1.5.16

EE25BTECH11028 - J.Navya sri

Question:

Find the coordinates of a point A where AB is the diameter of the circle with center is $\begin{pmatrix}3\\-1\end{pmatrix}$ and B is the point $\begin{pmatrix}2\\6\end{pmatrix}$.

Solution:

Given data:

Point	Vector
B	$\begin{pmatrix}2\\6\end{pmatrix}$
P	$\begin{pmatrix}3\\-1\end{pmatrix}$

Theory : Center of a circle is the mid-point of the diameter.

Let P be the center of the given circle , with AB as the diameter.
Let **A** be the Vector to be found
Given :

$$B \equiv \begin{pmatrix}2\\6\end{pmatrix}, \quad P \equiv \begin{pmatrix}3\\-1\end{pmatrix}$$

Center of a circle is the mid point of the diameter. For a circle with center **P** and ends of diameters represented by vectors **A** and **B**

$$\mathbf{P} = \frac{\mathbf{A}+\mathbf{B}}{2} \tag{0.1}$$

Rearranging , we get:

$$\mathbf{A} = 2\mathbf{P} - \mathbf{B} \tag{0.2}$$

Substituting the given vectors, we get:

$$\mathbf{A} = 2\begin{pmatrix}3\\-1\end{pmatrix} - \begin{pmatrix}2\\6\end{pmatrix} \tag{0.3}$$

$$\mathbf{A} = \begin{pmatrix}6\\-2\end{pmatrix} - \begin{pmatrix}2\\6\end{pmatrix} \tag{0.4}$$

$$\therefore \mathbf{A} \equiv \begin{pmatrix}4\\-8\end{pmatrix}$$

Hence , Coordinates of A are

$$\begin{pmatrix}4\\-8\end{pmatrix}$$

Graph representation:

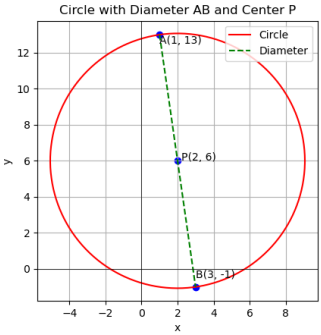
Circle with Diameter AB and Center P
Circle
Diameter
A(1, 13)
P(2, 6)
B(3, -1)
x
y

Fig. 0.1