

7-7.2-31

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Question:

The point (1,2) lies inside the circle $x^2 + y^2 - 2x + 6y + 1 = 0$.

Sol:

Label	Given
<i>circle</i>	$x^2 + y^2 - 2x + 6y + 1$
<i>point</i>	(1,2)

TABLE 0: Given information

General form of conic:

$$\begin{bmatrix} x & y \end{bmatrix} \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} b_1 & b_2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} + c = 0 \quad (0.1)$$

For given circle:

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \quad b = \begin{bmatrix} -2 \\ 6 \end{bmatrix}, \quad c = 1 \quad (0.2)$$

Matrix equation of conic:

$$x^T \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} x + \begin{bmatrix} -2 & 6 \end{bmatrix} x + 1 = 0 \quad (0.3)$$

Substituting,

$$x = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \quad (0.4)$$

$$\begin{bmatrix} 1 & 2 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \end{bmatrix} + \begin{bmatrix} -2 & 6 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \end{bmatrix} + 1 = 0 \quad (0.5)$$

$$16 \neq 0 \quad (0.6)$$

Hence statement is false.

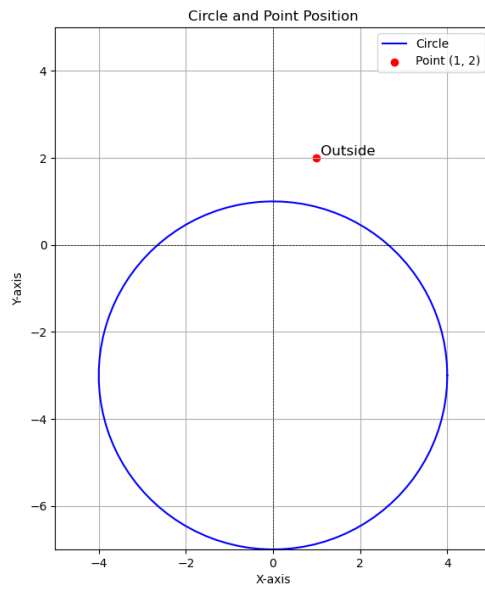


Fig. 0.1: Circle