Review Assorted Conics 2
Circles, Ellipses, Hyperbolas & Parabolas

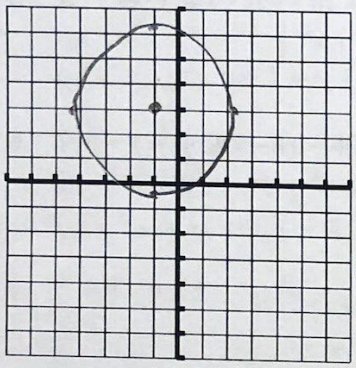
Name Key

1. Graph and provide the requested information:

a. $(x+1)^2+(y-3)^2=10$

c = (-1, 3)

r = $\sqrt{10} \approx 3.16$



b. $\frac{(x-2)^2}{9}+\frac{y^2}{25}=1$

$c^2=a^2-b^2$
$c^2=25-9$
$c^2=16$
$c=4$

c = (2, 0)

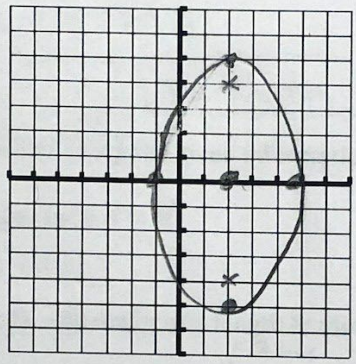
v = (2, 5) (2, -5)

cv = (-1, 0) (5, 0)

f = (2, 4) (2, -4)

major axis length = 10

minor axis length = 6



c. $16x^2-9y^2=144$ $\quad \frac{144}{144}$

$\frac{x^2}{9}-\frac{y^2}{16}=1$

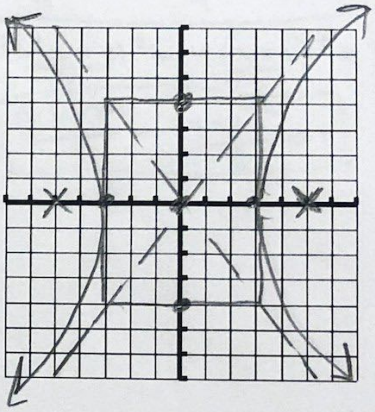
a^2 b^2

c = (0, 0)

v = (3, 0) (-3, 0)

f = (5, 0) (-5, 0)

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



d. $\frac{(y-2)^2}{25}-\frac{(x+3)^2}{4}=1$

a^2 b^2 $\quad a=5$ $\quad b=2$

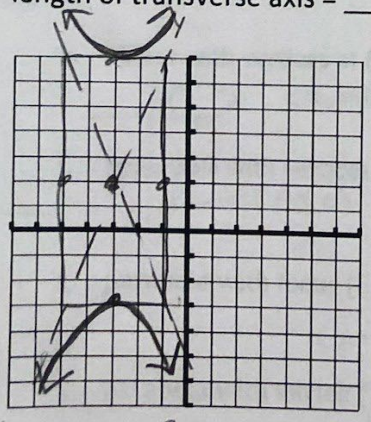
c = (-3, 2)

v = (-3, 7) (-3, 3)

f = $(-3, 2\pm\sqrt{29})$

asymptotes = $y-2=\pm\frac{5}{2}(x+3)$

length of transverse axis = 10



$c^2=a^2+b^2$
$c^2=25+4$
$c^2=29$
$c=\sqrt{29}\approx 5.39$

e. $(x+4)+(y-2)^2=0$

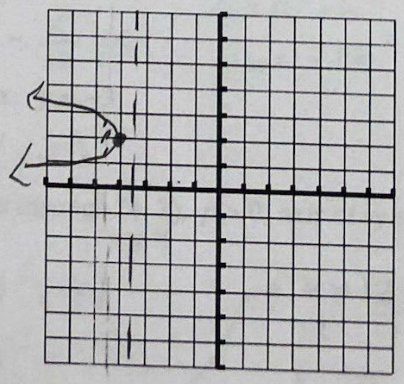
$(y-2)^2=-1(x+4)$

v = (-4, 2) $\quad 4p=1$ $\quad p=\frac{1}{4}$

f = $(-4\frac{1}{4}, 2)$

directrix = $x=-3\frac{3}{4}$

e of LR = $(-4\frac{1}{4}, \frac{1}{2})(-4\frac{1}{4}, 2\frac{1}{2})$



f. $4(y-1)^2=16(x-5)$

$\frac{4}{4}$ $\quad \frac{16}{4}$

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

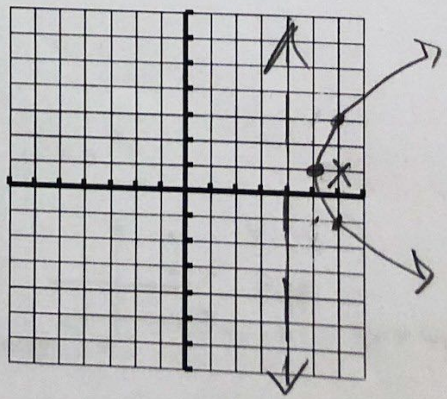
$4p=4$ $\quad p=1$

v = (5, 1)

f = (6, 1)

directrix = $x=4$

e of LR = (6, 3) (6, -1)



