

ASSIGNMENT 4

RONGALA ARUN SIDDARDHA
AI20BTECH110019

Download all python codes from

https://github.com/ArunSiddardha/EE3900/blob/main/Assignment_2/code/Assignment_3.py

and latex-tikz codes from

https://github.com/ArunSiddardha/EE3900/blob/main/Assignment_2/Assignment_3.tex

1 LINEAR FORMS/Q.2.21

The perpendicular from the origin to a line meets it at a point $\begin{pmatrix} -2 \\ 9 \end{pmatrix}$, find the equation of the line.

2 SOLUTION

Let the equation of line be

$$(-m \ 1)\mathbf{x} = c \quad (2.0.1)$$

So the perpendicular from the origin meets the line at $\mathbf{P} = \begin{pmatrix} -2 \\ 9 \end{pmatrix}$. Since,

$$\mathbf{P} - \mathbf{O} = \mathbf{P} \quad (2.0.2)$$

is the normal vector where \mathbf{O} is the origin then

$$\mathbf{m} = \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (2.0.3)$$

is the direction vector, Hence

$$\mathbf{m}^T \mathbf{P} = 0 \quad (2.0.4)$$

$$\Rightarrow (1 \ m) \begin{pmatrix} -2 \\ 9 \end{pmatrix} = 0 \quad (2.0.5)$$

$$\Rightarrow -2 + 9m = 0 \quad (2.0.6)$$

$$\Rightarrow m = \frac{2}{9} \quad (2.0.7)$$

Now the line

$$(-m \ 1)\mathbf{x} = c \quad (2.0.8)$$

meets it at the point $\mathbf{P} = \begin{pmatrix} -2 \\ 9 \end{pmatrix}$, Using m. we get,

$$\left(-\frac{2}{9} \ 1\right)\mathbf{P} = c \quad (2.0.9)$$

$$\Rightarrow \left(-\frac{2}{9} \ 1\right) \begin{pmatrix} -2 \\ 9 \end{pmatrix} = c \quad (2.0.10)$$

$$\Rightarrow \frac{4}{9} + 9 = c \quad (2.0.11)$$

$$\Rightarrow c = \frac{85}{9} \quad (2.0.12)$$

Hence, the values of m and c are obtains as

$$m = \frac{2}{9}, c = \frac{85}{9}$$

respectives so,

The equation of the line is given by

$$\left(-\frac{2}{9} \ 1\right)\mathbf{x} = \frac{85}{9}$$

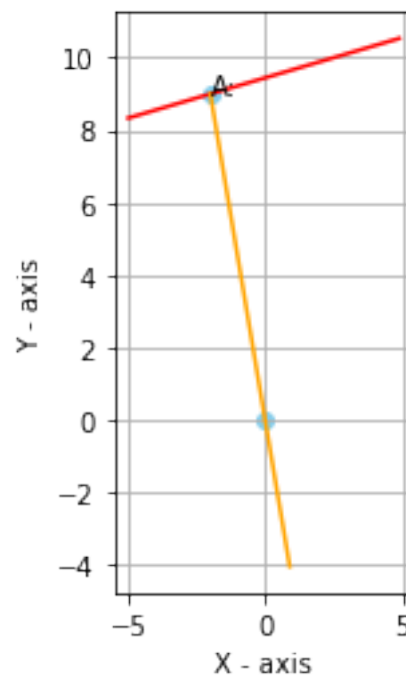


Fig. 0: Figure