5.5.29 Matgeo

AI25BTECH11012 - Garige Unnathi

Question

If the inverse of the matrix $\begin{bmatrix} 7 & -3 & -3 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix}$ is the matrix $\begin{bmatrix} 1 & 3 & 3 \\ 1 & \lambda & 3 \\ 1 & 3 & 4 \end{bmatrix}$,

then find the value of λ .

Solution

Let :

$$\mathbf{A} = \begin{bmatrix} 7 & -3 & -3 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix}$$

since we know that $\mathbf{A}\mathbf{A}^{-1} = \mathbf{I}$

$$\begin{bmatrix} 7 & -3 & -3 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 3 \\ 1 & \lambda & 3 \\ 1 & 3 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \tag{1}$$

we can find λ just by comparing the element a_{22} :

$$a_{22} = -3 + \lambda + 0 = 1 \tag{2}$$

$$\lambda = 4 \tag{3}$$