

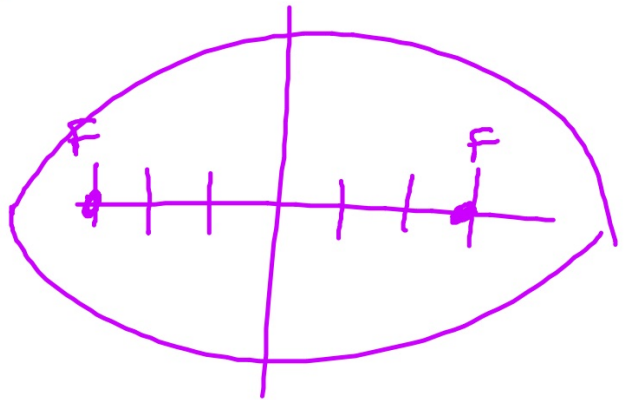
3e.) Foci $(\pm 3, 0)$

$$\frac{x^2}{36} + \frac{y^2}{27} = 1$$

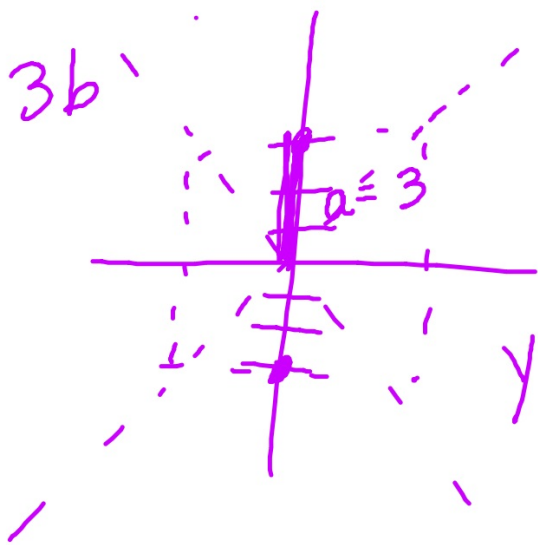
$$c^2 = a^2 - b^2$$

$$9 = 36 - b^2$$

$$27 = b^2$$

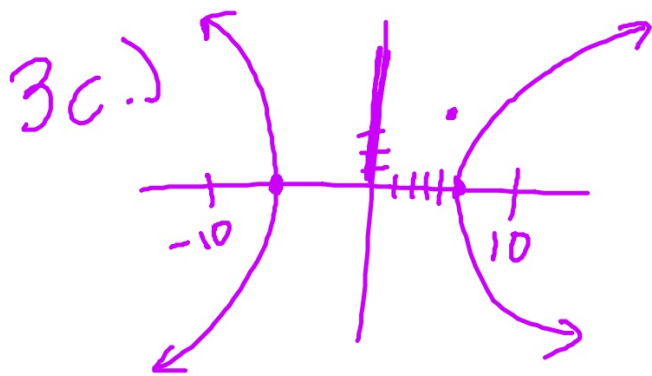


3b



$$\frac{y^2}{a} - \frac{x^2}{1} = 1$$

$$y = \pm 3x = \pm \underbrace{3}_{=b} x$$



$$c = 10$$

$$c^2 = a^2 + b^2$$

$$100 = 6^2 + 8^2$$

$$\frac{x^2}{64} - \frac{y^2}{36} = 1$$

$$y = \pm \frac{3}{4}x$$

$$a = 8$$

$$b = 6$$

$$\frac{6}{8}$$

4b.)

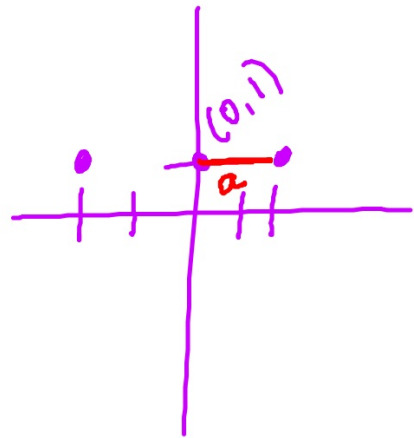
$$\frac{x^2}{4} - \frac{(y-1)^2}{\frac{12}{7}} = 1$$

$$(5,4) \quad \frac{25}{4} - \frac{9}{b^2} = 1$$

$$\frac{25}{4} - 1 = \frac{9}{b^2}$$

$$\frac{21}{4} = \frac{9}{b^2}$$

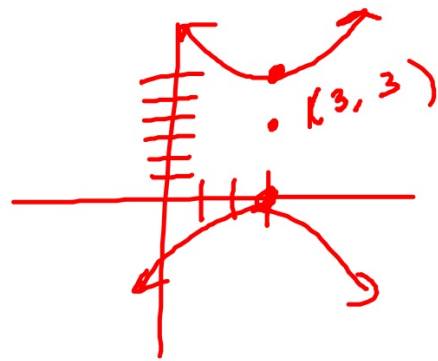
$$b^2 = \frac{36}{21} = \frac{12}{7}$$



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

$$a=3$$

$$b=3$$



$$y = -x + 6$$

$$y = x$$

Classify each equation as a parabola, circle, ellipse, hyperbola, or none of these.

