ASSIGNMENT 4

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- **Exercise:2.19:**

If,

$$A' = \begin{pmatrix} -2 & 3 \\ 1 & 2 \end{pmatrix}$$

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

Solution:

Given,

$$A' = \begin{pmatrix} -2 & 3 \\ 1 & 2 \end{pmatrix}$$

and

$$B = \begin{pmatrix} -1 & 0 \\ 1 & 2 \end{pmatrix}$$

Now,

$$A = \begin{pmatrix} -2 & 1 \\ 3 & 2 \end{pmatrix}$$

and,

$$2B = \begin{pmatrix} -2 & 0 \\ 2 & 4 \end{pmatrix}$$

Now,

$$A + 2B = \begin{pmatrix} -2 & 1 \\ 3 & 2 \end{pmatrix} + \begin{pmatrix} -2 & 0 \\ 2 & 4 \end{pmatrix}$$

Or,

$$A + 2B = \begin{pmatrix} -4 & 1 \\ 5 & 6 \end{pmatrix}$$

and

$$(A + 2B)' = \begin{pmatrix} -4 & 5 \\ 1 & 6 \end{pmatrix}$$

Exercise:2.21:

For the matrix,

$$A = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix}$$

verify that

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

Solution:

Given,

$$A = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix}$$

For matrix to be symmetric

$(A + A') = (A + A')'$

Now,

$$A' = \begin{pmatrix} 1 & 6 \\ 5 & 7 \end{pmatrix}$$

$$(A + A') = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix} + \begin{pmatrix} 1 & 6 \\ 5 & 7 \end{pmatrix}$$

Or,

$$(A + A') = \begin{pmatrix} 1 & 11 \\ 11 & 14 \end{pmatrix}$$

Also,

$$(A + A')' = \begin{pmatrix} 1 & 11 \\ 11 & 14 \end{pmatrix}$$

we get, $(A + A') = (A + A')'$

Therefore, $(A + A')$ is symmetric.
ii)(A-A') is a skew-symmetric matrix.

Solution:

Given,

$$A = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix}$$

For matrix to be skew-symmetric

$(A - A') = -(A - A')'$

Now,

$$A' = \begin{pmatrix} 1 & 6 \\ 5 & 7 \end{pmatrix}$$

$$(A - A') = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix} - \begin{pmatrix} 1 & 6 \\ 5 & 7 \end{pmatrix}$$

Or,

$$(A - A') = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

Also,

$$(A - A')' = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

and

$$-(A - A')' = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

we get, $(A - A') = -(A - A')'$

Therefore, $(A - A')$ is skew-symmetric.