

Systems of Conic Sections Notes

State if the point given is a solution to the system of equations.

1) $3y^2 + 13x + 6y - 137 = 0$

$15x^2 - 3y^2 - 28x - 6y - 163 = 0$

Point: $(7, -4)$ → plug in for x & y

$$3(-4)^2 + 13(7) + 6(-4) - 137 = 0$$

$$3(16) + 91 - 24 - 137$$
$$48 + 91 - 24 - 137 \neq 0$$

No

2) $x^2 - 3y^2 + 30x + 2y - 192 = 0$ YES

$x + y - 2 = 0 \rightarrow 10 + (-8) - 2 = 0$

Point: $(10, -8)$

$$10^2 - 3(-8)^2 + 30(10) + 2(-8) = 192$$

$$100 - 3(64) + 300 - 16$$

$$400 - 192 - 16$$

$$208 - 16 = 192 \checkmark$$

Solve each system of equations.

3) $2y^2 - 27x - 3y + 180 = 0$

$x + y = 4$

solve for x or solve for y

$x = -y + 4$

$$2y^2 - 27(-y + 4) - 3y + 180 = 0$$

$$2y^2 + 27y - 108 - 3y + 180 = 0$$

$$2y^2 + 24y + 72 = 0$$

$$2(y^2 + 12y + 36) = 0$$

$$2(y + 6)(y + 6) = 0$$

$y = -6$

$x = -(-6) + 4$

$x = 10$

$(10, -6)$

$$4) 2x^2 - 3y^2 + 76x + 4y + 4 = 0$$

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

Solve for y $y(0) = 2$
 $y(4) = -10$

$$2x^2 - 3(-3x+2)^2 + 76x + 4(-3x+2) + 4 = 0$$

$$2x^2 - 3(9x^2 - 12x + 4) + 76x - 12x + 8 + 4 = 0$$

$$2x^2 - 27x^2 + 36x - 12 + 64x + 12 = 0$$

$$-25x^2 + 100x = 0 \quad (0, 2)$$

$$-25x(x-4) = 0 \quad (4, -10)$$

$$x = 0, 4$$

$$5) 2x^2 - y^2 + 4x + 10y - 32 = 0$$

$$-(14x^2 - y^2 + 28x + 10y - 128 = 0)$$

$$-12x^2 - 24x + 96 = 0$$

$$-12(x^2 + 2x - 8) = 0$$

$$-12(x+4)(x-2) = 0$$

$$x = -4 \quad x = 2$$

$$2(-4)^2 - y^2 + 4(-4) + 10y - 32 = 0$$

$$2(16) - y^2 - 16 + 10y - 32 = 0$$

$$32 - y^2 - 16 + 10y - 32 = 0$$

$$-y^2 + 10y - 16 = 0$$

$$-(y^2 - 10y + 16) = 0$$

$$-(y-8)(y-2) = 0$$

$$y = 8, 2$$

$$(-4, 8)$$

$$(-4, 2)$$

$$(2, 8)$$

$$(2, 2)$$

$$2(2)^2 - y^2 + 4(2) + 10y - 32 = 0$$

$$2(4) - y^2 + 8 + 10y - 32 = 0$$

$$-y^2 + 10y - 16 = 0$$

$$y = 8, 2$$

$$6) 4x^2 - 2y^2 - 55x + 20y + 138 = 0$$

$$+ 9x^2 + 2y^2 + 53x - 20y - 151 = 0$$

$$-5x^2 - 2x - 13 = 0$$

$$5x^2 + 2x + 13 = 0$$

$$b^2 - 4ac = 2^2 - 4(5)(13) = -$$

Therefore, there are no solutions

Write the equation of each conic section in standard form.

7) $4x^2 + 25y^2 + 8x - 250y + 529 = 0$

8) $6y^2 + x + 36y + 57 = 0$

$$4x^2 + 8x + 4 + 25y^2 - 250y + 625 = -529 + 4 + 625$$

$$4(x^2 + 2x + 1) + 25(y^2 - 10y + 25) + 625$$

$$x + 57 = -6y^2 - 36y - 54$$

$$= -6(y^2 + 6y + 9)$$

$$\frac{4(x+1)^2}{100} + \frac{25(y-5)^2}{100} = \frac{100}{100}$$

$$x + 3 = -6(y+3)^2$$

$$\frac{(x+1)^2}{25} + \frac{(y-5)^2}{4} = 1$$

9) $2y^2 - 12x = -12y - 2x^2 - 28$

10) $4x - 6 = y^2 - x^2 - 2y$

$$2x^2 - 12x + 18 + 2y^2 + 12y + 18 = -28 + 18 + 18$$

$$2(x^2 - 6x + 9) + 2(y^2 + 6y + 9) + 18$$

$$-x^2 - 4x - 4 + y^2 - 2y + 1 = 6$$

$$-1(x^2 + 4x + 4) + (y^2 - 2y + 1) = 6 - 1$$

$$\frac{2(x-3)^2}{2} + \frac{2(y+3)^2}{2} = \frac{8}{2}$$

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

$$(x-3)^2 + (y+3)^2 = 4$$

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

Answers to Systems of Conic Sections Notes

1) No

2) Yes

3) $(10, -6)$

4) $(0, 2), (4, -10)$

5) $(-4, 8), (-4, 2), (2, 8), (2, 2)$

6) No solution.

$$7) \frac{(x+1)^2}{25} + \frac{(y-5)^2}{4} = 1$$

8) $x = -6(y+3)^2 - 3$

9) $(x-3)^2 + (y+3)^2 = 4$

$$10) \frac{(x+2)^2}{9} - \frac{(y-1)^2}{9} = 1$$