P 1. $3x^2 + 2x - y + 3 = 0$

C 2. $3x^2 + 3y^2 - 12x + 18y - 6 = 0$

E 3. $4x^2 + 3y^2 - 12x + 21y - 6 = 0$ (same signs x^2, y^2 ; diff. coeff)

4. $3x + 5y - 6 = 0$ none

H 5. $2x^2 - y^2 + 5x - 6y + 3 = 0$

C 6. $5x^2 + 5y^2 - 3x + 2y - 7 = 0$

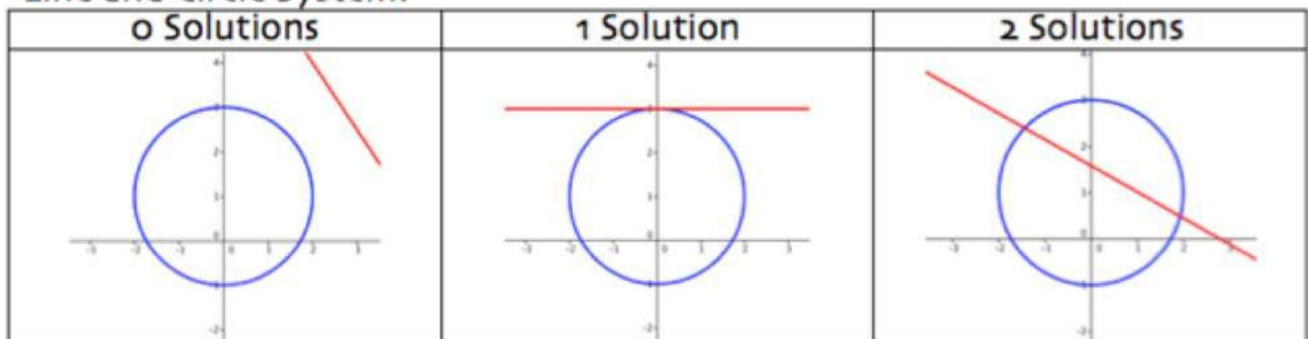
E 7. $-2x^2 - 3y^2 + 7x - 8y + 2 = 0$

P 8. $x^2 - 3y + 4 = 0$

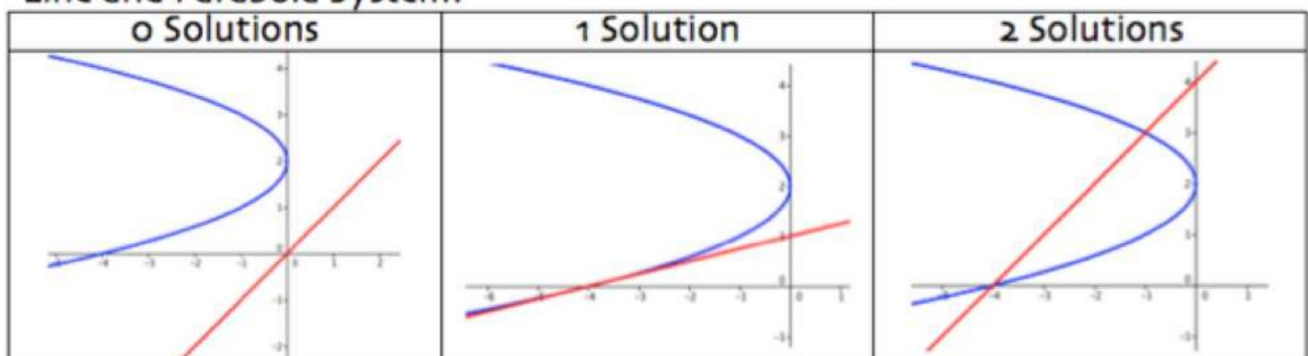
H 9. $x^2 - 2y^2 + 6x - 8y + 2 = 0$

8.7 Nonlinear Systems

Line and Circle System:

