

# 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  $= 2$  (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  $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$

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

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

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

$$\mathbf{n}^T = (2 \ -3) \quad (2.0.3)$$

Equation of a line is,

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

We find the equation of line by,

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

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

$$= (2 \ -3)x = -6 \quad (2.0.7)$$

Therefore, the equation of the line is,

$$(2 \ -3)x = -6 \quad (2.0.8)$$

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.

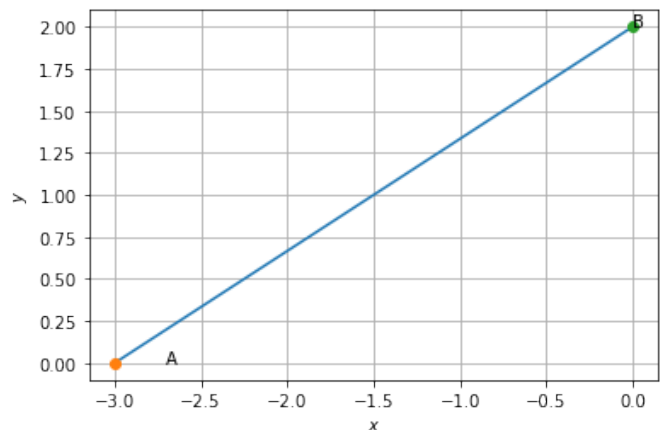


Fig. 0: The line  $(2 \ -3)x = -6$