4-4.4-13

AI24BTECH11020 - RISHIKA KOTHA

Question:Equation of the circle with centre on the Y axis and passing through the origin and the point (2, 3) is
a)$3x^2 + 3y^2 - 13y = 0$
b)$3x^2 + 3y^2 + 13x + 3 = 0$
c)$6x^2 + 6y^2 - 13x = 0$
d)$x^2 + y^2 + 13x + 3 = 0$
Solution: from the given information, the following equations can be formulated

$$\|P\|^2 + 2u^T P + f = 0 \tag{0.1}$$

$$u = ke_2 \tag{0.2}$$

$$\|u\|^2 - f = r^2 \tag{0.3}$$

$$P = \begin{pmatrix} 2 \\ 3 \end{pmatrix} and r = 13/6 \tag{0.4}$$

$$\|P\|^2 + 2ke_2^T P + \|u\|^2 = r^2 \tag{0.5}$$

$$k^2 + 2ke_2^T P + \|P\|^2 - r^2 = 0 \tag{0.6}$$

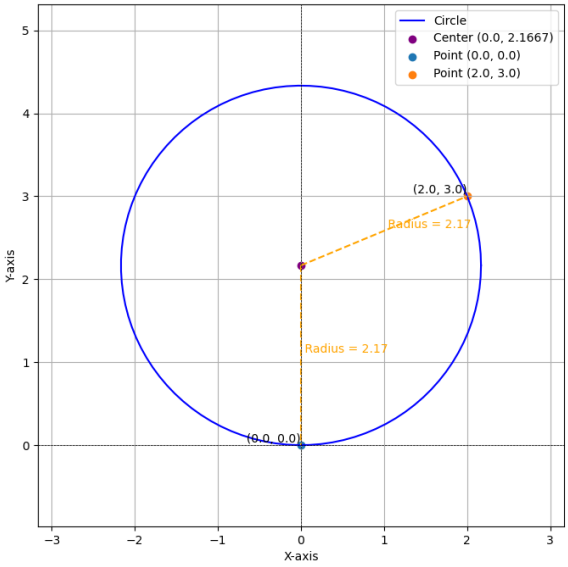
$$k = -e_2^T P \pm \sqrt{(e_2^T P)^2 + r^2 - \|P\|^2} \tag{0.7}$$

Substituting numerical values,

$$k = 13/6, -13/6 \tag{0.8}$$

since $k < 0$, k=-13/6
$\therefore$ the equation of the circle is $3x^2 + 3y^2 - 13y = 0$.

parameter	value
centre(C)	$\begin{pmatrix} 0 \\ 13/6 \end{pmatrix}$
Origin(O)	$\begin{pmatrix} 0 \\ 0 \end{pmatrix}$
point(P)	$\begin{pmatrix} 2 \\ 3 \end{pmatrix}$
radius(r)	13/6


Circle
Center (0.0, 2.1667)
Point (0.0, 0.0)
Point (2.0, 3.0)
(2.0, 3.0)
Radius = 2.17
Radius = 2.17
(0.0, 0.0)
X-axis
Y-axis