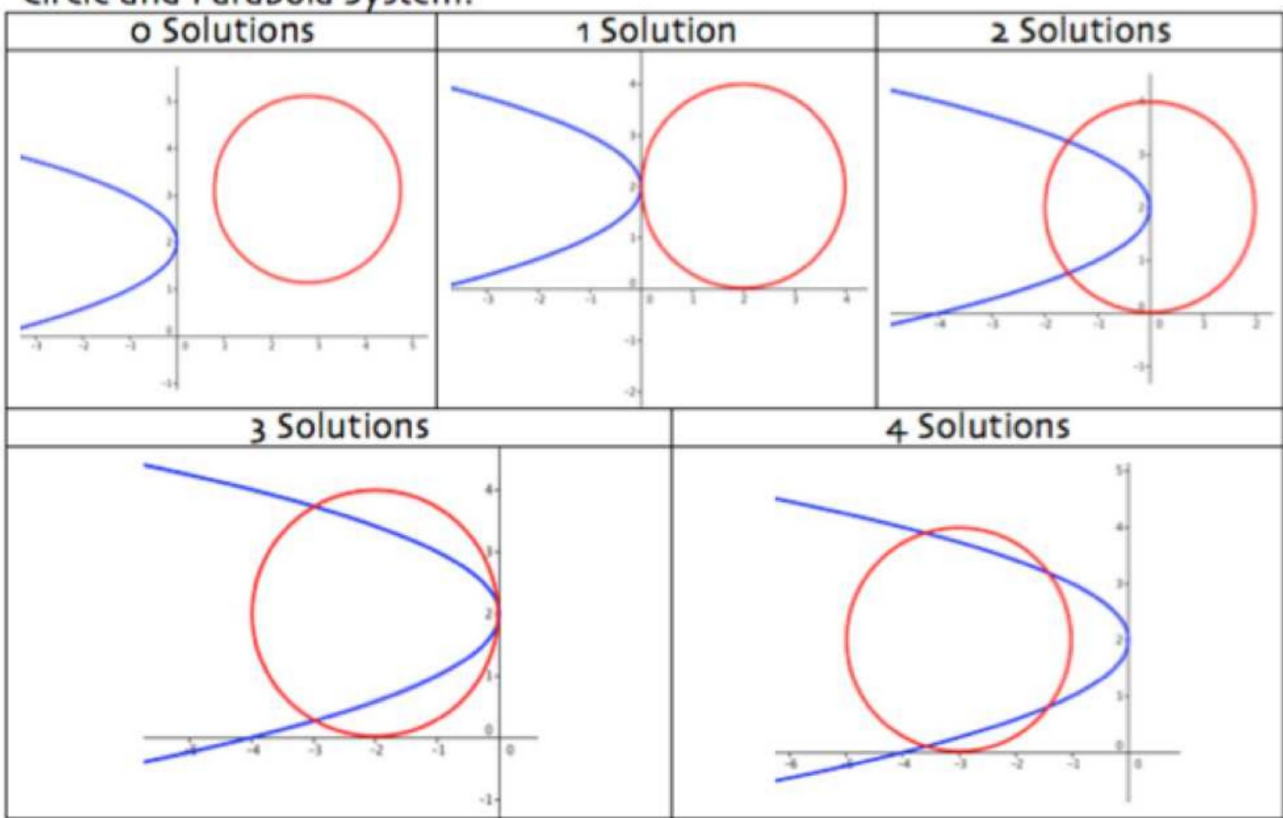


Line and Parabola System:



*See printout.

Circle and Parabola System:



Solve for the real solutions of the system.

ex: Is the point a solution to the system?

a) (1, 2)

$$4y^2 + 34x + y - 52 = 0$$

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

Yes

$$\rightarrow 4(2^2) + 34(1) + 2 - 52 = 0 \checkmark$$

$$2(1) + 2 - 4 = 0 \checkmark$$

b.) (2,7)

$$\begin{cases} x^2 + y^2 \leq 9 \\ x^2 > -4(y-1) \end{cases}$$

NO

$$\rightarrow 4 + 49 \leq 9 \quad X$$

b) Solve graphically

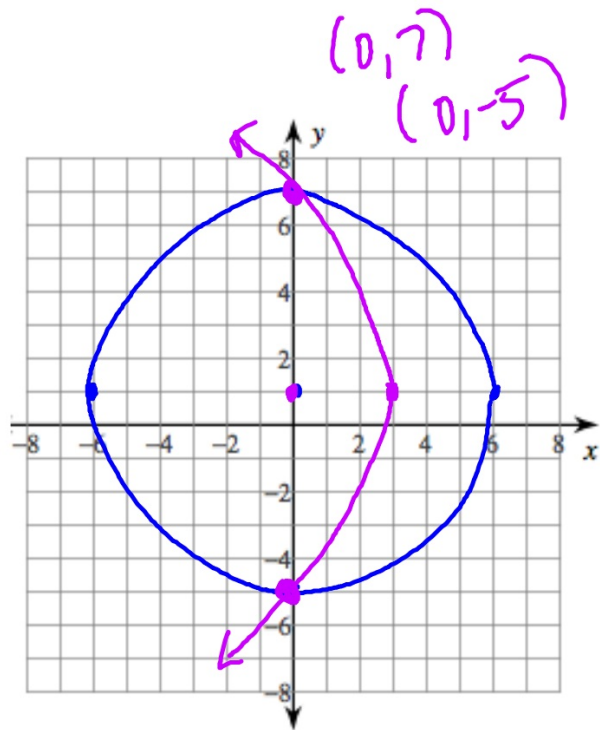
$$x^2 + y^2 = 9$$

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

$$x^2 + (y-1)^2 = 36$$

$$(y-1)^2 = -12(x-3)$$

$$\downarrow$$
$$4p = -12$$
$$p = -3$$



Systems of Equations

ex: Solve algebraically.

