

CONICS

Lesson 2 - Circles

General
Form:

$$x^2 + y^2 + Dx + Ey + F = 0$$

Standard
Form:

$$(x-h)^2 + (y-k)^2 = r^2$$

* where (h, k) is the center

Ex. 1] Write the general form
for $(x+2)^2 + (y-1)^2 = 8$

$$x^2 + 4x + 4 + y^2 - 2y + 1 = 8$$

$$x^2 + y^2 + 4x - 2y - 3 = 0$$

Ex. 2] Find the center and radius
of $x^2 + y^2 - 10x + 4y + 17 = 0$

$$x^2 - 10x + \frac{25}{1} + y^2 + 4y + \frac{4}{2} = -17 + \frac{25}{1} + \frac{4}{2}$$

$$(x-5)^2 + (y+2)^2 = 12$$

center: $(5, -2)$

radius: $2\sqrt{3}$

Ex. 3] Write the standard form equation for a circle with center $(7, -9)$ and radius 6.

$$(x-7)^2 + (y+9)^2 = 36$$

Ex. 4] Find the center and radius of circle $x^2 + y^2 + 14x - 4y + 37 = 0$

$$(x+7)^2 + (y-2)^2 = 16$$

Center: $(-7, 2)$

Radius: 4

Ex. 5] Find the general equation of the circle that passes through points $(-2, 3)$, $(6, -5)$ and $(0, 7)$.

$$x^2 + y^2 + Dx + Ey + F = 0$$

1. $(-2)^2 + (3)^2 + D(-2) + E(3) + F = 0$
2. $(6)^2 + (-5)^2 + D(6) + E(-5) + F = 0$
3. $(0)^2 + (7)^2 + D(0) + E(7) + F = 0$

1. $-2D + 3E + F = -13$
2. $6D - 5E + F = -61$
3. $7E + F = -49$

Matrix $\begin{bmatrix} -2 & 3 & 1 & -13 \\ 6 & -5 & 1 & -61 \\ 0 & 7 & 1 & -49 \end{bmatrix}$

Ex. 5] continued ...

$$\begin{array}{ccc} D & E & F \\ \left[\begin{array}{ccc|c} 1 & 0 & 0 & \# \\ 0 & 1 & 0 & \# \\ 0 & 0 & 1 & \# \end{array} \right] \end{array}$$

Row
Reduced
Echelon
Form

Equation:

$$x^2 + y^2 - 10x - 4y - 21 = 0$$

REVIEW!

Dist: $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

Mid-Pt: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$