Assignment 2

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Download all python codes from

https://github.com/mirhasidheek7213/InternshipIITH/tree/main/Assignment−2/Codes

and latex-tikz codes from

https://github.com/mirhasidheek7213/InternshipIITH/blob/main/Assignment−2/Assignment2.tex

1 Question No. 1.23 - Linear forms

Find the equation of the line, which makes intercepts -3 and 2 on the x and y axes respectively.

2 Solution

$$Given, x-intercept = -3, y-intercept = 2 \quad (2.0.1)$$

Hence , the line cuts through the x-axis at $\begin{pmatrix}-3\\0\end{pmatrix}$ and the line cuts through the y-axis at $\begin{pmatrix}0\\2\end{pmatrix}$

$$A = \begin{pmatrix}-3\\0\end{pmatrix}, B = \begin{pmatrix}0\\2\end{pmatrix} \quad (2.0.2)$$

The direction vector of the line $= \begin{pmatrix}-3\\2\end{pmatrix}$

Therefore, normal vector(n) of the line $= \begin{pmatrix}2\\-3\end{pmatrix}$

$$n^T = \begin{pmatrix}2 & -3\end{pmatrix} \quad (2.0.3)$$

Equation of a line is,

$$\mathbf{n^T(x - A) = 0} \quad (2.0.4)$$

We find the equation of line by,

$$\mathbf{n^T x = n^T A} \quad (2.0.5)$$

$$\begin{pmatrix}2 & -3\end{pmatrix} x = \begin{pmatrix}2 & -3\end{pmatrix}\begin{pmatrix}-3\\0\end{pmatrix} \quad (2.0.6)$$

$$= \begin{pmatrix}2 & -3\end{pmatrix} x = -6 \quad (2.0.7)$$

Therefore, the equation of the line is,

$$\begin{pmatrix}2 & -3\end{pmatrix} x = -6 \quad (2.0.8)$$

Since the line passes through the points $\begin{pmatrix}-3\\0\end{pmatrix}$ and $\begin{pmatrix}0\\2\end{pmatrix}$, The line AB is plotted using these points as shown below.

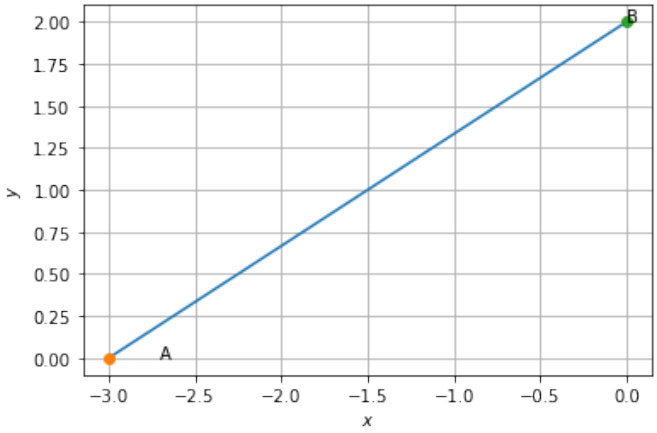

Fig. 0: The line $\begin{pmatrix}2 & -3\end{pmatrix} x = -6$