Math 1120F - Fall 2014
Worksheet 19 - Chapter 11

Name(s): KEY

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Work with partners in groups of 2-4. **This is required.**

1. Identify each equation. If it is a parabola, give its vertex, focus, and directrix; if it is an ellipse, give its center, vertices, and foci; if it is an hyperbola, give its center, vertices, foci, and asymptotes.

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

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

   Hyperbola
   Center: $(1,2)$
   Vertices: $(1,0), (1,4)$
   Foci: $(1, 2\pm\sqrt{5})$
   Asymp: $y-2=\pm 2(x-1)$

   $a=2$, $b=1$ $\Rightarrow c^2=a^2+b^2=4+1=5$, $c=\sqrt{5}$

   (b) $4x^2 + 9y^2 - 16x - 18y = 11$

   $$4(x^2-4x)+9(y^2-2y)=11$$
   $$4(x^2-4x+4)+9(y^2-2y+1)=11+16+9$$
   $$4(x-2)^2+9(y-1)^2=36$$
   $$\frac{(x-2)^2}{9}+\frac{(y-1)^2}{4}=1$$

   Ellipse
   Center: $(2,1)$
   Vertices: $(-1,1), (5,1)$
   foci: $(2\pm\sqrt{5}, 1)$

   $a=3$, $b=2$ $\Rightarrow c^2=a^2-b^2=9-4=5$

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

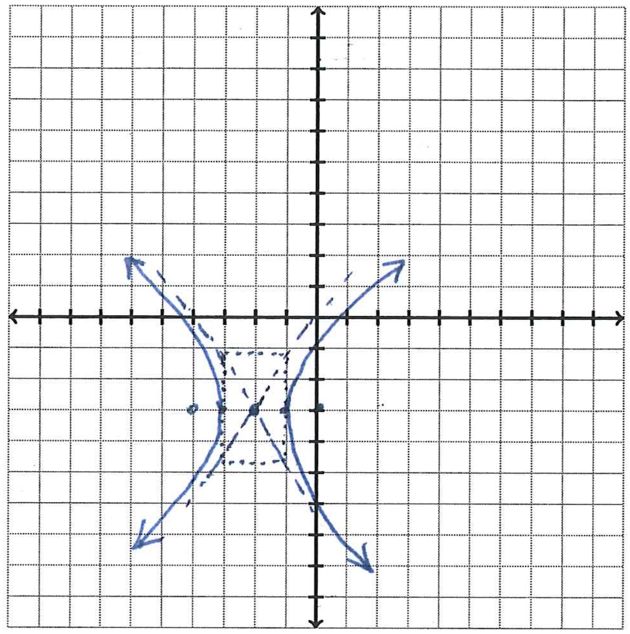
   $$2(y^2-2y)=x-2$$
   $$2(y^2-2y+1)=x-2+2$$
   $$2(y-1)^2=x$$
   $$(y-1)^2=\frac{1}{2}x$$

   Parabola
   Vertex: $(0,1)$
   focus: $(\frac{1}{8},1)$
   Directrix: $x=-\frac{1}{8}$

   $a=\frac{1}{8}$

2. Graph the following equations.

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



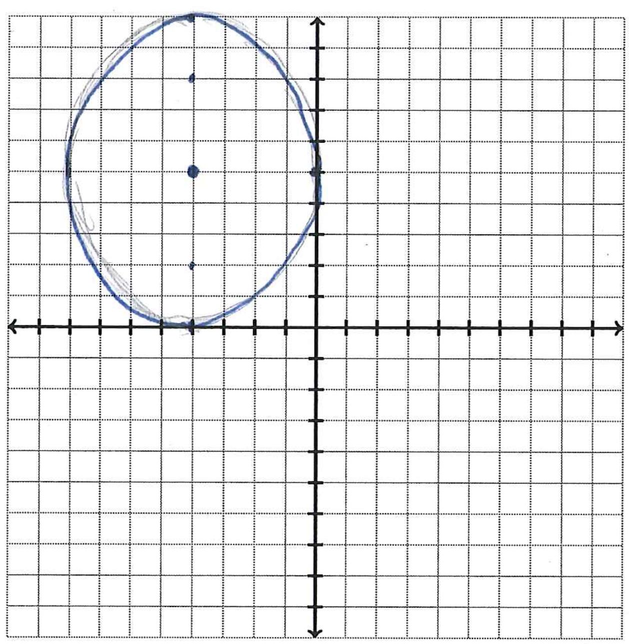
$a = 1$
$b = \sqrt{3}$ $\Rightarrow c = 2$

Center: $(-2, -3)$

focus: $(-4, -3)$, $(\ , -3)$

Vertex: $(-3, -3)$, $(-1, -3)$

(b) $\frac{(x+4)^2}{16} + \frac{(y-5)^2}{25} = 1$



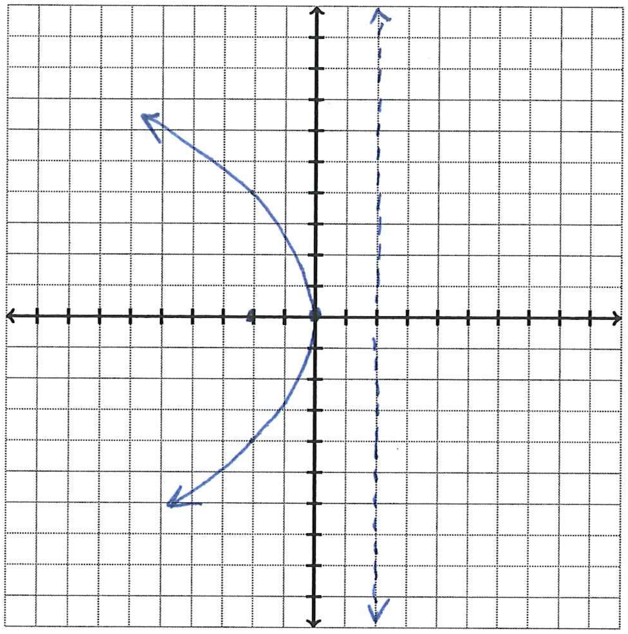
$a = 5$
$b = 4$ $\Rightarrow c = 3$

Center: $(-4, 5)$

foci: $(-4, 2)$, $(-4, 8)$

Vertices: $(-4, 0)$, $(-4, 10)$

(c) $y^2 = -8x$



$a = -2$

Vertex : $(0,0)$

Focus: $(-2,0)$

Directrix: $x=2$

3. Find an equation of the conic described.

(a) Ellipse; center at (-1,2); focus at (0,2); vertex at (2,2)

$a=3$
$c=1$ $\Rightarrow b^2 = a^2 - c^2 = 9 - 1 = 8$

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

(b) Parabola; focus at(3,6); directrix the line $y = 8$

parabola opens down

$a=-1$ $\boxed{(x-3)^2 = -4(y-7)}$

(c) Hyperbola; vertices at (-3,3) and (5,3); focus at (7,3)

Center $(1,3)$

$a=4$
$c=6$ $\Rightarrow b^2 = c^2 - a^2 = 36 - 16 = 20$

$$\boxed{\frac{(x-1)^2}{16} - \frac{(y-3)^2}{20} = 1}$$