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Quiz : 1

①

Answer to the Q: N: 2

Here,

$$A = \begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & -4 \end{bmatrix}$$

$\therefore A^2 + 2A + \text{tra}(A^T)$

$$A^2 = \begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & -4 \end{bmatrix} \times \begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & -4 \end{bmatrix}$$

$$= \begin{bmatrix} 75 & -89 & -13 \\ -89 & 117 & 1 \\ -13 & 1 & 21 \end{bmatrix}$$

$$2A = 2\begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & -4 \end{bmatrix}$$

$$= \begin{bmatrix} 10 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & -8 \end{bmatrix}$$

$$A^T = \begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & -4 \end{bmatrix}$$

$$= \begin{bmatrix} 5 & -7 & 1 \\ -7 & 8 & 2 \\ 1 & 2 & -4 \end{bmatrix}$$

$$\text{tra}(A^T) = 5 + 8 - 4$$
$$= 9$$

then compute,

$$A^2 + 2A + \text{tra}(A^T)$$

$$= \begin{bmatrix} 75 & -89 & -13 \\ -89 & 117 & 1 \\ -13 & 1 & 21 \end{bmatrix} + \begin{bmatrix} 10 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & -8 \end{bmatrix} + 9I$$

$$= \begin{bmatrix} 75 & -89 & -13 \\ -89 & 117 & 1 \\ -13 & 1 & 21 \end{bmatrix} + \begin{bmatrix} 10 & -14 & 2 \\ -14 & 16 & 4 \\ 2 & 4 & -8 \end{bmatrix} + \begin{bmatrix} 9 & 0 & 0 \\ 0 & 9 & 0 \\ 0 & 0 & 9 \end{bmatrix}$$

$$= \begin{bmatrix} 94 & -103 & -11 \\ -103 & 142 & 5 \\ -11 & 5 & 22 \end{bmatrix}$$

$$\therefore A^2 + 2A + \text{tra}(A^T) = \begin{bmatrix} 94 & -103 & -11 \\ -103 & 142 & 5 \\ -11 & 5 & 22 \end{bmatrix}$$

Answer to the Q: N: 1

Here,

$$x_1 + 2x_2 - 3x_3 + 4x_4 = 2$$

$$2x_1 + 5x_2 - 2x_3 + x_4 = 1$$

$$5x_1 + 12x_2 - 7x_3 + 6x_4 = 3$$

$$\text{Argumented matrix} = \left[\begin{array}{cccc|c} 1 & 2 & -3 & 4 & 2 \\ 2 & 5 & -2 & 1 & 1 \\ 5 & 12 & -7 & 6 & 3 \end{array}\right]$$

Now, we have to solve this matrix by Gauss elimination and hence Gauss Jordan elimination method.

$$\left[\begin{array}{cccc|c} 1 & 2 & -3 & 4 & 2 \\ 2 & 5 & -2 & 1 & 1 \\ -5 & 12 & -7 & 6 & 3 \end{array}\right]$$

$$= \cancel{1} \quad \cancel{2}$$

$$\cancel{2}$$

$$= \begin{bmatrix} -2 & -4 & 6 & -8 & -4 \\ 0 & 1 & 4 & -7 & -3 \\ -5 & 12 & -7 & 6 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 2 & -3 & 4 & 2 \\ 0 & 1 & 4 & -7 & -3 \\ -5 & 12 & -7 & 6 & 3 \end{bmatrix}$$