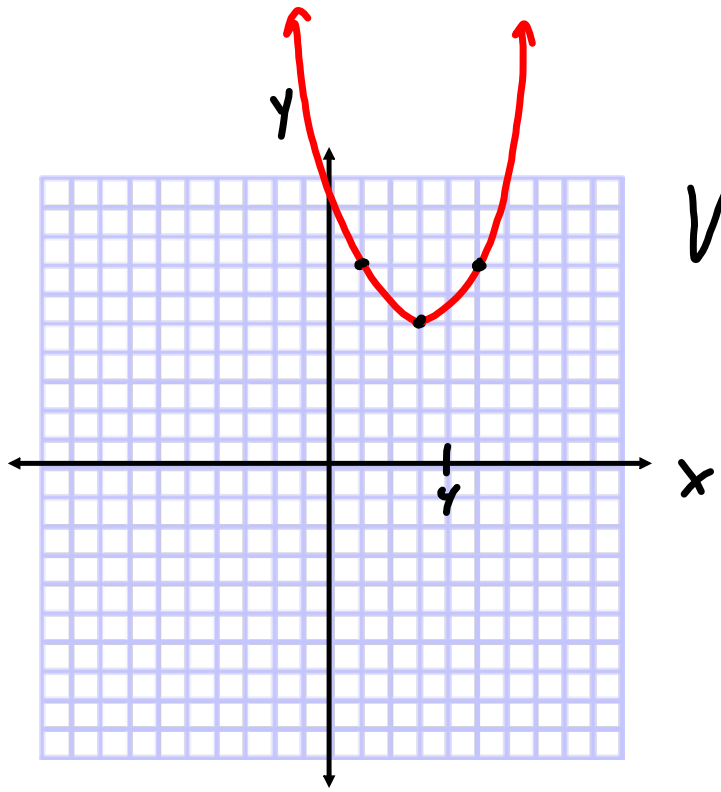
1) (5 points) Graph the conic section.

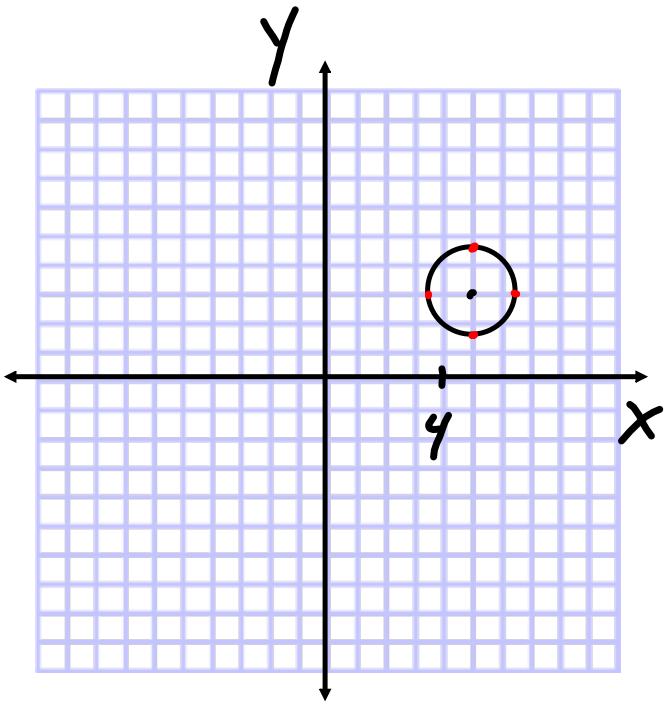


$$y = \frac{1}{2}(x-3)^2 + 5$$

VERTEX: (3, 5)

2) (5 points) Graph the conic section.

