23.02.25

* Find the order of a matrix :-

Q1. If A is 1×3 order & B is 2×3 order then AB = order?

→ A×B

= (1×3) × (2×3)

= (1 × 3)

Q2. If order of A is 2×3 then what will be the order of A^T ?

= ~~A^T = 3×2~~

let, $A = \begin{bmatrix} 2 & 3 & 5 \\ 6 & 0 & 7 \end{bmatrix}_{2\times3}$

$\therefore A^T = \begin{bmatrix} 2 & 6 \\ 3 & 0 \\ 5 & 7 \end{bmatrix}_{3\times2}$

$\therefore$ A^T order is 3×2 Ans.

Q3. If $x = \{1\ 0\ 1\}_{1\times3}$ and $y = \begin{Bmatrix} 1 \\ 2 \\ 3 \end{Bmatrix}_{3\times1}$ find the order of (a) xy, (b) yx, (c) $x+y^T$ and (d) x^T+y

→ Given; $x \to 1\times3$ $\therefore x^T \to 3\times1$

$y \to 3\times1$ $\therefore y^T \to 1\times3$

(a) xy = (1×3) × (3×1) = 1×1

(b) yx = (3×1) × (1×3) = 3×3

(c) $x+y^T$ = (1×3) × (1×3) = 1×3 Ans ✓

(d) x^T+y = (3×1) × (3×1) = 3×1

Q4. Find the order of the followings — (a) AB, (b) BC & (c) ABC If A = 2×3, B = 3×1, & C = 1×3

→ Given, A → 2×3
B → 3×1
C → 1×3

(a) AB = (2×3)×(3×1) → 2×1

(b) BC → (3×1)×(1×3) → 3×3 Ans.

(c) ABC → (2×3)×(3×3) → 2×3

* Singular and Non-Singular matrix :—

let A is a matrix, if |A| = 0, then it is a Singular matrix or and if |A| ≠ 0 then it is a non-singular matrix.

Q1. Show that the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 2 \\ 1 & 3 & 4 \end{bmatrix}$ is singular

→ ∴ $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 2 \\ 1 & 3 & 4 \end{bmatrix}$

then, $|A| = \begin{vmatrix} 1 & 2 & 3 \\ 1 & 1 & 2 \\ 1 & 3 & 4 \end{vmatrix}$

$= 1\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} - 2\begin{vmatrix} 1 & 2 \\ 1 & 4 \end{vmatrix} + 3\begin{vmatrix} 1 & 1 \\ 1 & 3 \end{vmatrix}$

$= 1(4-6) - 2(4-2) + 3(3-1)$

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

$= -2 - 4 + 6$

$= 0$ Ans

$\therefore |A| = 0$, so, A is a singular matrix. (proved).

Q2. If $A = \begin{bmatrix} a & h & g \\ h & b & f \\ g & f & c \end{bmatrix}$ then a is a singular or non-singular.

$\rightarrow \therefore |A| = \begin{vmatrix} a & hg \\ h & bf \\ g & fc \end{vmatrix}$

$= a\begin{vmatrix} b & f \\ f & c \end{vmatrix} - h\begin{vmatrix} h & f \\ g & c \end{vmatrix} g\begin{vmatrix} h & b \\ g & f \end{vmatrix}$

$= a(bc - f^2) - h(hc - gf) + g(hf - bg)$

$= abc - af^2 - h^2 + ghf + ghf - bg^2$

$\therefore |A| \neq 0$, so. A is a non-singular matrix (proved)