

CHAPTER-11  
CIRCLES

### Exercise 11.1

Q1. Find the equation of the circle with centre  $(-2, 3)$  and radius 4.

**Solution:**

Given

$$\mathbf{c} = \begin{pmatrix} -2 \\ 3 \end{pmatrix} \text{ and } r = 4 \quad (1)$$

The equation of the circle is given as

$$\|\mathbf{x}\|^2 + 2\mathbf{u}^\top \mathbf{x} + f = 0 \quad (2)$$

Where,

$$\mathbf{u} = -\mathbf{c} \text{ and } f = \|\mathbf{u}\|^2 - r^2 \quad (3)$$

$$\mathbf{u} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}, \|\mathbf{u}\| = \sqrt{13} \quad (4)$$

$$f = \|\mathbf{u}\|^2 - r^2 \quad (5)$$

$$= (\sqrt{13})^2 - 4^2 = -1 \quad (6)$$

Now substituting the values the equation of circle can be given as

$$\|\mathbf{x}\|^2 + 2\mathbf{u}^\top \mathbf{x} - 1 = 0 \quad (7)$$

$$\|\mathbf{x}\|^2 + 2\mathbf{u}^\top \mathbf{x} = 1 \quad (8)$$

$$\text{where } \mathbf{u} = \begin{pmatrix} 2 \\ -3 \end{pmatrix} \quad (9)$$

As shown in Figure ??

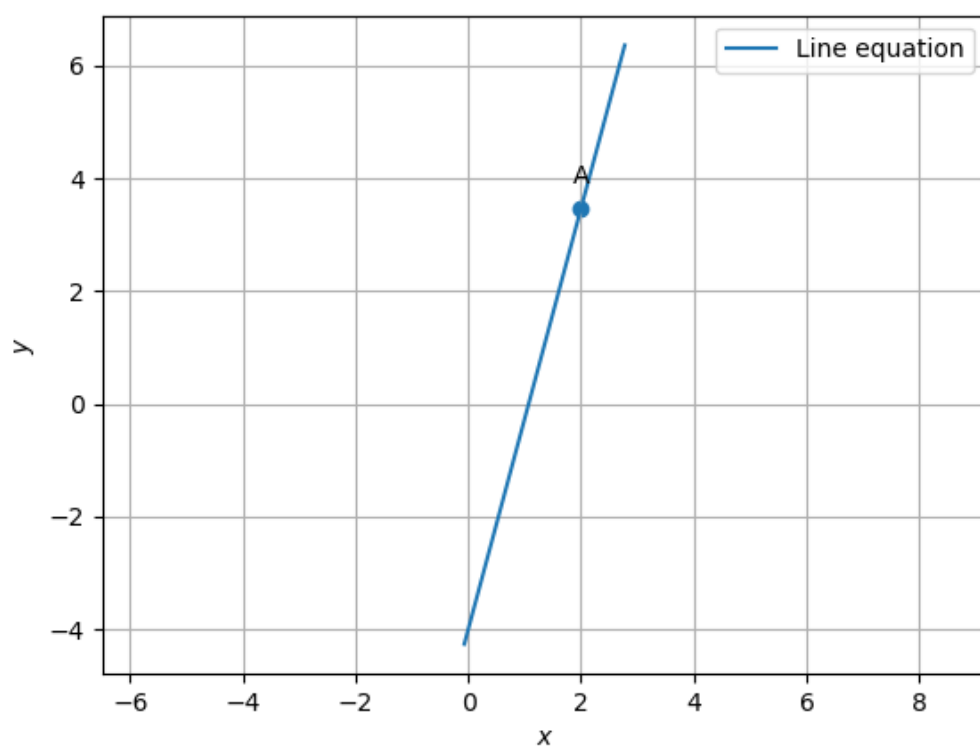


Figure 1: