Equation of 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.

Solution:
Given

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

$$\mathbf{O} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{2}$$

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

The equation of line is

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

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

The directional vector **OP** is

$$\left(\mathbf{O} - \mathbf{P}\right)^\top \mathbf{m} = 0 \tag{6}$$

$$\begin{pmatrix} -1 & 2 \end{pmatrix} \begin{pmatrix} -1 \\ -m \end{pmatrix} = 0 \tag{7}$$

$$\mathbf{m} = \frac{1}{2} \tag{8}$$

From the line equation we find c value is

$$\begin{pmatrix} \frac{1}{2} \\ 1 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \end{pmatrix} = c \tag{9}$$

$$\begin{pmatrix} \frac{1}{2} & 2 \end{pmatrix} = c \tag{10}$$

$$c = \frac{5}{2} \tag{11}$$

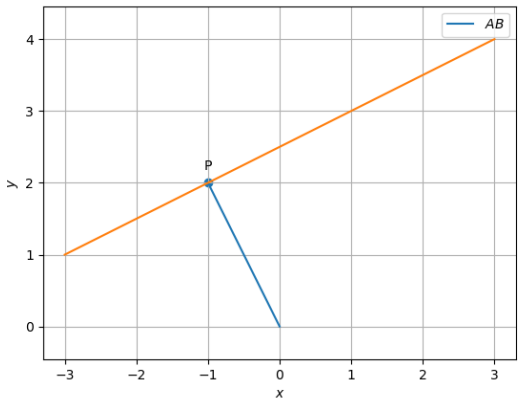

Figure 1