# TASK-1

1. a) $A = 2\times3$ , $B = 4\times3$ , $C = 1\times5$

b) D and G

c) G

d) B

e) A , B

f) F , E

g) C , E

h) $A^T = \begin{bmatrix} -1 & 0 \\ 23 & -2 \\ 10 & -11 \end{bmatrix}$

$C^T = \begin{bmatrix} -3 \\ 2 \\ 9 \\ -5 \\ 7 \end{bmatrix}$

2. a) $AB = \begin{bmatrix} 3 & -1 & -2 \\ -1 & 4 & -2 \end{bmatrix}$

b) BC Not possible

c) AD " "

d) EF " "

e) $FE = \begin{bmatrix} -25 \\ -65 \\ 56 \end{bmatrix}$

3. $|M| = \begin{vmatrix} 2 & 3 & 1 \\ -1 & 2 & 3 \\ 3 & 2 & -1 \end{vmatrix}$

$= 2(-2-6) - 3(1-9) + 1(-2-6)$

$= 0$

4. $|A| = 1(1-1) - 0 + 1(0-1) = -1$

$A_{minor} = \begin{bmatrix} 0 & -1 & -1 \\ 1 & 0 & -1 \\ -1 & -1 & 1 \end{bmatrix}$ → symmetrical Aminor = $A_{adj}$

$\Rightarrow A_{adj} = \begin{bmatrix} 0 & 1 & -1 \\ 1 & 0 & -1 \\ -1 & -1 & 1 \end{bmatrix}$

$\Rightarrow A^{-1} = \frac{1}{-1} \begin{bmatrix} 0 & -1 & -1 \\ 1 & 0 & -1 \\ -1 & -1 & 1 \end{bmatrix} = \begin{bmatrix} 0 & -1 & 1 \\ -1 & 0 & 1 \\ 1 & 1 & -1 \end{bmatrix}$

5. b

6. $f(x,y) = x^T Ay + x^T Bx - Cy + D$

$x \in \mathbb{R}^M \rightarrow M \times 1$

$y \in \mathbb{R}^N \rightarrow N \times 1$

① $x^T Ay$ : $x^T \rightarrow 1 \times M$, $y \rightarrow N \times 1$ ∴ $A = M \times N$

② $x^T Bx$ : $x^T \rightarrow 1 \times M$, $x \rightarrow M \times 1$ ∴ $B = M \times M$

③ $Cy$ : $y \rightarrow N \times 1$ ∴ $C = 1 \times N$

④ $D$ : $1 \times 1$ (scalar)