November 21, 2023

IDENTIFYING CONICS

1) Identify conics from equation
2) Solve quadratic systems of eq.

P 1) $x = 5 - 3(y+2)^2$

H 2) $\frac{x^2}{9} - \frac{(y+3)^2}{4} = 1$

E 3) $\frac{x^2}{9} + \frac{(y-2)^2}{4} = 1$

C 4) $\frac{x^2}{9} + \frac{(y-2)^2}{9} = 1$

E 5) $3x^2 + 7x - 4y + 2y^2 = 11$

P 6) $2x^2 - 5y = 3x + 14 - 3x^2$

H 7) $9x^2 - 2x + 1 = 3y^2 + 2y$
$9x^2 - 3y^2$

C 8) $2 - 4y + 7y^2 = 5x + 3 - 7x^2$
$7x^2 + 7y^2$

DO NOT WRITE THESE RULES ON YOUR CARD!

Parabola – one squared variable

Hyperbola – two squared vars with opposite signs

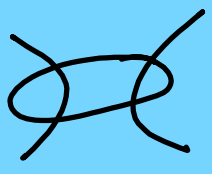
Ellipse – two squared vars, same signs, different coefficients

Circle – two squared vars, same signs, same coefficients

Solving Systems of Quadratic Equations

$5x^2 - 3y^2 = -28$

$2x^2 + y^2 = 24$



Elimination--Variables must have the same exponents.

$$\begin{array}{r} 5x^2 - 3y^2 = -28 \\ +\ 6x^2 + 3y^2 = 72 \\ \hline \end{array}$$

$$\frac{11x^2}{11} = \frac{44}{11}$$

$$\sqrt{x^2} = \sqrt{4}$$

$$x = \pm 2$$

$2x^2 + y^2 = 24$

$x = 2$: $2(2)^2 + y^2 = 24$

$8 + y^2 = 24$

$\sqrt{y^2} = \sqrt{16}$

$y = \pm 4$

$(2, 4)$

$(2, -4)$

$(-2, 4)$

$(-2, -4)$

Substitution--Variables do NOT have the same exponents.

KEY: Isolate a variable which has no exponent!

Ell $x^2 + 9y^2 = 25$

Line $2y = 1 - x$

$x = 1 - 2y$

1) Isolate a var.

2) Sub it into opposite equation

$(1-2y)^2 + 4y^2 = 25$ ← FOIL!

$(1-2y)(1-2y) + 4y^2 = 25$

$1 - 2y - 2y + 4y^2 + 4y^2 = 25$

$8y^2 - 4y + 1 = 25$ ← set = 0, factor or quadr. formula

-25

$8y^2 - 4y - 24 = 0$

$4(2y^2 - y - 6) = 0$ (6, 3)

$4(2y+3)(y-2) = 0$ (+3y, −4y)

$2y + 3 = 0$ $\quad y - 2 = 0$

$2y = -3$ $\quad y = 2$

$y = -3/2$

$x = 1 - 2y$

$y = -\frac{3}{2}$: $x = 1 + 2(+\frac{3}{2})$

$x = 4$

$y = 2$: $x = 1 - 2(2)$

$x = 1 - 4$

$x = -3$

$(4, -3/2)$

$(-3, 2)$

No solution

Variables will cancel

$-2y + 3 = 2y - 7$

$3 = -7$

$\sqrt{x^2} = \sqrt{-4}$

$x = \pm 2i$

No solution

Infinitely Many

$2y + 3 = 2y + 3$

$0 = 0$