Straight Lines

11^{th} Maths - Chapter 10

This is Problem-8 from Exercise 10.3

1. Find the equation of line perpendicular to the line x - 7y + 5 = 0 and having x intercept 3.

Solution: Given line is

$$x - 7 + 5 = 0 \tag{1}$$

this equation can be expressed as

$$\mathbf{n}^{\mathsf{T}}\mathbf{x} = c \tag{2}$$

where
$$\mathbf{n} = \begin{pmatrix} 1 \\ -7 \end{pmatrix}, c = -5$$
 (3)

the equation of line perpendicular having x intercept 3 is given by

$$\mathbf{m}^{\top} \left(\mathbf{x} - \mathbf{A} \right) = 0 \tag{4}$$

where \mathbf{A} and \mathbf{m} is

$$\mathbf{m} = \begin{pmatrix} 7 \\ 1 \end{pmatrix} \tag{5}$$

$$\mathbf{m}^{\top} = \begin{pmatrix} 7 & 1 \end{pmatrix} \tag{6}$$

$$\mathbf{A} = \begin{pmatrix} 3 \\ 0 \end{pmatrix} \tag{7}$$

Substituting the value of \mathbf{m} and \mathbf{A} in (4)

$$\begin{pmatrix} 7 & 1 \end{pmatrix} \begin{pmatrix} \mathbf{x} - \begin{pmatrix} 3 \\ 0 \end{pmatrix} \end{pmatrix} = 0
\tag{8}$$

$$\begin{pmatrix} 7 & 1 \end{pmatrix} \mathbf{x} - 21 = 0 \tag{9}$$

$$\begin{pmatrix} 7 & 1 \end{pmatrix} \mathbf{x} = 21 \tag{10}$$

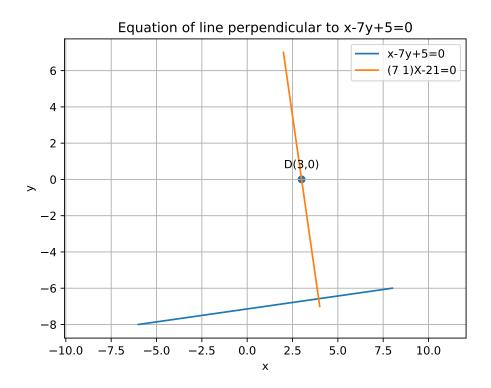


Figure 1