LINE

1 11^{th} Maths - Chapter 10

This is Problem-15 from Exercise 10.3

1. The perpendicular from the origin to the line y=mx+c meets it at the point (-1,2) find value of **m** and **c**.

2 SOLUTION

Given line equation and points are

$$\mathbf{y} = \mathbf{mx} + \mathbf{c} \tag{1}$$

$$\mathbf{p} = \begin{pmatrix} -1 \\ 2 \end{pmatrix} \tag{2}$$

$$\mathbf{n} = \begin{pmatrix} m \\ -1 \end{pmatrix} \tag{3}$$

$$\mathbf{n}^{\top}\mathbf{x} = \mathbf{c} \tag{4}$$

$$\begin{pmatrix} m & -1 \end{pmatrix} \mathbf{x} = \mathbf{c} \tag{5}$$

$$\mathbf{mx} - \mathbf{y} = \mathbf{c} \tag{6}$$

$$\mathbf{m} = \begin{pmatrix} -1 \\ -m \end{pmatrix} \tag{7}$$

The directional vector is

$$\left(\mathbf{o} - \mathbf{p}\right)^{\top} \mathbf{m} = 0 \tag{8}$$

$$\begin{pmatrix} -1 & 2 \end{pmatrix} \begin{pmatrix} -1 \\ -m \end{pmatrix} = 0 \tag{9}$$

$$1 - 2\mathbf{m} = 0 \tag{10}$$

$$\mathbf{m} = \frac{1}{2} \tag{11}$$

The value of c is

$$\mathbf{n}^\top x = \mathbf{c} \tag{12}$$

$$\begin{pmatrix} \frac{1}{2} \\ -1 \end{pmatrix} \begin{pmatrix} -1 \\ 2 \end{pmatrix} = \mathbf{c} \tag{13}$$

$$\begin{pmatrix} \frac{-1}{2} & -2 \end{pmatrix} = \mathbf{c} \tag{14}$$

$$\mathbf{c} = \frac{-1-4}{2} \tag{15}$$

$$\mathbf{c} = \frac{-5}{2} \tag{16}$$

3 FIGURE

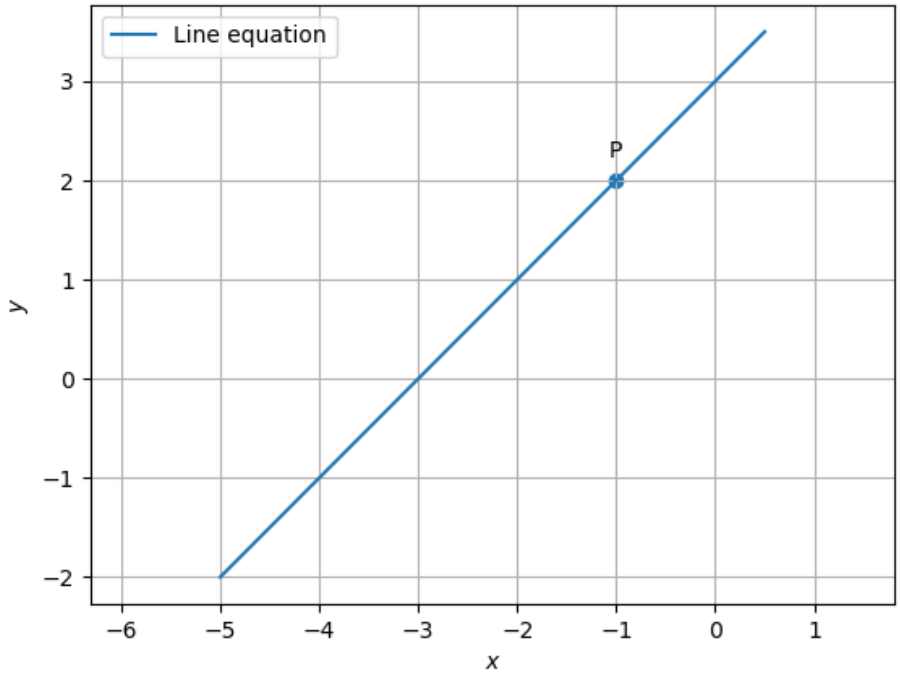

Figure 1