

Diagonal matrix :- In linear algebra, a diagonal matrix is a matrix in which the entries outside the main diagonal are all zero; the term usually refers to square matrices.

ex: -
$$\begin{bmatrix} 3 & 0 \\ 0 & 2 \end{bmatrix}$$

ex: -
$$\begin{bmatrix} 6 & 0 & 0 \\ 0 & 7 & 0 \\ 0 & 0 & 4 \end{bmatrix}$$

Symmetric Matrix :- In linear algebra, a symmetric matrix is a square matrix that is equal to its transpose.

ex: -
$$A = \begin{bmatrix} 1 & 7 & 3 \\ 7 & 4 & -5 \\ 3 & -5 & 6 \end{bmatrix}$$

$$A' = \begin{bmatrix} 1 & 7 & 3 \\ 7 & 4 & -5 \\ 3 & -5 & 6 \end{bmatrix}$$

$$\boxed{A = A'}$$

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Skew Symmetric Matrix :- A skew-symmetric is a square matrix whose transpose is equal to its negative.

$$\text{ex: } A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ 2 & -3 & 0 \end{bmatrix}$$

$$A' = \begin{bmatrix} 0 & -1 & 2 \\ 1 & 0 & -3 \\ -2 & 3 & 0 \end{bmatrix}$$

$$\therefore \boxed{A = -A'}$$