5.3.6

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 :

$$\mathbf{r_1} = \begin{pmatrix} 3 & -1 \end{pmatrix} \mathbf{x} = -8 \tag{0.1}$$

$$\mathbf{r_2} = \begin{pmatrix} 6 & -r \end{pmatrix} \mathbf{x} = -16 \tag{0.2}$$

For coincident lines:

$$Rank(\mathbf{r_1} \quad \mathbf{r_2}) = \begin{pmatrix} 3 & -1 \\ 6 & -r \end{pmatrix} = 1 \tag{0.3}$$

solving using above equation :

$$R_2 = R_2 - 2R_1 \tag{0.4}$$

$$= \begin{pmatrix} 3 & -1 \\ 0 & -r+2 \end{pmatrix} = 1 \tag{0.5}$$

For the rank of above matrix to be one ,we need :

$$-r + 2 = 0 \tag{0.6}$$

$$r = 2 \tag{0.7}$$

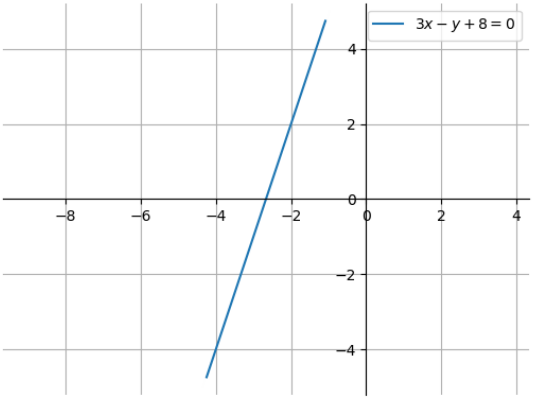

Fig. 0.1