CHAPTER-11
CIRCLES

1 Excercise 11.1

Find the equation of the circle with centre $(-a,-b)$ and radius $\sqrt{a^2-b^2}$.

2 SOLUTION

Given points are

$$\mathbf{c} = \begin{pmatrix} -a \\ -b \end{pmatrix} \text{ and } r = \sqrt{a^2-b^2} \tag{1}$$

The equation of the circle

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

$$\mathbf{u} = \begin{pmatrix} a \\ b \end{pmatrix} \tag{3}$$

$$f = \|\mathbf{u}\|^2 - r^2 \tag{4}$$

$$= \left(a^2 + b^2 - a^2 - b^2\right) \tag{5}$$

$$= 2b^2 \tag{6}$$

Thus ,the equation of circle is obtained as

$$\|\mathbf{x}\|^2 + 2\begin{pmatrix} a & b \end{pmatrix}\mathbf{x} + 2b^2 = 0 \tag{7}$$

3 FIGURE

Assume the values in (a,b) for plot the figure in python

$$\mathbf{c} = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \text{ and } r = \sqrt{3^2-2^2} \tag{8}$$

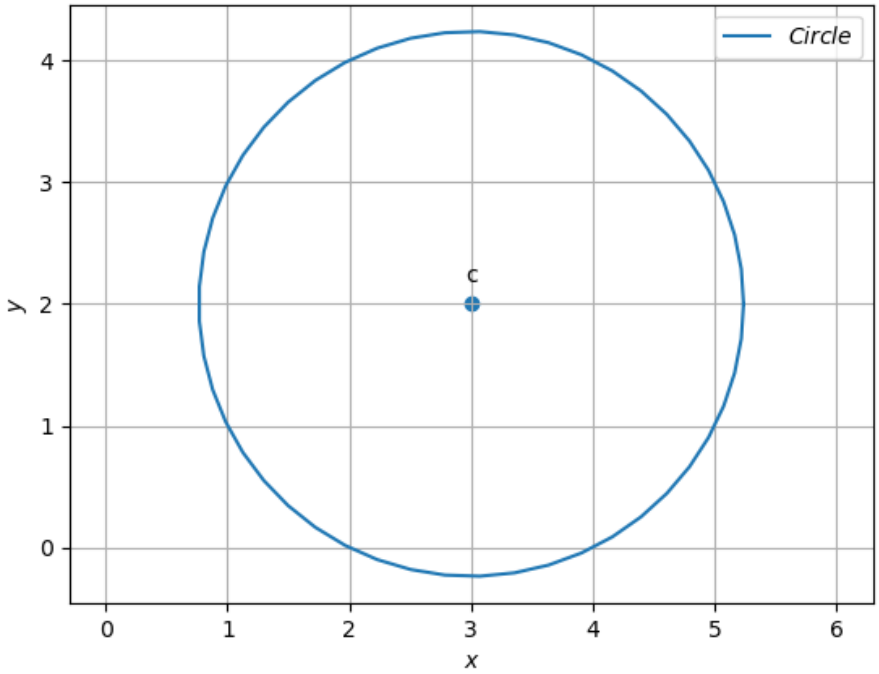

Figure 1: circle