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,

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

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

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

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

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

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

$$\|\mathbf{x}\|^2 + 2\mathbf{u}^\top \mathbf{x} = 1 \tag{8}$$

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

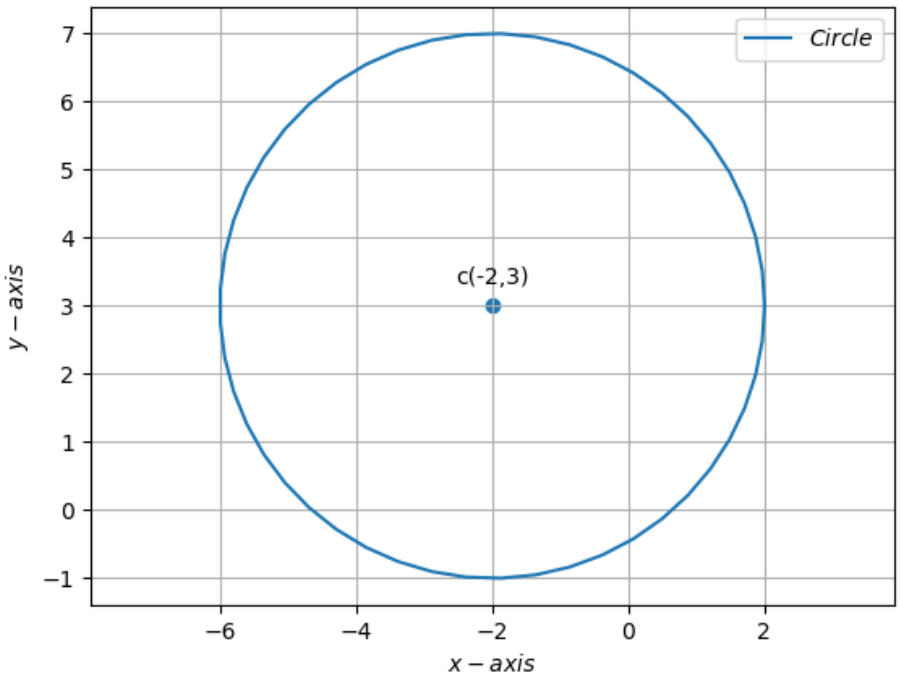

Figure 1: