CHAPTER-11
CIRCLES

Excercise 11.1

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

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

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

$$\begin{aligned} f &= \|\mathbf{u}\|^2 - r^2 && (4)\\ &= \left(a^2+b^2-a^2-b^2\right) && (5)\\ &= 2b^2 && (6) \end{aligned}$$

Thus ,the equation of circle is obtained as

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