

Intercepts Lines

11th Maths - Chapter 10

This is Problem-3 from Exercise 10.4

1. Find the equations of the lines, which cut-off intercepts on the axes whose sum and product are 1 and -6, respectively.

1 Solution

Let the x intercept be a and the y intercept be b , Then

$$(a + b) = 1 \quad (1)$$

$$(ab) = -6 \quad (2)$$

upon simplifying (1) and (2)

$$\mathbf{a} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}, \mathbf{b} = \begin{pmatrix} 0 \\ -2 \end{pmatrix} \quad (3)$$

$$\mathbf{a} - \mathbf{b} = \begin{pmatrix} 3 \\ 0 \end{pmatrix} - \begin{pmatrix} 0 \\ -2 \end{pmatrix} \quad (4)$$

$$= \begin{pmatrix} 3 \\ 2 \end{pmatrix} \quad (5)$$

$$\mathbf{m} = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \text{ or, } \begin{pmatrix} -2 \\ 3 \end{pmatrix} \quad (6)$$

2. \implies The normal vector \mathbf{n} to the line is given as

$$\mathbf{n} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 3 \\ 2 \end{pmatrix} \quad (7)$$

$$= \begin{pmatrix} -2 \\ 3 \end{pmatrix} \quad (8)$$

$$\mathbf{n}^\top (\mathbf{x} - \mathbf{A}) = 0 \quad (9)$$

$$(-2 \ 3) \mathbf{x} = 6 \quad (10)$$

or

3. \implies The normal vector \mathbf{n} to the line is given as

$$\mathbf{n} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} -2 \\ 3 \end{pmatrix} \quad (11)$$

$$= \begin{pmatrix} -3 \\ -2 \end{pmatrix} \quad (12)$$

$$\mathbf{n}^\top (\mathbf{x} - \mathbf{B}) = 0 \quad (13)$$

$$(-3 \ -2) \mathbf{x} = 6 \quad (14)$$

The equation of a line with normal vector \mathbf{n} and passing through a point \mathbf{A} is given by $(-2, 3)\mathbf{x} = 6$ and for \mathbf{B} is $(-3, -2)\mathbf{x} = 6$

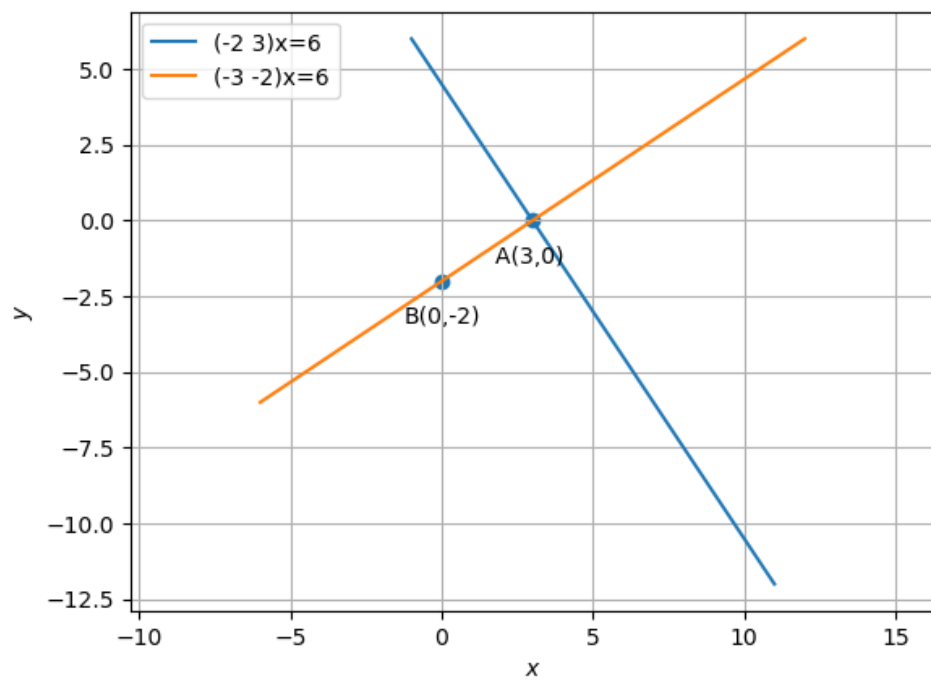


Figure 1