11.11.1.13

Question : Find the equation of the circle with radius 5 whose centre lies on x-axis and passes through the point $(2, 3)$.

Solution :

Input parameters	Description	Value
r	Radius	5
$\mathbf{O}$	Center	$x\mathbf{e_1}$
$\mathbf{A}$	Point	$\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

Table 1: Table of input parameters

The general formula of the circle is

$$||\mathbf{x}||^2 + 2\mathbf{u}^\top\mathbf{x} + f = 0 \tag{1}$$

$$where, \mathbf{u} = -x\mathbf{e_1} \tag{2}$$

$$f = ||\mathbf{O}|| - r^2 \tag{3}$$

$$f = x - r^2 \tag{4}$$

$$||\mathbf{A}||^2 + 2\mathbf{u}^\top\mathbf{A} + f = 0 \tag{5}$$

$$13 - 4x + x - r^2 = 0 \tag{6}$$

$$or, x = -4 \tag{7}$$

$$or, f = -29 \tag{8}$$

Therefore the equations of the circle are

$$||\mathbf{x}||^2 - 2\begin{pmatrix} -4 & 0 \end{pmatrix}\mathbf{x} - 29 = 0 \tag{9}$$

$$\tag{10}$$

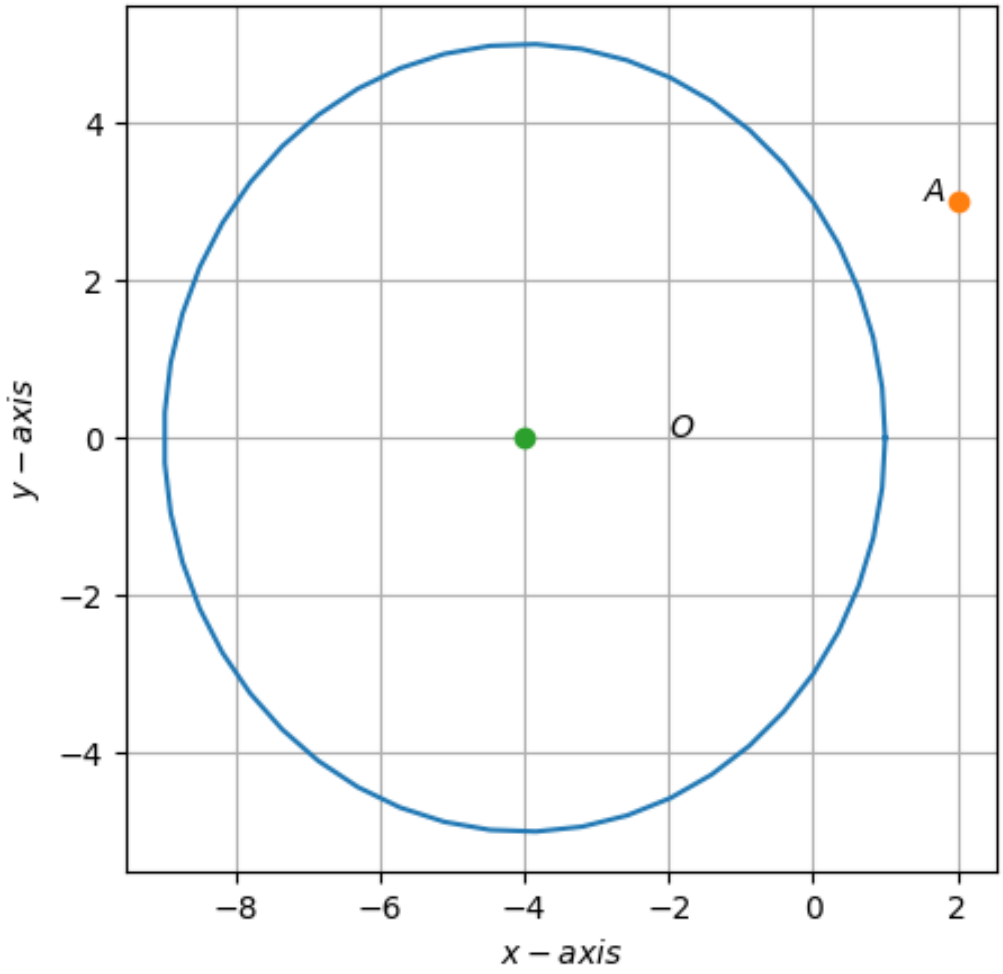

Figure 1: