Q1:- $A = \begin{bmatrix} 1 & 0 & -1 & 2 \\ 3 & 1 & 2 & 5 \\ 0 & -2 & 1 & 6 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -1 & 3 & 1 \\ 1 & 3 & -1 & 4 \\ 3 & 1 & 2 & -1 \end{bmatrix}$

Then Show that $(A+B)^t = A^t + B^t$

$A+B = \begin{bmatrix} 3 & -1 & 2 & 3 \\ 4 & 4 & 1 & 9 \\ 3 & -1 & 3 & 5 \end{bmatrix}$, $(A+B)^t = \begin{bmatrix} 3 & 4 & 3 \\ -1 & 4 & -1 \\ 2 & 1 & 3 \\ 3 & 9 & 5 \end{bmatrix}$

and

$A^t + B^t = \begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & -2 \\ -1 & 2 & 1 \\ 2 & 5 & 6 \end{bmatrix} + \begin{bmatrix} 2 & 1 & 3 \\ -1 & 3 & 1 \\ 3 & -1 & 2 \\ 1 & 4 & -1 \end{bmatrix} = \begin{bmatrix} 3 & 4 & 3 \\ -1 & 4 & -1 \\ 2 & 1 & 3 \\ 3 & 9 & 5 \end{bmatrix}$

Scalar Multiplication :- $r(A+B) = rA + rB$

Multiplication of two matrices :- order 2×2

$A = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$ 2×1

$AxB = \begin{bmatrix} 2x & +3x5 \\ 1x & +4x5 \end{bmatrix} = \begin{bmatrix} 6 & +15 \\ 3 & +20 \end{bmatrix} = \begin{bmatrix} 21 \\ 23 \end{bmatrix}$

+	−	=	−
−	−	=	+
+	+	=	+
−	+	=	−

Determinant :- $A = \begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$, $|A| = \begin{vmatrix} 2 & -1 \\ 4 & 3 \end{vmatrix} = 6+4 = 10$

$|A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$

if $|A| = 0$, matrix is Singular matrix, if $|A| \neq 0$, non-Singular

Adjoint :- $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, $adj\,A = \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

$AA^{-1} = I$

Inverse of a 2×2 matrix :- $A^{-1} = \frac{1}{|A|} adj\,A$