

# LATEX ASSIGNMENT

ANAND

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$i$

## EXERCISE 11.12.3

1. Find the transpose of each 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  $A'A = 1$

(ii)  $A = \begin{pmatrix} \sin \alpha & \cos \alpha \\ -\cos \alpha & \sin \alpha \end{pmatrix}$ , then verify that  $A'A = 1$

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)  $(A - A)$  is 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

(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  $\alpha$  is

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