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



CIRCLE

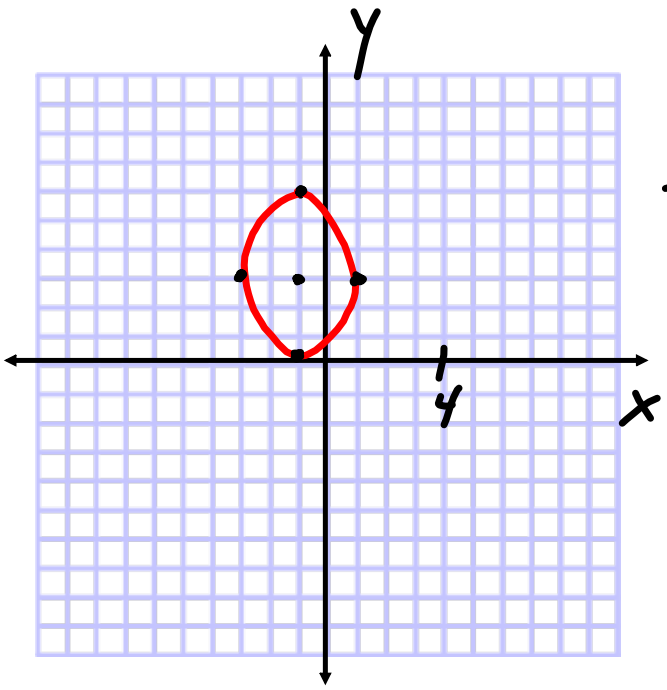
CENTER: (5, 3)

RADIUS = $\sqrt{2}$

≈ 1.4

3) (5 points) Graph the conic section.

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



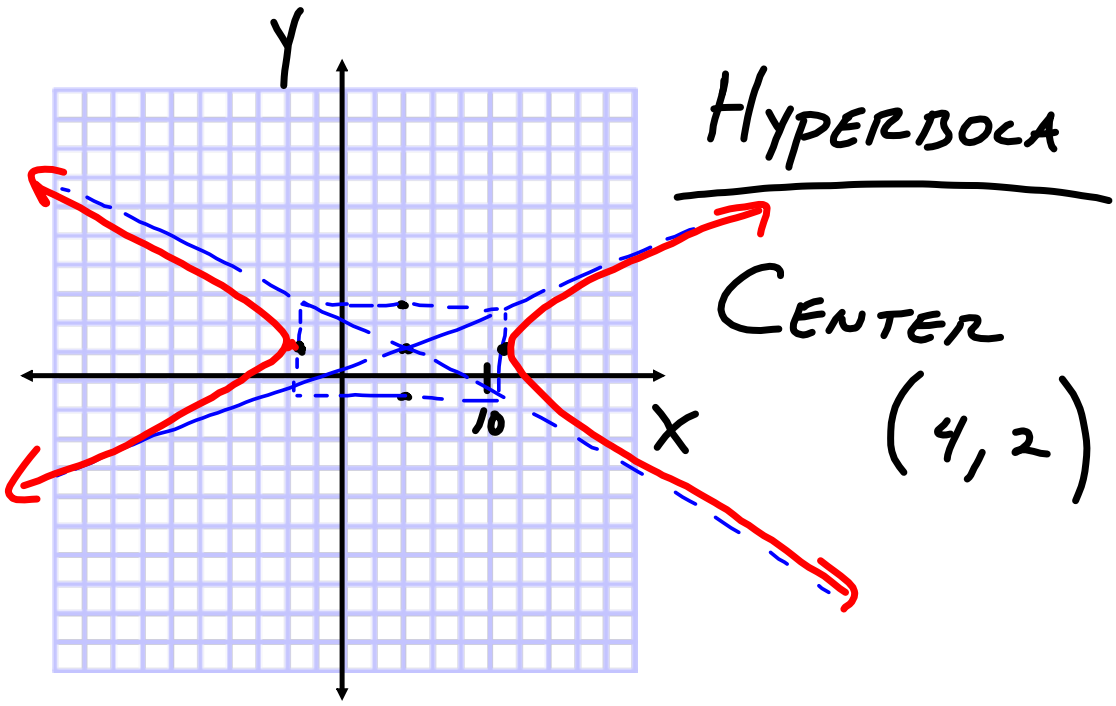
ELLIPSE

CENTER

(-1, 3)

4) (5 points) Graph the conic section.

