Question: 11.11.1.15

Nikam Pratik Balasaheb (EE21BTECH11037)

1 Problem

Does the point $\begin{pmatrix}-2.5\\3.5\end{pmatrix}$lie inside, outsideor on the circle $x^2 + y^2 = 25$?

2 Solution

Given circle equation is,

$$\|\mathbf{x}\|^2 = 25 \tag{2.0.1}$$

The point $\mathbf{x}$ lies inside a circle with centre $\mathbf{O}$ and radius r if $\|\mathbf{x}-\mathbf{O}\|^2 < r^2$.
The point lies inside the circle if $\|\mathbf{x}-\mathbf{O}\|^2 > r^2$.
And, the point lies on the circle if $\|\mathbf{x}-\mathbf{O}\|^2 < r^2$.

Here,

$$\|\mathbf{x}-\mathbf{O}\|^2 = \left\|\begin{pmatrix}-2.5\\3.5\end{pmatrix}\right\|^2 = 18.5 \tag{2.0.2}$$

$$r^2 = 25 \tag{2.0.3}$$

$$\implies \|\mathbf{x}-\mathbf{O}\|^2 < r^2 \tag{2.0.4}$$

Therefore, the point lies inside the given circle.

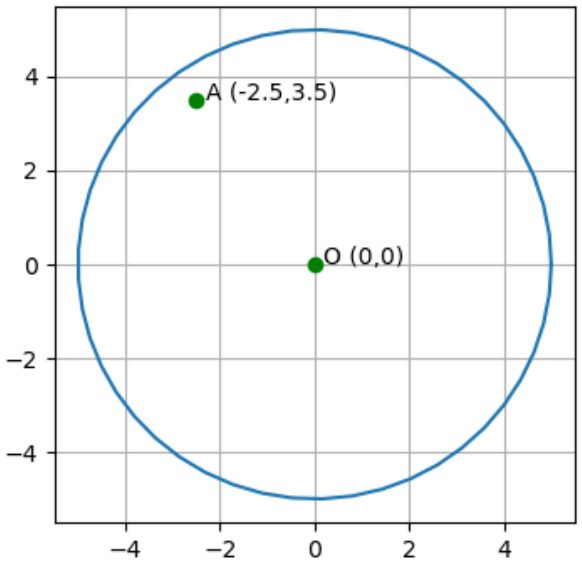

Fig. 0: Figure 1