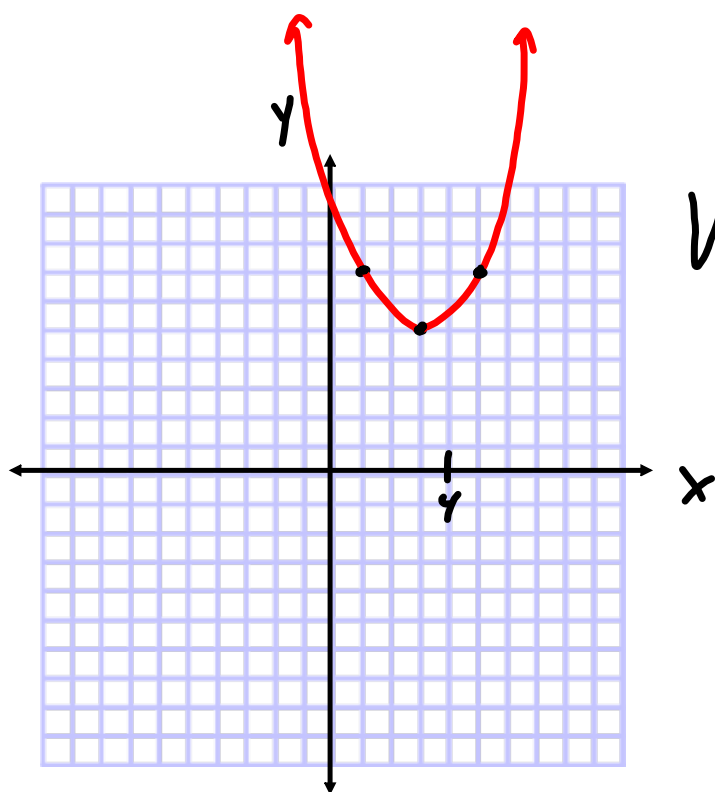


1) (5 points) Graph the conic section.

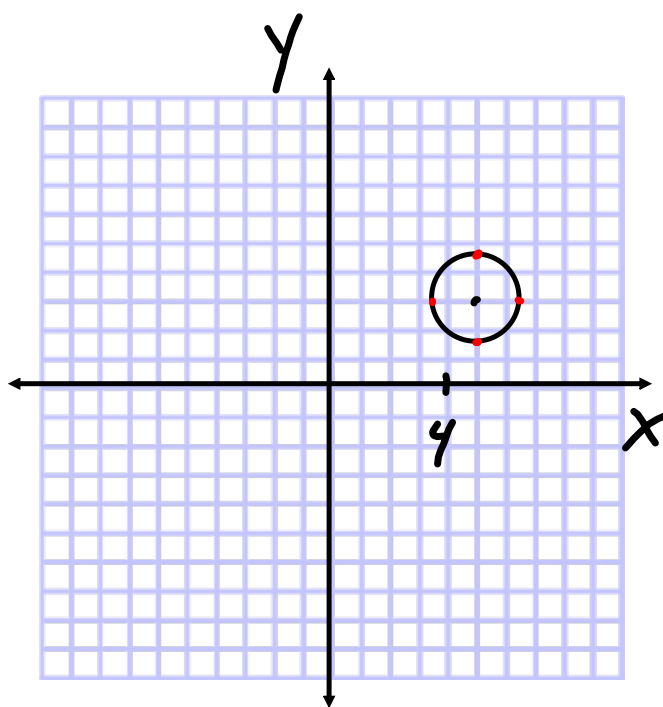


$$y = \frac{1}{2}(x - 3)^2 + 5$$

VERTEX: (3, 5)

2) (5 points) Graph the conic section.