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



HYPERBOLA

CENTER

(4, 2)

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

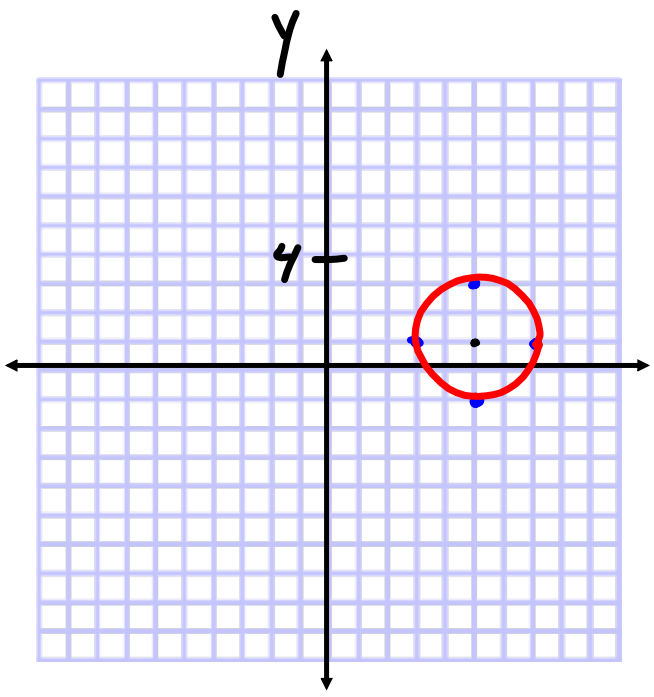
$$15x^2 + 15y^2 - 150x - 30y + 330 = 0$$

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

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

$+25 \quad +1 \quad +25 \quad +1$

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



CENTER: (5, 1)

RADIUS = 2

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

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

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

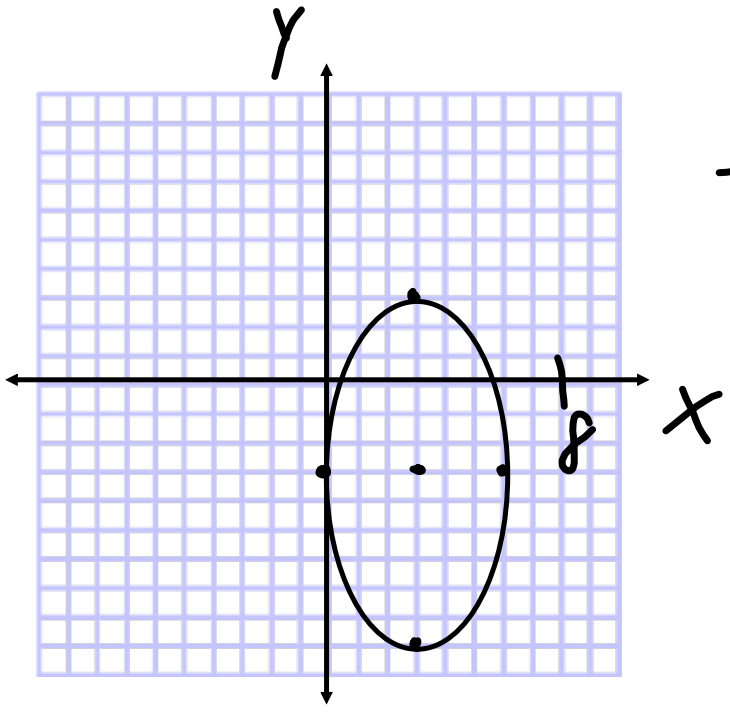
$4(x^2 - 6x\ \ ) + (y^2 + 6y\ \ ) = -9$

$+9 \qquad +9 \quad +36$

$+9$

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

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



CENTER

$(3, -3)$

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

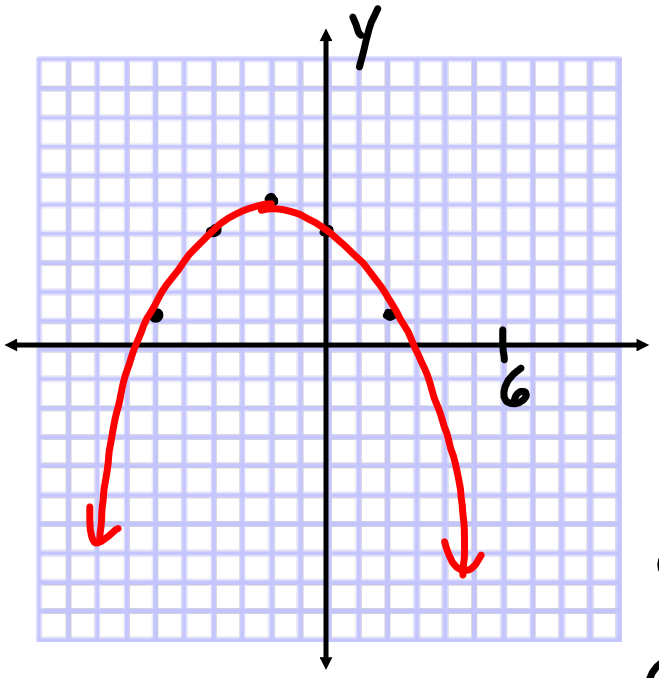
$x^2 + 4x + 4y - 16 = 0$

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

$+4 \qquad -4$

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

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



VERTEX

$(-2, 5)$

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

OVER 2 DOWN 1

OVER 4 DOWN 4

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

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

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

$-25(x^2-2x \quad)+(y^2+20y \quad)=-50$

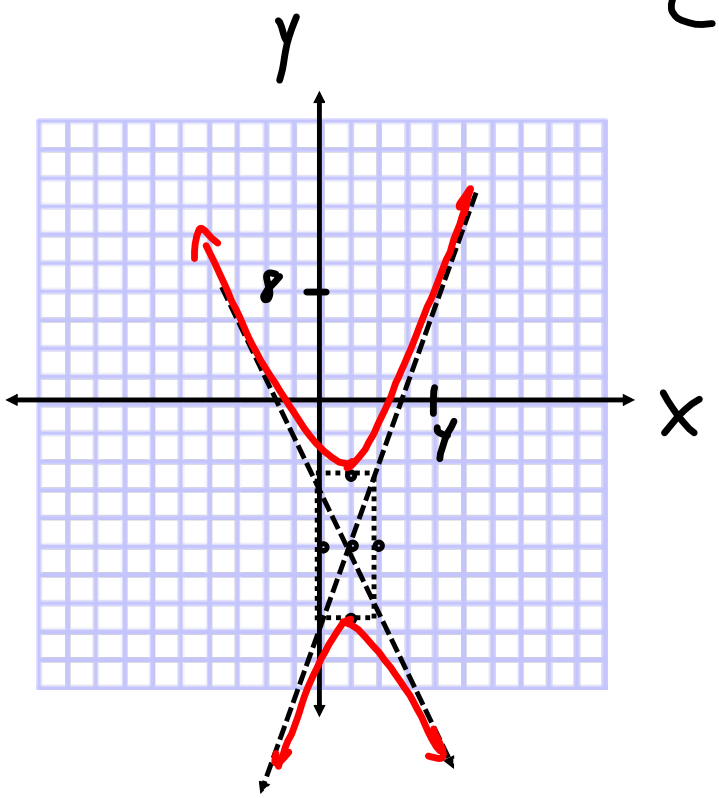
$+1 \qquad\qquad +100 \quad -25 \quad +100$

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

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

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

CENTER: $(1,-10)$



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.

