11.10.3.10

Lokesh Surana

Class 11, Chapter 10, Exercise 3.10

Q. The line through the points $(h, 3)$ and $(4, 1)$ intersects the line $7x - 9y - 19 = 0$ at right angle. Find the value of h.

Solution: The slope of line through given points, Let

$$\mathbf{A} = \begin{pmatrix} h \\ 3 \end{pmatrix} \tag{1}$$

$$\mathbf{B} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} \tag{2}$$

is given by

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 4-h \\ 1-3 \end{pmatrix} = \begin{pmatrix} 4-h \\ -2 \end{pmatrix} \tag{3}$$

For the given line,

$$\begin{pmatrix} 7 & -9 \end{pmatrix} \mathbf{x} = 19 \tag{4}$$

$$\mathbf{n} = \begin{pmatrix} 7 \\ -9 \end{pmatrix} \tag{5}$$

$$\implies \mathbf{m} = \begin{pmatrix} 9 \\ 7 \end{pmatrix} \tag{6}$$

As given this two lines intersect at right angle, we have

$$\mathbf{m}^{\top}(\mathbf{B} - \mathbf{A}) = 0 \tag{7}$$

$$\implies \begin{pmatrix} 9 & 7 \end{pmatrix} \begin{pmatrix} 4-h \\ -2 \end{pmatrix} = 0 \tag{8}$$

$$\implies h = \frac{22}{9} \tag{9}$$

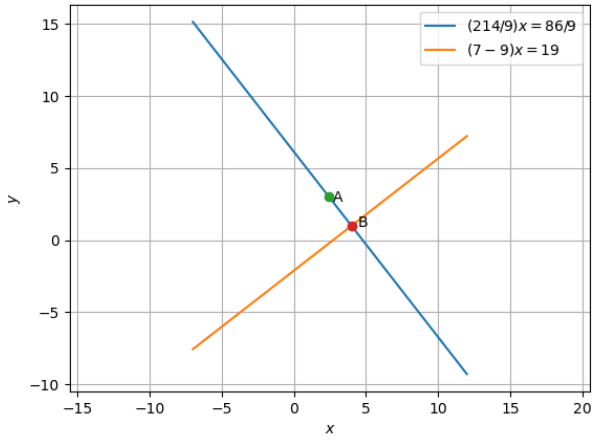

Fig. 1: Given lines and equidistant line