

CHAPTER-10

STRAIGHT LINES

January 13, 2023

Excercise 10.2

Q4. Passing through $(2, 2\sqrt{3})$ and inclined with the x-axis at an angle of 75° .

Solution

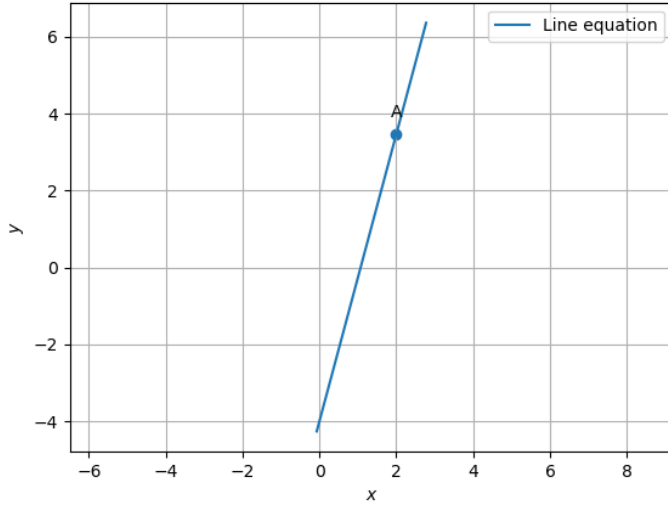


Figure 1:

1 construction

Point	Value
A	$\begin{pmatrix} 2 \\ 2\sqrt{3} \end{pmatrix}$
θ	75°

2 Assumptions

To find the line equation through the point $(2, 2\sqrt{3})$

The Directional vector is:

$$\mathbf{m} = \begin{pmatrix} 1 \\ 2 + \sqrt{3} \end{pmatrix} \quad (1)$$

3 Proof:

we know that the Normal vector is:

$$\mathbf{n} = \begin{pmatrix} 2 + \sqrt{3} \\ -1 \end{pmatrix} \quad (2)$$

$$\mathbf{m} = \begin{pmatrix} 1 \\ 2 + \sqrt{3} \end{pmatrix} \quad (3)$$

$$\mathbf{n} = \begin{pmatrix} 2 + \sqrt{3} \\ -1 \end{pmatrix} \quad (4)$$

$$\mathbf{n}^T = (2 + \sqrt{3} \quad -1) \quad (5)$$

Where line equation is given by:

$$\mathbf{n}^T(\mathbf{x} - \mathbf{A}) = 0 \quad (6)$$

By substituting the values in the above equation:

$$(2 + \sqrt{3} \quad -1) \left(\begin{pmatrix} x \\ y \end{pmatrix} - \begin{pmatrix} 2 \\ 2\sqrt{3} \end{pmatrix} \right) = 0 \quad (7)$$

$$(2 + \sqrt{3} \quad -1) (\mathbf{x}) = 4 \quad (8)$$