

Assignment 1

Pulkit Saxena

1 QUESTION No. 42

Find the equation of lines through the point $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$ which make an angle of 45° to the line

$$(1 \ -2)\mathbf{x} = 3. \quad (1.0.1)$$

2 EXPLANATION

2.1 Finding the Slope of Lines

Line 1:-

$$\tan(\tan^{-1}(\frac{1}{2}) + 45^\circ) = 3 \quad (2.1.1)$$

Line 2:-

$$\tan(\tan^{-1}(\frac{1}{2}) - 45^\circ) = -\frac{1}{3} \quad (2.1.2)$$

Line Passes through point P

$$\mathbf{P} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$$

2.2 Finding the constant terms of both Lines

Line 1:-

$$(3 \ -1) \cdot \begin{pmatrix} 3 \\ 2 \end{pmatrix} = b_1 \quad (2.2.1)$$

$$b_1 = 7 \quad (2.2.2)$$

Line 2:-

$$\left(\frac{1}{3} \ 1\right) \cdot \begin{pmatrix} 3 \\ 2 \end{pmatrix} = b_2 \quad (2.2.3)$$

$$b_2 = 3 \quad (2.2.4)$$

2.3 Equations of the lines are(Answers)

Line 1:-

$$(3 \ -1)\mathbf{x} = 7 \quad (2.3.1)$$

Line 2:-

$$\left(\frac{1}{3} \ 1\right)\mathbf{x} = 3 \quad (2.3.2)$$

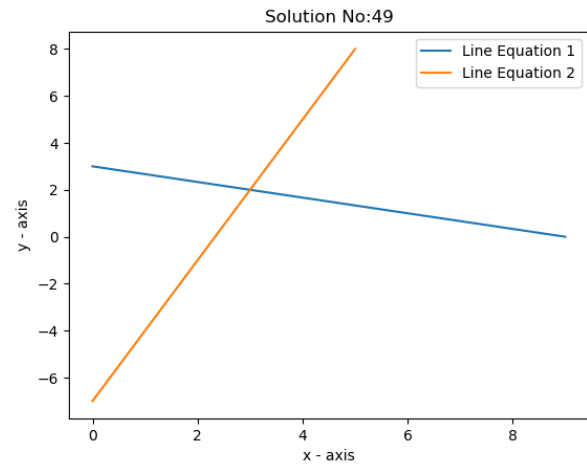


Fig. 0: Plotting both these equation passing through a point (3,2)