

11.11.1.7

Lokesh Surana

CLASS 11, CHAPTER 11, EXERCISE 1.7

Q. Find the centre and radius of the circle $x^2 + y^2 - 4x - 8y - 45 = 0$.

Solution: The equation of the circle in vector form is given by

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

where

$$\mathbf{u} = -\mathbf{c} \quad (2)$$

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

The given circle is

$$\|\mathbf{x}\|^2 + 2(-2 \ -4)\mathbf{x} - 45 = 0 \quad (4)$$

Comparing the equations (1) and (4), we get

$$\mathbf{u} = \begin{pmatrix} -2 \\ -4 \end{pmatrix} \quad (5)$$

$$\Rightarrow \mathbf{c} = \begin{pmatrix} 2 \\ 4 \end{pmatrix} \quad (6)$$

$$f = \|\mathbf{c}\|^2 - r^2 \quad (7)$$

$$\Rightarrow -45 = (\sqrt{2^2 + 4^2})^2 - r^2 \quad (8)$$

$$\Rightarrow r^2 = 65 \quad (9)$$

$$\Rightarrow r = \sqrt{65} \quad (10)$$

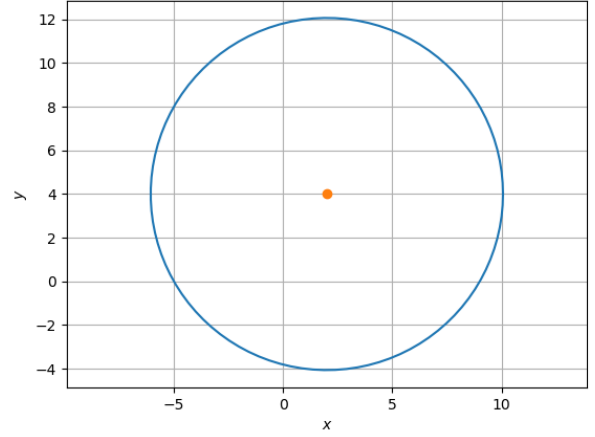


Fig. 1: Circle