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



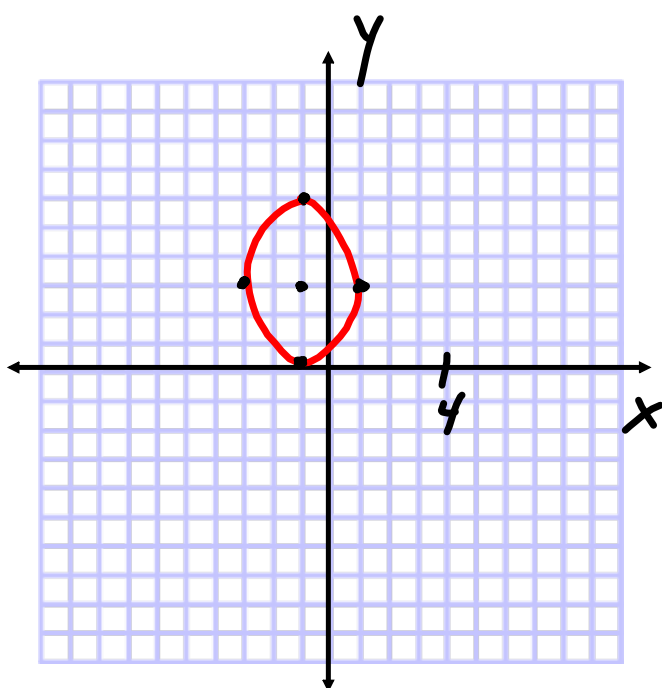
CIRCLE

CENTER: $(5, 3)$

RADIUS = $\sqrt{2}$
 ≈ 1.4

3) (5 points) Graph the conic section.

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

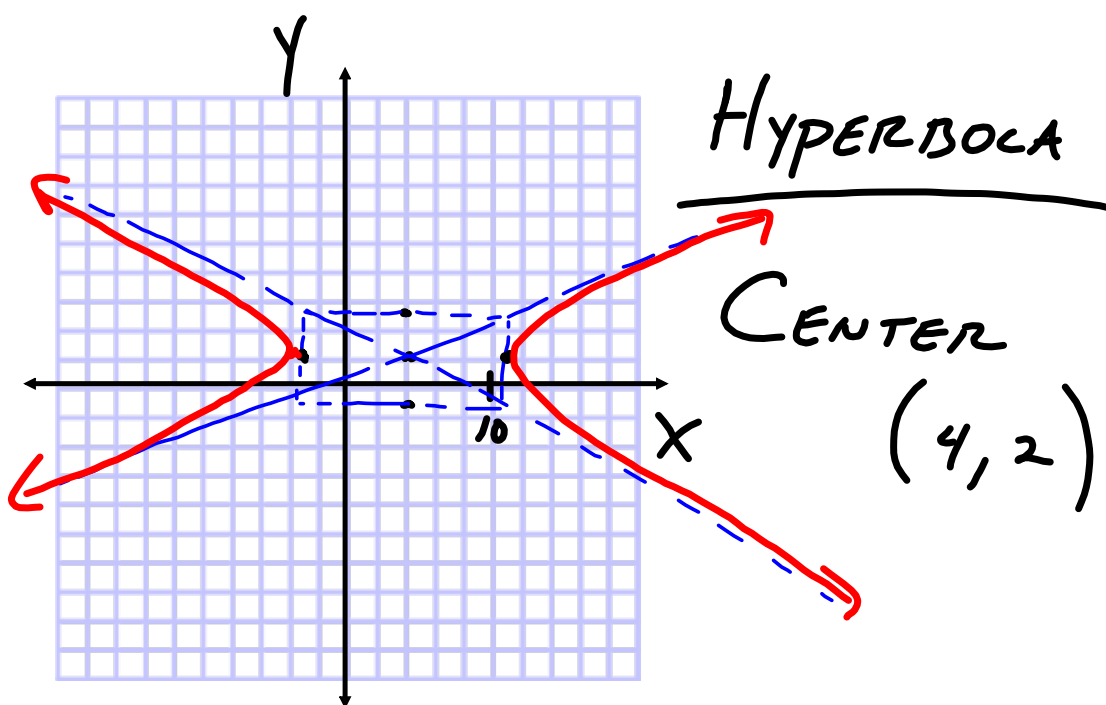


ELLIPSE

CENTER
 $(-1, 3)$

4) (5 points) Graph the conic section.

$$\frac{(x-4)^2}{49} - \frac{(y-2)^2}{10} = 1$$



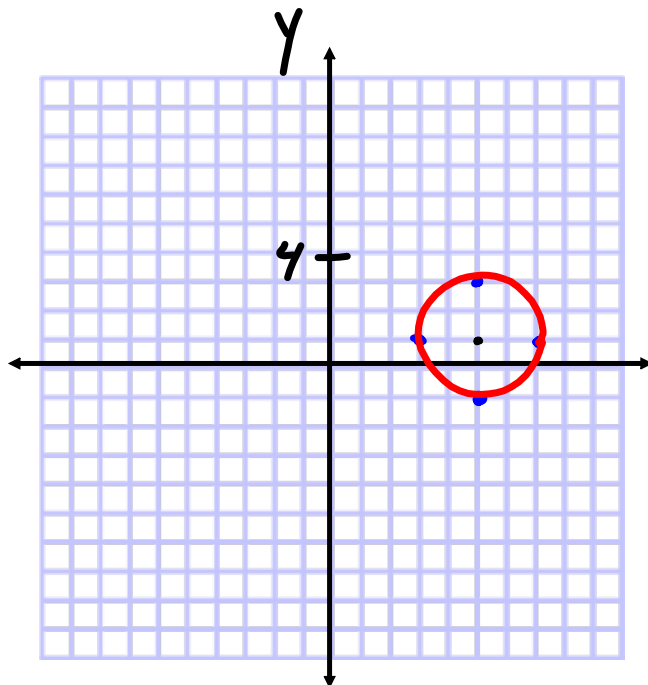
6) (5 points) Write the equation of the conic section in standard form and graph the equation.

$$15x^2 + 15y^2 - 150x - 30y + 330 = 0$$

$$15(x^2 + y^2 - 10x - 2y + 22) = 0$$

$$x^2 - 10x + 25 + y^2 - 2y + 1 = -22 + 25 + 1$$

$$(x-5)^2 + (y-1)^2 = 4$$



CENTER: $(5, 1)$

RADIUS = 2

x

7) (5 points) Write the equation of the conic section in standard form and graph the equation.

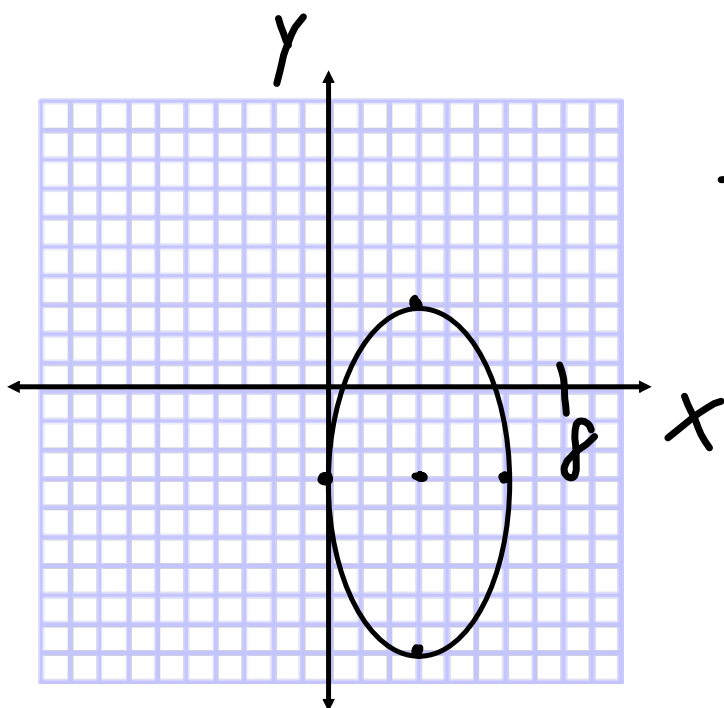
$$4x^2 + y^2 - 24x + 6y + 9 = 0$$

$$4x^2 - 24x + y^2 + 6y = -9$$

$$4(x^2 - 6x) + (y^2 + 6y) = -9$$

$$4(x-3)^2 + (y+3)^2 = 36$$

$$\frac{(x-3)^2}{9} + \frac{(y+3)^2}{36} = 1$$



CENTER
(3, -3)

5) (5 points) Write the equation of the conic section in standard form and graph the equation.

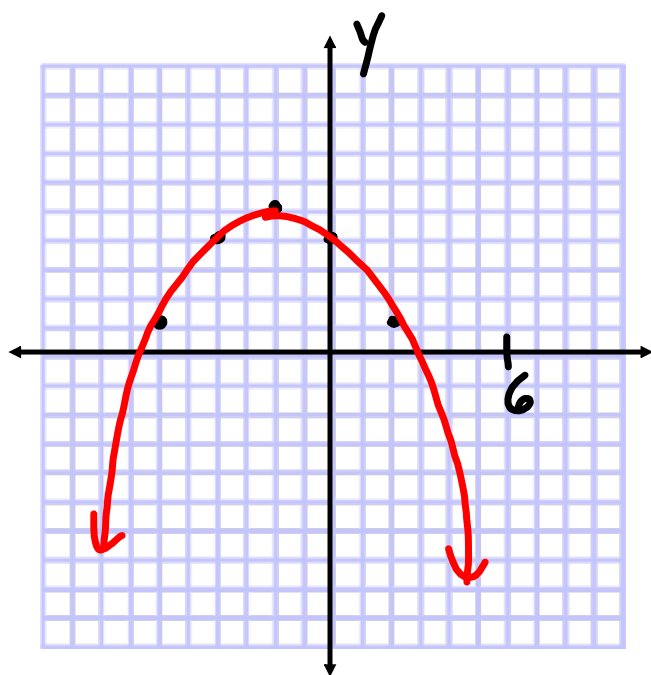
$$x^2 + 4x + 4y - 16 = 0$$

$$-4y = x^2 + 4x - 16$$

$$-4y = (x+2)^2 - 20$$

$$\frac{-4y}{-4} = \frac{(x+2)^2 - 20}{-4}$$

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



VERTEX
 $(-2, 5)$

OVER 1 DOWN $\frac{1}{4}$
 OVER 2 DOWN 1
 OVER 4 DOWN 4

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8) (5 points) Write the equation of the conic section in standard form and graph the equation.

$$-25x^2 + y^2 + 50x + 20y + 50 = 0$$

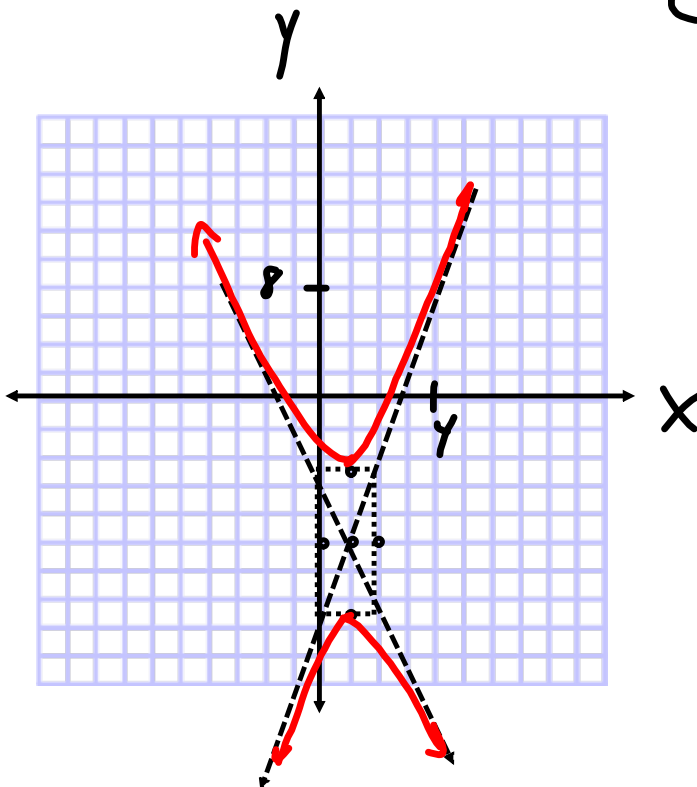
$$-25x^2 + 50x + y^2 + 20y = -50$$

$$-25(x^2 - 2x + 1) + (y^2 + 20y + 100) = -50$$

$$\frac{-25(x-1)^2}{25} + \frac{(y+10)^2}{25} = \frac{25}{25}$$

$$\frac{(y+10)^2}{25} - \frac{(x-1)^2}{1} = 1$$

CENTER: (1, -10)



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9) (7 points) Write the equation of the conic section in standard form and graph the equation. If the conic section is a parabola, find the vertex and the directrix. If the conic section is an ellipse, find the foci. If the conic section is a hyperbola, list the foci and the equations of the asymptotes.

$$16x^2 + y^2 + 160x - 22y + 505 = 0$$

$$16x^2 + 160x + y^2 - 22y = -505$$

$$16(x^2 + 10x) + (y^2 - 22y) = -505$$

$$16(x+5)^2 + (y-11)^2 = 16$$

$$\frac{(x+5)^2}{1} + \frac{(y-11)^2}{16} = 1$$

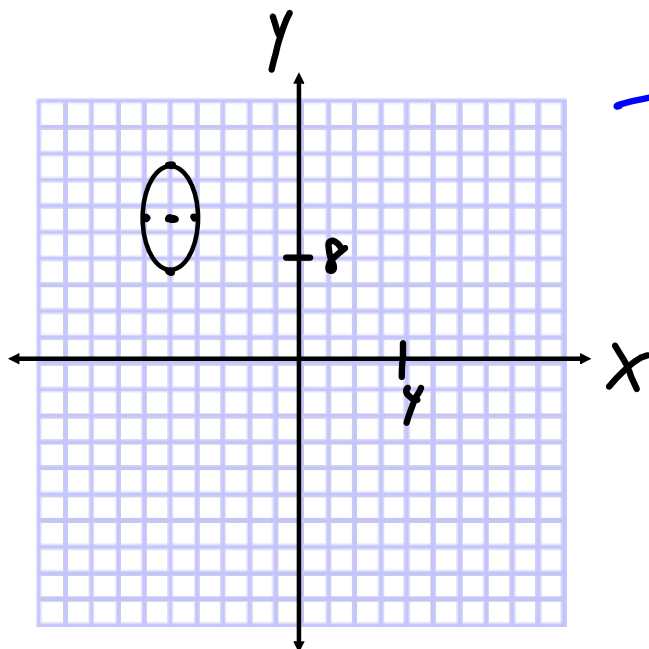
CENTER
 (-5, 11)

$$c^2 = 16 - 1 = 15$$

$$c = \sqrt{15}$$

Foci

$$(-5, 11 \pm \sqrt{15})$$



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10) (10 points) Write the equation of the conic section in standard form and graph the equation. If the conic section is a parabola, find the vertex and the directrix. If the conic section is an ellipse, find the foci. If the conic section is a hyperbola, list the foci and the equations of the asymptotes.

$$4x^2 - 9y^2 + 32x - 144y - 548 = 0$$

$$4x^2 + 32x - 9y^2 - 144y = 548$$

$$4(x^2 + 8x) - 9(y^2 + 16y) = 548$$

$+16$
 $+64$
 $+64$
 -576

$$4(x+4)^2 - 9(y+8)^2 = 36$$

$$\frac{(x+4)^2}{9} - \frac{(y+8)^2}{4} = 1$$

CENTER: $(-4, -8)$

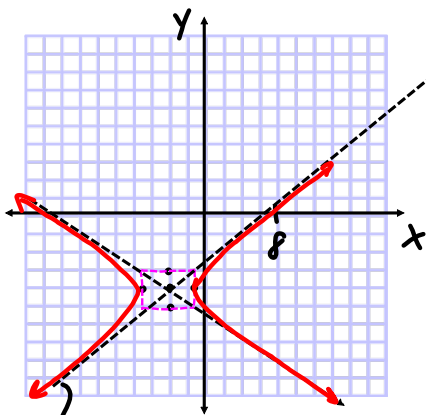
Foci: $\sqrt{13}$ UNITS FROM CENTER

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

$$c^2 = 9 + 4 = 13$$

Foci: $(-4 \pm \sqrt{13}, -8)$

NOTE: IT OPENS IN X-DIRECTION



$$m = \frac{2}{3} (-4, -8)$$

$$y = \frac{2}{3}x + b$$

$$-8 = \frac{2}{3}(-4) + b$$

$$b = -\frac{16}{3}$$

$$y = \frac{2}{3}x - \frac{16}{3}$$

$$m = -\frac{2}{3} (-4, -8)$$

$$y = -\frac{2}{3}x + b$$

$$-8 = -\frac{2}{3}(-4) + b$$

$$-8 = \frac{8}{3} + b$$

$$b = -\frac{32}{3}$$

$$y = -\frac{2}{3}x - \frac{32}{3}$$

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11) (6 points) Solve the system of nonlinear equations given below.

$$4x^2 + y^2 - 4y - 32 = 0$$

$$x^2 - y - 7 = 0$$

ELLIPSE

$$4x^2 + y^2 - 4y = 32$$

$$4x^2 + y^2 - 4y + 4 = 32 + 4$$

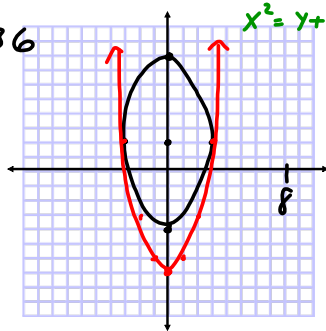
$$4x^2 + (y-2)^2 = 36$$

$$\frac{x^2}{9} + \frac{(y-2)^2}{36} = 1$$

↓
PARABOLA

$$y = x^2 - 7$$

$$x^2 = y + 7$$



$$4x^2 + y^2 - 4y - 32 = 0$$

$$4(y+7) + y^2 - 4y - 32 = 0$$

$$4y + 28 + y^2 - 4y - 32 = 0$$

$$y^2 - 4 = 0$$

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

$$y = -2, 2$$

IF $y = -2$

$$x^2 = -2 + 7$$

$$x^2 = 5$$

$$x = \pm\sqrt{5}$$

$$(\sqrt{5}, -2)$$

$$(-\sqrt{5}, -2)$$

IF $y = 2$

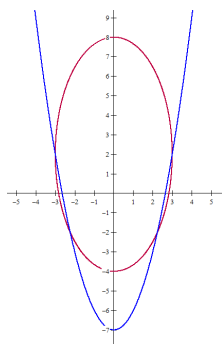
$$x^2 = 2 + 7$$

$$x^2 = 9$$

$$x = 3, -3$$

$$(3, 2)$$

$$(-3, 2)$$



4 SOLUTIONS
 $(\pm\sqrt{5}, -2)$ $(\pm 3, 2)$