

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

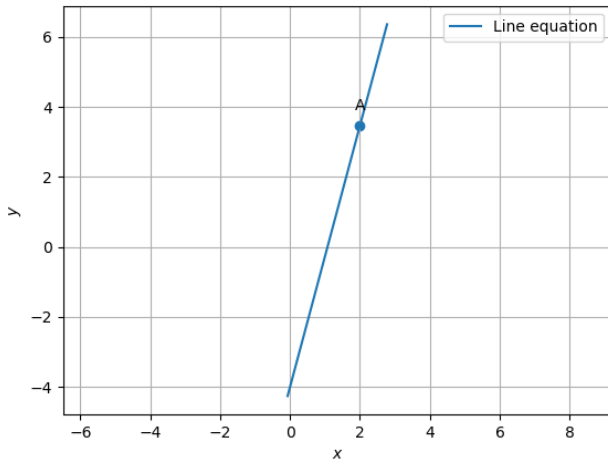


Figure 1:

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 $\begin{pmatrix} 2 \\ 2\sqrt{3} \end{pmatrix}$

The Directional vector is:

$$\mathbf{m} = \begin{pmatrix} 1 \\ \tan 75^\circ \end{pmatrix} = \begin{pmatrix} 1 \\ 2 + \sqrt{3} \end{pmatrix} \quad (1)$$

3 Proof

we know that the Normal vector is:

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

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

Where line equation is given by:

$$\mathbf{n}^\top (\mathbf{x} - \mathbf{A}) = 0 \quad (4)$$

By substituting the values in the above equation:

$$(2 + \sqrt{3} \quad -1) \left(\mathbf{x} - \begin{pmatrix} 2 \\ 2\sqrt{3} \end{pmatrix} \right) = 0 \quad (5)$$

$$(2 + \sqrt{3} \quad -1) \mathbf{x} = 4 \quad (6)$$