LATEX ASSIGNMENT

ANAND

01-09-2023

¿

EXERCISE 12.3.3

1. Find the transpose of eaach of the following matrices:

   (i) $\begin{pmatrix} 5 \\ \frac{1}{2} \\ -1 \end{pmatrix}$

   (ii) $\begin{pmatrix} 1 & -1 \\ 2 & -3 \end{pmatrix}$

   (iii) $\begin{pmatrix} -1 & 5 & 6 \\ \sqrt{3} & 5 & 6 \\ 2 & 3 & 1 \end{pmatrix}$

2. If $A = \begin{pmatrix} -1 & 2 & 3 \\ 5 & 7 & 9 \\ -2 & 3 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} -4 & 1 & -5 \\ 1 & 2 & 0 \\ 1 & 3 & 1 \end{pmatrix}$, then verify that

   (a) $(A + B) = A' + B'$

   (b) $(A - B)' = A' - B'$

3. If $A = \begin{pmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 0 \\ 1 & 2 \end{pmatrix}$, then find $(A + 2B)'$

4. If $A = \begin{pmatrix} -2 & 3 \\ 1 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 0 \\ 1 & 2 \end{pmatrix}$, then find the $(A + 2B)'$

5. For the matrices A and B, Verify that $(AB)' = B'A'$, where

   (i) $A = \begin{pmatrix} 1 \\ -4 \\ 3 \end{pmatrix}, B = \begin{pmatrix} -1.2 & 1 \end{pmatrix}$

(ii) $A = \begin{pmatrix} 0 \\ 1 \\ 2 \end{pmatrix}, B = \begin{pmatrix} 1 & 5 & 7 \end{pmatrix}$

6. If

   (i) $A = \begin{pmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{pmatrix}$, then verify that $A + A' = I$

   (ii) $A = \begin{pmatrix} \sin\alpha & \cos\alpha \\ -\cos\alpha & \sin\alpha \end{pmatrix}$, then verify that $A + A' = I$

7. (i) Show that the matrix $A = \begin{pmatrix} 1 & -1 & 5 \\ -1 & 2 & 1 \\ 5 & 1 & 3 \end{pmatrix}$ is a symmetrical matrix.

   (ii) Show that the matrix $A = \begin{pmatrix} 0 & 1 & -1 \\ -1 & 0 & 1 \\ 1 & -1 & 0 \end{pmatrix}$ is a skew symmetric matrix.

8. For the matrix $A = \begin{pmatrix} 1 & 5 \\ 5 & 7 \end{pmatrix}$, verify that

   (i) $(A + A)$ is a symmetric matrix.

   (ii) $(A - A)$ ia a skew symmetric matrix.

9. Find $\frac{1}{2}(A + A')$ and $\frac{1}{2}(A - A')$, when $A = \begin{pmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{pmatrix}$

10. Express the following matrices as the sum of a symmetric and a skew symmetric matrix:

    (i) $\begin{pmatrix} 3 & 5 \\ 1 & -1 \end{pmatrix}$

    (ii) $\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$

    (iii) $\begin{pmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{pmatrix}$

    (iv) $\begin{pmatrix} 1 & 5 \\ -1 & 2 \end{pmatrix}$

11. If A, B are symmetric matrices of same order, then $AB - BA$ is a

    (a) Skew symmetric matrix

    (b) Symmetric matrix

    (c) Zero matrix

2

(d) Identity matrix

12. If $A = \begin{pmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{pmatrix}$ and $A + A' = 1$ then the value of α is

   (a) $\frac{\pi}{6}$
   (b) $\frac{\pi}{3}$
   (c) π
   (d) $\frac{3\pi}{2}$