

5.3.6 Matgeo

AI25BTECH11012 - Garige Unnathi

Question

If the pair of equations $3x - y + 8 = 0$ and $6x - ry + 16 = 0$ represents coincident lines, then the value of r is

Solution

Let :

$$r_1 = \begin{bmatrix} 3 & -1 \end{bmatrix} \mathbf{x} = -8 \quad (1)$$

$$r_2 = \begin{bmatrix} 6 & -r \end{bmatrix} \mathbf{x} = -16 \quad (2)$$

For coincident lines:

$$r_2 = \kappa r_1 \quad (3)$$

Solution

Solving using above equation

$$\begin{bmatrix} 6 & -r \end{bmatrix} \mathbf{x} + 16 = \kappa(\begin{bmatrix} 3 & -1 \end{bmatrix} \mathbf{x} + 8) \quad (4)$$

$$= \begin{bmatrix} 3\kappa & -1\kappa \end{bmatrix} \mathbf{x} + 8\kappa \quad (5)$$

By comparing we get :

$$\kappa = 2 \quad (6)$$

$$\begin{bmatrix} 6 & -r \end{bmatrix} \mathbf{x} + 16 = \begin{bmatrix} 6 & -2 \end{bmatrix} \mathbf{x} + 16 \quad (7)$$

since LHS should be equal to RHS :

$$r = 2 \quad (8)$$