PARISHRAM 2026

Maths

DPP: 4

MATRICES

Q1 If $A = \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$, then $(A^T)^T$ is:

(A) $\begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$

(C) $\begin{bmatrix} -1 & 2 \\ 4 & 3 \end{bmatrix}$ (D) None of these

Q2 If $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$, then A^T is:

(A) $\begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 2 \\ 4 & 5 \\ 3 & 6 \end{bmatrix}$

(C) $\begin{bmatrix} 4 & 1 \\ 5 & 2 \\ 6 & 3 \end{bmatrix}$ (D) None of these

Q3 Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$. Find $(2A)^T$

(A) $\begin{bmatrix} 2 & 6 \\ 4 & 8 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & 6 \\ 4 & 8 \end{bmatrix}$ (D) $\begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$

Q4 For any two matrices A and B such that AB is defined, which is true?

(A) $(AB)^T = A^T B^T$ (B) $(AB)^T = B^T A^T$

(C) $\left(AB\right)^T = AB^T$ (D) $\left(AB\right)^T = BA^T$

Q5 The transpose of an upper triangular matrix is:

(A) Diagonal

(B) Lower triangular

(C) Skew-symmetric

(D) Symmetric

Q6 Which of the following is not true?

(A) $(A^T)^T = A$ (B) $(AB)^T = A^T B^T$

(C) $(A+B)^T = A^T + B^T$ (D) $\left(kA\right)^T = kA^T$

Q7 If $A^T = A$ and $B^T = -B$, then what is $(AB)^T$?

(A) $B^T A^T = -BA$ (B) $B^T A^T = AB$

(C) $A^T B^T = -AB$ (D) $B^T A^T = A^T B^T$

Q8 Let $A = BB^T + CC^T$, where $B = \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}, C = \begin{bmatrix} \sin\theta \\ -\cos\theta \end{bmatrix}; \theta \in R$. Then A is :

(A) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$

Q9 If $A = \begin{bmatrix} 5a & -b \\ 3 & 2 \end{bmatrix}$ and $A \operatorname{adj} A = AA^T$, then $5a + b$ is equal to :

(A) 13 (B) -1

(C) 5 (D) 4

Answer Key

Q1	(B)
Q2	(A)
Q3	(A)
Q4	(B)
Q5	(B)
Q6	(B)
Q7	(A)
Q8	(C)
Q9	(C)

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 **Text Solution:**

We know that $\left(A^T\right)^T = A$.

So, the matrix remains the same. Hence, option B.

Video Solution:

Q2 **Text Solution:**

Transpose: Flip rows and columns

Row 1 $\rightarrow$ Column 1: [1, 2, 3] $\rightarrow$[1 ; 2 ; 3]

Row 2 $\rightarrow$ Column 2: [4, 5, 6] $\rightarrow$[4 ; 5 ; 6]

Video Solution:

Q3 **Text Solution:**

First compute $2A = \begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$

Then transpose = same (since symmetric here)

Video Solution:

Q4 **Text Solution:**

Transpose of product rule:

$(AB)^T = B^T A^T$

Video Solution:

Q5 **Text Solution:**

Transpose flips rows and columns $\rightarrow$ upper becomes lower triangular.

Video Solution:

Q6 **Text Solution:**

Correct is $(AB)^T = B^T A^T$, not $A^T B^T$ $\rightarrow$ hence incorrect.

Video Solution:

Q7 **Text Solution:**

$(AB)^T = B^T A^T = -BA = -BA$

Video Solution:

Q8 Text Solution:

$A = BB^T + CC^T$

$= \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix} \begin{bmatrix} \cos\theta & \sin\theta \end{bmatrix} + \begin{bmatrix} \sin\theta \\ -\cos\theta \end{bmatrix} \begin{bmatrix} \sin\theta & -\cos\theta \end{bmatrix}$

$= \begin{bmatrix} \cos^2\theta & \cos\theta.\ \sin\theta \\ \sin\theta.\ \cos\theta & \sin^2\theta \end{bmatrix}$

$+ \begin{bmatrix} \sin^2\theta & -\sin\theta.\ \cos\theta \\ -\sin\theta.\ \cos\theta & \cos^2\theta \end{bmatrix}$

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

Video Solution:

Q9 Text Solution:

Given, $A. adj\ A = A.\ A^T$

$A = \begin{bmatrix} 5a & -b \\ 3 & 2 \end{bmatrix}, adj\ A = \begin{bmatrix} 2 & b \\ -3 & 5a \end{bmatrix},$

$A^T = \begin{bmatrix} 5a & 3 \\ -b & 2 \end{bmatrix}$

$A,\ adj\ A = A. A^T$

$\begin{bmatrix} 5a & -b \\ 3 & 2 \end{bmatrix} \begin{bmatrix} 2 & b \\ -3 & 5a \end{bmatrix} =$

$\begin{bmatrix} 5a & -b \\ 3 & 2 \end{bmatrix} \begin{bmatrix} 5a & 3 \\ -b & 2 \end{bmatrix}$

$\begin{bmatrix} 10a + 3b & 0 \\ 0 & 10a + 3b \end{bmatrix} =$

$\begin{bmatrix} 25a^2 + b^2 & 15a - 2b \\ 15a - 2b & 13 \end{bmatrix}$

comparing both side, we get

15a - 2b = 0.....(i)

10a + 3b = 13......(ii)

Solving two equation, we get the values of a & b

$a = \frac{2}{5}, b = 3$

$Now,$

$5a + b = 5 \times \frac{2}{5} + 3 = 5$

Video Solution: