

1.5.30

EE25BTECH11043 - Nishid Khandagre

Question:

If the coordinates of one end of a diameter of a circle are $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and the coordinates of its centre are $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$, then the coordinates of the other end of the diameter are

Solution: Let the coordinates of one end of the diameter be $\mathbf{A} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$.

Let the coordinates of the centre of the circle be $\mathbf{C} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$.

Let the coordinates of the other end of the diameter be $\mathbf{B} = \begin{pmatrix} x \\ y \end{pmatrix}$.

Since the centre of the circle is the midpoint of the diameter, we can use the midpoint formula.

The midpoint formula states that if \mathbf{C} is the midpoint of \mathbf{A} and \mathbf{B} ,

then $\mathbf{C} = \frac{\mathbf{A} + \mathbf{B}}{2}$.

Therefore, we have:

$$2\mathbf{C} = \mathbf{A} + \mathbf{B} \quad (0.1)$$

$$\mathbf{B} = 2\mathbf{C} - \mathbf{A} \quad (0.2)$$

Now, substitute the given coordinates into the equation:

$$\begin{pmatrix} x \\ y \end{pmatrix} = 2 \begin{pmatrix} -2 \\ 5 \end{pmatrix} - \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad (0.3)$$

$$= \begin{pmatrix} 2 \times (-2) \\ 2 \times 5 \end{pmatrix} - \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad (0.4)$$

$$= \begin{pmatrix} -4 \\ 10 \end{pmatrix} - \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad (0.5)$$

$$= \begin{pmatrix} -4 - 2 \\ 10 - 3 \end{pmatrix} \quad (0.6)$$

$$= \begin{pmatrix} -6 \\ 7 \end{pmatrix} \quad (0.7)$$

Thus, the coordinates of the other end of the diameter are $\begin{pmatrix} -6 \\ 7 \end{pmatrix}$

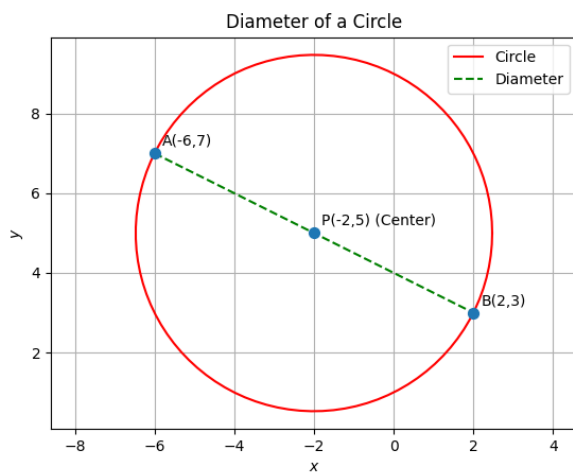


Fig. 0.1