

# 1-1.5-18

AI24BTECH11003 - Vijaya Sreyas

## Question:

Find the coordinated of a point **A** where  $AB$  is the diameter of a circle whose center is  $(2, -3)$  and **B** is the point  $(1, 4)$ .

## Solution:

Say center of the circle is **O**, and **A** be located at  $\begin{pmatrix} x \\ y \end{pmatrix}$ .

Term	Description
<b>A</b>	End of a diameter represented by $\begin{pmatrix} x \\ y \end{pmatrix}$
<b>B</b>	End of diameter at $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$
<b>O</b>	Center of the circle, at $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$

TABLE 0: Points Involved

We know that the midpoint of any diameter of a circle is its center, i.e., in this case, midpoint of  $AB$  is  $O = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ .

Applying section formula, we get

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

$$2O = A + B \quad (0.2)$$

$$2 \begin{pmatrix} 2 \\ -3 \end{pmatrix} = \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 1 \\ 4 \end{pmatrix} \quad (0.3)$$

$$\begin{pmatrix} 4 \\ -6 \end{pmatrix} = \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 1 \\ 4 \end{pmatrix} \quad (0.4)$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ -6 \end{pmatrix} - \begin{pmatrix} 1 \\ 4 \end{pmatrix} \quad (0.5)$$

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

$\therefore$  The point **A** is  $\begin{pmatrix} 3 \\ -10 \end{pmatrix}$ .

Code for plotting points and circle

codes/code.py