CLASS-11
CHAPTER-11
CIRCLES

Excercise 11.1

Q2. Find the equation of the circle with centre $(-2, 3)$ and radius 4.
Solution:
Given

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

The equation of the circle is given as

$$\|\mathbf{x}\|^2 + 2\mathbf{u}^\top \mathbf{x} + f = 0 \tag{2}$$

Where,

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

$$\mathbf{u} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}, \mathbf{u}^\top = \begin{pmatrix} 2 & -3 \end{pmatrix}, \|\mathbf{u}\| = \sqrt{13} \tag{4}$$

$$f = \|\mathbf{u}\|^2 - r^2 = -3 \tag{5}$$

Substituting those values in the equation of circle, we get:

$$\|\mathbf{x}\|^2 + 2\mathbf{u}^\top \mathbf{x} - 3 = 0 \tag{6}$$

$$\|\mathbf{x}\|^2 + 2\begin{pmatrix} 2 & -3 \end{pmatrix}\mathbf{x} = 3 \tag{7}$$

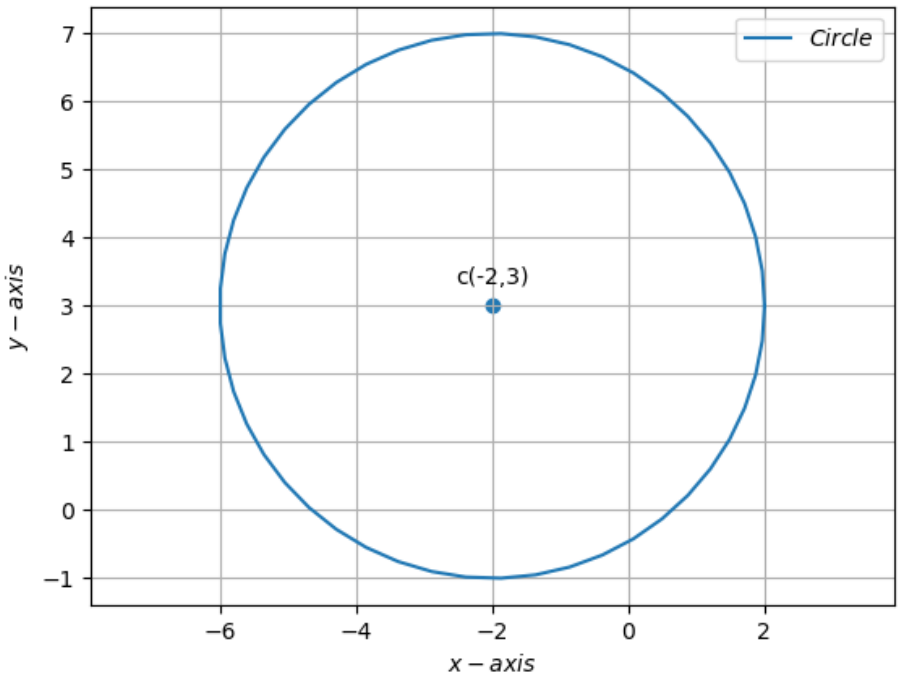

Figure 1: