&0&0&0&0&0\\
1&9&6&0&0&0&0&0&0&0&0&0\\
0&0&0&1&0&2&0&0&0&0&0&0\\
0&0&0&6&4&5&0&0&0&0&0&0\\
0&0&0&1&9&6&0&0&0&0&0&0\\
0&0&0&0&0&0&1&0&2&0&0&0\\
0&0&0&0&0&0&6&4&5&0&0&0\\
0&0&0&0&0&0&1&9&6&0&0&0\\
0&0&0&0&0&0&0&0&0&1&0&2\\
0&0&0&0&0&0&0&0&0&6&4&5\\
0&0&0&0&0&0&0&0&0&1&9&6
\end{bmatrix}$$

(Hint: Map the elements by its row and column number positions)