a) $x^2 + y^2 = 13$

$$y = (x-1)$$

$$x^2 + (x-1)^2 = 13$$

$$x^2 + x^2 - 2x + 1 - 13 = 0$$

$$2x^2 - 2x - 12 = 0$$

Solve for the real solutions of the system.

$$x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$x = 3, -2$$

$$(3, 2)$$

$$(-2, -3)$$

Systems of Equations

ex: Solve algebraically.

$$\text{b) } -2(y^2) + x + 2 = 0$$

$$x^2 + y^2 - 1 = 0$$

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

$$\sqrt{y^2} = \sqrt{1}$$

$$y = \pm 1$$

$$y^2 = 1 - \left(-\frac{1}{2}\right)^2$$
$$\sqrt{y^2} = \sqrt{1 - \frac{1}{4}} = \sqrt{\frac{3}{4}}$$
$$y = \pm \frac{\sqrt{3}}{2}$$

Solve for the real solutions of the system.

$$-2(1 - x^2) + x + 2 = 0$$

$$\cancel{-2} + 2x^2 + x + \cancel{2} = 0$$

$$x(2x + 1) = 0$$

$$x = 0, -\frac{1}{2}$$

$$(0, \pm 1)$$

$$\left(-\frac{1}{2}, \pm \frac{\sqrt{3}}{2}\right)$$

Systems of Equations

ex: Solve algebraically.

$$b) -2y^2 + x + 2 = 0$$

$$x^2 + y^2 - 1 = 0$$

$$x = 2y^2 - 2$$

$$x = 2 - 2 = 0$$

$$x = 2\left(\frac{\sqrt{3}}{2}\right)^2 - 2$$

$$x = \frac{3}{2} - 2$$

Solve for the real solutions of the system.

$$(2y^2 - 2)^2 + y^2 - 1 = 0$$

$$(4y^4 - 8y^2 + 4) + y^2 - 1 = 0$$

$$4y^4 - 7y^2 + 3 = 0$$

$$(4y^2 - 3)(y^2 - 1) = 0$$

$$y = \pm \frac{\sqrt{3}}{2} \quad y = \pm 1$$

$$\begin{aligned} & (0, \pm 1) \\ & \left(-\frac{1}{2}, \pm \frac{\sqrt{3}}{2}\right) \end{aligned}$$

Systems of Equations

Solve for the real solutions of the system.

ex: Solve algebraically.

$$x^2 - y^2 - 9 = 0$$

$$c) x^2 - y^2 - 16x + 39 = 0$$

$$+ \quad -x^2 + y^2 + 9 = 0$$

$$-16x + 48 = 0$$

$$x = 3$$

$$(3, 0)$$

Solve algebraically.

Solve for the real solutions of the system.

d) $5x^2 + 3y^2 = 7$

$$3x^2 - 7y^2 = 13$$

Solve algebraically.

Solve for the real solutions of the system.

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

$$y = -4x + 1$$

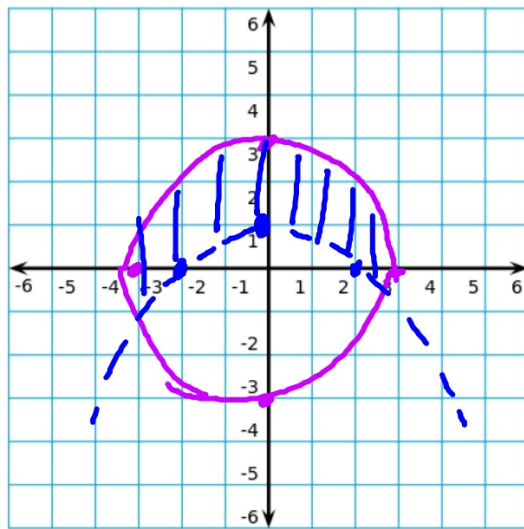
$$x^2 + y^2 \leq 9$$

$$x^2 > -4(y-1)$$

$(0,0)$

$$0^2 > -4(0-1)$$

$$0 > 4$$



$$(y+3)^2 < 8(x+2)$$

$$x > 2$$

$$(0+3)^2 < 8(0+2)$$

$$9 < 16$$

