Line Assignment

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September 2022

Problem Statement **- The perpendicular from the Origin to a line meets it at the point (-2,9).Find the equation of the line?**

Solution

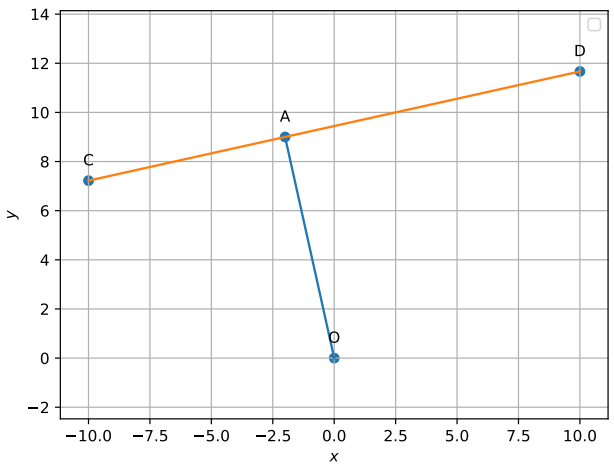

Figure 1:

Construction

The input parameters of figure

Symbol	value
O	$\begin{pmatrix}0\\0\end{pmatrix}$
A	$\begin{pmatrix}-2\\9\end{pmatrix}$
D	$\begin{pmatrix}x\\y\end{pmatrix}$

Table 1:

let D be a point on the required line :

$$\mathbf{D} = \begin{pmatrix}x\\y\end{pmatrix} \tag{2}$$

$$\mathbf{D}-\mathbf{A} = \begin{pmatrix}x+2\\y-9\end{pmatrix}$$

directional vector:

$$\mathbf{n} = \mathbf{O}-\mathbf{A}$$

$$\mathbf{n} = \begin{pmatrix}0\\0\end{pmatrix} - \begin{pmatrix}-2\\9\end{pmatrix}$$

$$\mathbf{n} = \begin{pmatrix}2\\-9\end{pmatrix} \tag{3}$$

General form for the equation of line is :

$$\mathbf{n^T}(\mathbf{D}-\mathbf{A}) = 0$$

$$\begin{pmatrix}2 & -9\end{pmatrix}\left(\begin{pmatrix}x+2\\y-9\end{pmatrix}\right) = -85$$

$$2\mathbf{x}-9\mathbf{y}+85 = 0 \tag{4}$$

Solution:

Given vector points :

$$\mathbf{0} = \begin{pmatrix}0\\0\end{pmatrix}, \mathbf{A} = \begin{pmatrix}-2\\9\end{pmatrix} \tag{1}$$