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

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

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

$+25$ $+121$ $+400$ $+121$

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

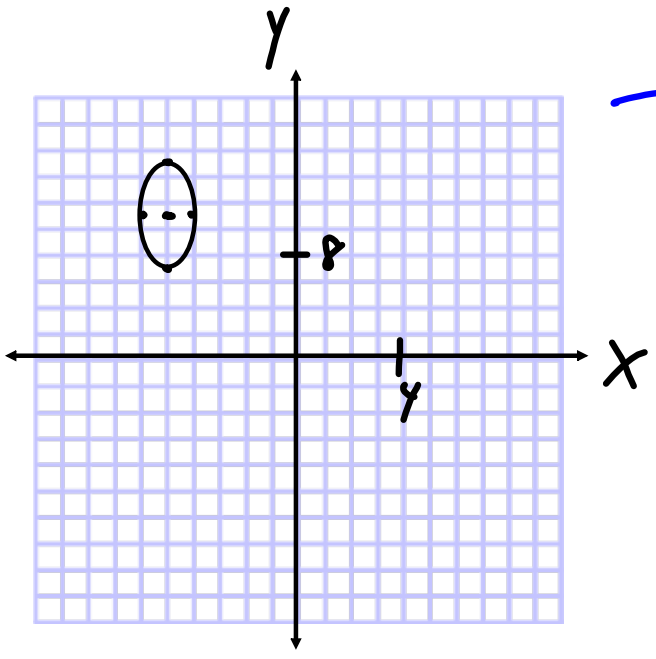
$$\frac{(x+5)^2}{1} + \frac{(y-11)^2}{16} = 1$$

CENTER

$(-5, 11)$

$c^2 = 16 - 1 = 15$

$c = \sqrt{15}$



FOCI

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

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.

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

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

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

$+16 \qquad +64 \qquad +64$

-576

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

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

CENTER: $(-4,-8)$

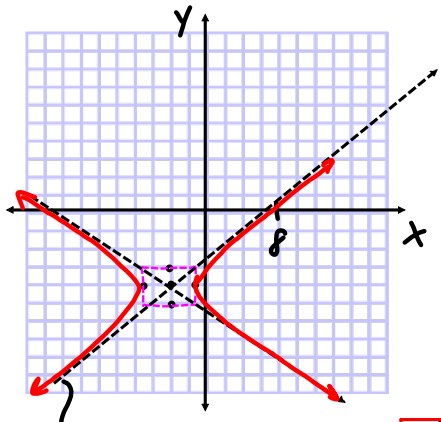
FOCI : $\sqrt{13}$ UNITS FROM CENTER

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

$c^2 = 9+4 = 13$

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

NOTE: IT OPENS IN X-DIRECTION



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

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

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

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

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

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

$(-4,-8)$

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

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

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

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

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

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

$$4x^2 + y^2 - 4y - 32 = 0$$
$$x^2 - y - 7 = 0$$

ELLIPSE

PARABOLA

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

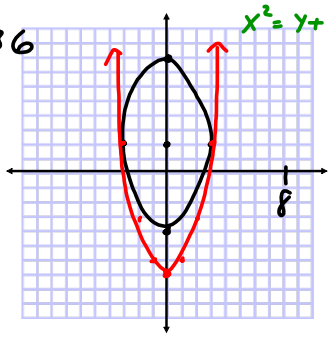
$4x^2 + y^2 - 4y + 4 = 32 + 4$

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

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

$y = x^2 - 7$

$x^2 = y + 7$



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

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

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

$y^2 - 4 = 0$

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

$y = -2, 2$

IF $y = -2$

$x^2 = -2 + 7$

$x^2 = 5$

$x = \pm\sqrt{5}$

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

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

IF $y = 2$

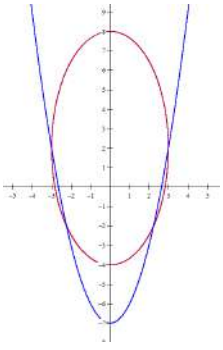
$x^2 = 2 + 7$

$x^2 = 9$

$x = 3, -3$

$(3, 2)$

$(-3, 2)$



4 SOLUTIONS

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