

1.5.20

EE25BTECH11032 - Kartik Lahoti

Question:

Find the coordinates of a point A where AB is the diameter of the circle with center $\begin{pmatrix} -2 \\ 2 \end{pmatrix}$ and B is the point $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$.

Solution:

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 Point A have the coordinates $\begin{pmatrix} x \\ y \end{pmatrix}$

Given : $B \equiv \begin{pmatrix} 3 \\ 4 \end{pmatrix}, P \equiv \begin{pmatrix} -2 \\ 2 \end{pmatrix}$

If P is the mid point of AB

$$P = \frac{A + B}{2} \quad (0.1)$$

Substituting the given vectors , we get :

$$\begin{pmatrix} -2 \\ 2 \end{pmatrix} = \frac{\begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 3 \\ 4 \end{pmatrix}}{2} \quad (0.2)$$

$$\begin{pmatrix} -2 \\ 2 \end{pmatrix} = \frac{\begin{pmatrix} x+3 \\ y+4 \end{pmatrix}}{2} \quad (0.3)$$

$$2 \begin{pmatrix} -2 \\ 2 \end{pmatrix} = \begin{pmatrix} x+3 \\ y+4 \end{pmatrix} \quad (0.4)$$

$$\begin{pmatrix} -4 \\ 4 \end{pmatrix} = \begin{pmatrix} x+3 \\ y+4 \end{pmatrix} \quad (0.5)$$

On comparing , we get :

$$-4 = x + 3 \implies x = -7 \quad (0.6)$$

$$4 = y + 4 \implies y = 0 \quad (0.7)$$

$$\therefore A \equiv \begin{pmatrix} -7 \\ 0 \end{pmatrix}$$

Hence , Coordinates of A are $\begin{pmatrix} -7 \\ 0 \end{pmatrix}$

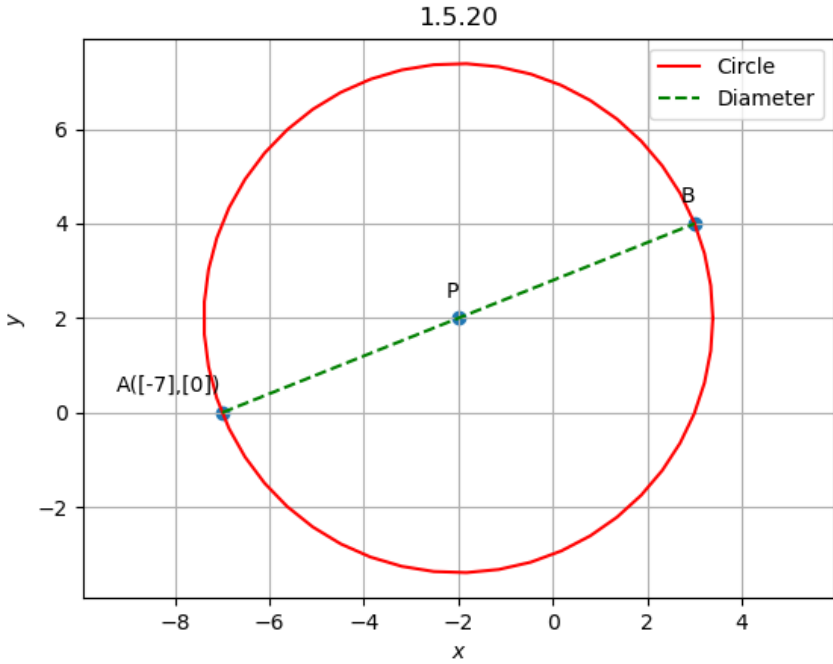


Fig. 0.1: Circle With Centre P