Matrix

Q.1) if A & B are square Matrix of same order then

A) $A+B = B+A$ ✓

B) $A+B = A-B$

C) $A-B = B-A$

d) $\boxed{AB = BA}$

$A + B = B+A$ ✓

$$\begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix} + \begin{bmatrix} 0 & 1 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 7 & 6 \end{bmatrix}$$

$5-3=2$

$3-5=-2$

$[AB = BA = I]$

Matrix

Q.2) if $\underbrace{\begin{bmatrix} 1 & x & 1 \end{bmatrix}}_{A,\ 1\times 3} \underbrace{\begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & 3 & 2 \end{bmatrix}}_{B,\ 3\times 3} \underbrace{\begin{bmatrix} x \\ 1 \\ -2 \end{bmatrix}}_{C} = 0$ find $x = ?$

$\left[\begin{array}{l} (AB)' = B'A' \\ (ABC)' = C'B'A' \end{array}\right.$

[1-2]

Q(3) if A is symm. matrix then prove that $\boxed{B^T AB}$ is also symm. matrix.

Sol^n :- $\underbrace{\begin{bmatrix} 1 & 6+5x & 4+x \end{bmatrix}}_{1\times 3} \underbrace{\begin{bmatrix} x \\ 1 \\ -2 \end{bmatrix}}_{3\times 1} = 0$

$[x+6+5x-2(4+x)] = 0$

$\Rightarrow [x+6+5x-8-2x] = 0$

$\Rightarrow [4x-2] = 0$

$\Rightarrow 4x-2 = 0$

$\Rightarrow 4x = 2$

$x = \frac{2}{4} = \frac{1}{2}$ Ans

Q.3 if A is symm. $\rightarrow$ $A = A'$

prove :- $B^T AB \rightarrow$ symm.

i.e. $(\underbrace{B^T AB}_{C}) = (B^T AB)'$

$\Rightarrow \boxed{C = C'}$ ✓

Now

$C' = (B^T AB)' = B'.A'(B^T)' = B'A'B$

$C' = B'AB = C \Rightarrow C' = C$ H.P.

Matrix

Q.(4) if $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $A^2 + 2A$ equals = ?

A) $4A$ C) = $2A$

B) $3A$ D = A.

$A + 2A = 3A$

$\underline{A = I}$

$\boxed{I^2 = I}$

$A^2 = A$

$\underline{A.A} = A^2 = A$

$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Q.(5) which is true and false?

i) Matrix Multi. is Commutative.

ii) Matrix Multi. is associative.

iii) Matrix addition is Commutative.

iv) Matrix addition is associative.

i) $A.B \neq BA$ φ

✓ ii) $(AB)C = A(BC)$

✓ iii) $A + B = B + A$

✓ iv) $(A+B)+C = A+(B+C)$

Matrix

Q.81 if $Ax = B$, $B = \begin{bmatrix} 9 \\ 52 \\ 0 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 3 & -1/2 & -1/2 \\ -4 & 3/4 & 5/4 \\ 2 & -1/4 & -3/4 \end{bmatrix}$

then $x = ?$

A) $\begin{bmatrix} 1 \\ 3 \\ 5 \end{bmatrix}$ B) $= \begin{bmatrix} -4 \\ 2 \\ 3 \end{bmatrix}$

C) $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ D) $= \begin{bmatrix} -1 \\ 0 \\ 2 \end{bmatrix}$

$AB^2 = \underline{AB} \cdot AB$

$0 \cdot 0 = 0$

from eqⁿ ① & ② :-

$$\boxed{\underline{(A+B)^2} = (A-B)^2}$$

Q.71 if A & B are square Matrix of same order :- such that :-

$\boxed{A^2 = A}$, $\boxed{B^2 = B}$, $\boxed{AB = BA = 0}$

then

A) $(A+B)^2 = (A-B)^2$

B) $\boxed{(AB)^2 = I}$ φ

C) $AB = I$ φ

D) $(A-B)^2 = \underline{A-B}$ φ

A) $(A+B)^2 = (A+B)(A+B)$

$A^2 + AB + BA + B^2$

$$\boxed{(A+B)^2 = A + 0 + 0 + B = \boxed{A+B}} \rightarrow ①$$

$(A-B)^2 = (A-B)(A-B) = \underline{A^2} - AB - BA + B^2$

$A - 0 - 0 + B$

$$\boxed{(A-B)^2 = A+B} \rightarrow ②$$