

7.4 Circle

Radius: R

Center of circle: (a, b)

- 640.** Equation of a Circle Centered at the Origin (Standard Form)

$$x^2 + y^2 = R^2$$

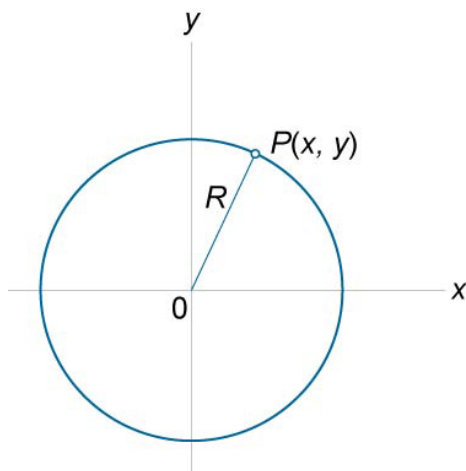


Figure 112.

- 641.** Equation of a Circle Centered at Any Point (a, b)

$$(x - a)^2 + (y - b)^2 = R^2$$

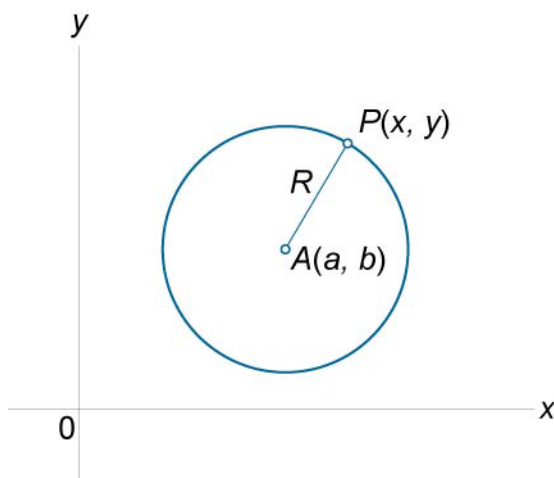


Figure 113.

642. Three Point Form

$$\begin{vmatrix} x^2 + y^2 & x & y & 1 \\ x_1^2 + y_1^2 & x_1 & y_1 & 1 \\ x_2^2 + y_2^2 & x_2 & y_2 & 1 \\ x_3^2 + y_3^2 & x_3 & y_3 & 1 \end{vmatrix} = 0$$

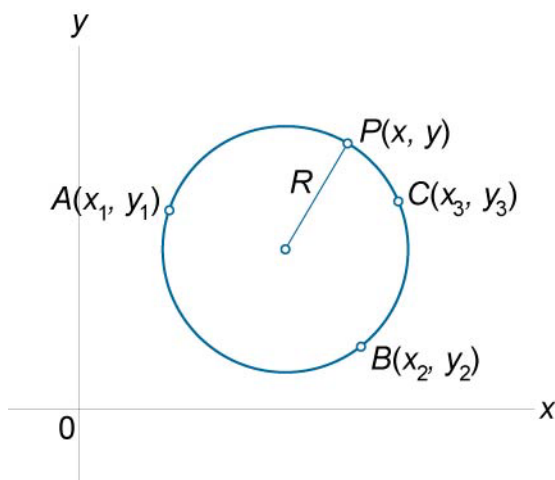


Figure 114.

643. Parametric Form

$$\begin{cases} x = R \cos t \\ y = R \sin t \end{cases}, 0 \leq t \leq 2\pi.$$

644. General Form

$$Ax^2 + Ay^2 + Dx + Ey + F = 0 \quad (A \text{ nonzero, } D^2 + E^2 > 4AF).$$

The center of the circle has coordinates (a, b) , where

$$a = -\frac{D}{2A}, \quad b = -\frac{E}{2A}.$$

The radius of the circle is

$$\mathbf{R}=\sqrt{\frac{\mathbf{D}^2+\mathbf{E}^2-4\mathbf{A}\mathbf{F}}{2|\mathbf{A}|}}\,.$$