Matgeo - 1-1.5-18

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Question: Find the coordinates 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:

Let the coordinates of point A be (x, y).

We know that the midpoint of any diameter of a circle is its center, i.e., in this case, midpoint of AB is $(2, -3)$, the center of the circle (say it's O).

Applying the midpoint formula, we get

$$O = \frac{A + B}{2} \tag{1.1}$$

$$2O = A + B \tag{1.2}$$

$$2\begin{pmatrix} 2 \\ -3 \end{pmatrix} = \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 1 \\ 4 \end{pmatrix} \tag{1.3}$$

$$\begin{pmatrix} 4 \\ -6 \end{pmatrix} - \begin{pmatrix} 1 \\ 4 \end{pmatrix} = \begin{pmatrix} x \\ y \end{pmatrix} \tag{1.4}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 - 1 \\ -6 - 4 \end{pmatrix} \tag{1.5}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ -10 \end{pmatrix} \tag{1.6}$$

$\therefore$ The point A is $\begin{pmatrix} 3 \\ -10 \end{pmatrix}$
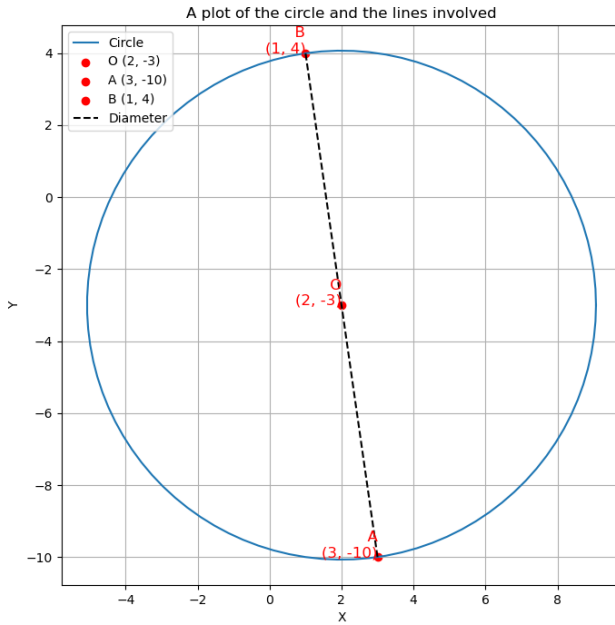
Fig. 1: A plot of the circle and points invloved

Code for plotting points and circle

codes/code.py