2. Name the conic and write it in standard form:

a. $x^2 + y^2 - 6x - 2y + 1 = 0$ Circle

$x^2 - 6x + 9 + y^2 - 2y + 1 = -1 + 9 + 1$

$(x-3)^2 + (y-1)^2 = 9$

b. $6x^2 - 12 = 6y^2$ Hyperbola

$6x^2 - 6y^2 = 12$ $\quad \frac{6x^2}{12} - \frac{6y^2}{12} = \frac{12}{12}$ $\quad \frac{x^2}{2} - \frac{y^2}{2} = 1$

c. $9x^2 + 4y^2 + 54x - 16y + 61 = 0$ Ellipse

$9x^2 + 54x + 4y^2 - 16y = -61$

$9(x^2 + 6x + 9) + 4(y^2 - 4y + 4) = -61 + 81 + 16$

$\frac{9(x+3)^2}{36} + \frac{4(y-2)^2}{36} = \frac{36}{36}$

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

d. $9x^2 - 4y^2 + 36x - 8y - 40 = 0$ Hyperbola

$9x^2 + 36x - 4y^2 - 8y = 40$

$9(x^2 + 4x + 4) - 4(y^2 + 2y + 1) = 40 + 36 - 4$

$\frac{9(x+2)^2}{72} - \frac{4(y+1)^2}{72} = \frac{72}{72}$

$\frac{(x+2)^2}{8} - \frac{(y+1)^2}{18} = 1$

e. $x^2 + x - y = 5$ $\quad x^2 + x + \frac{1}{4} = y + 5 + \frac{1}{4}$

$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$

$\left(x + \frac{1}{2}\right)^2 = y + \frac{21}{4}$ Parabola

3. Write the standard form of the given conic using the given information:

a. circle with center $(-2, 3)$ (h k) and diameter 8 $r = 4$

$(x+2)^2 + (y-3)^2 = 16$

b. horizontal ellipse with center at (3, –4); major axis length 8; minor axis length 4 $b = 2$ $\quad a = 4$

$\frac{(x-3)^2}{16} + \frac{(y+4)^2}{4} = 1$

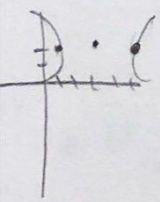
c. circle with center (1, 4) and passes through (2, –1)

$r = \sqrt{(2-1)^2 + (-1-4)^2}$

$r = \sqrt{1 + 25} = \sqrt{26}$

$(x-1)^2 + (y-4)^2 = 26$

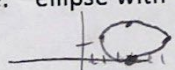
d. hyperbola with vertices (1, 2) and (5, 2) and the slope of one asymptote is $\frac{3}{2}$ ($\frac{b}{a}$)



center $(3, 2)$

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

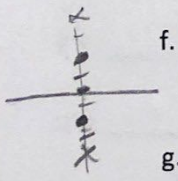
e. ellipse with vertices at (2, 1) and (6, 1); co-vertices at (4, 2) and (4, 0)



center $(4, 1)$

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

f. hyperbola with vertices $(0, \pm 2)$ and foci $(0, \pm 4)$



center $(0, 0)$

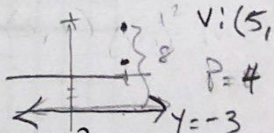
$\frac{y^2}{4} - \frac{x^2}{12} = 1$

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

$16 = 4 + b^2$

$12 = b^2$

g. parabola with focus (5, 5), directrix: $y = -3$



V: $(5, 1)$

$p = 4$

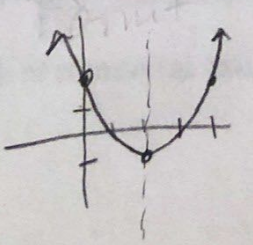
$y = -3$

$4p = 4(4) = 16$

$(x-5)^2 = 16(y-1)$

h. parabola with vertex (2, -1), passes through (4, 2), $p > 0$, axis of symmetry: $x = 2$

(h k) (x y)



$(x-h)^2 = 4p(y-k)$

$(4-2)^2 = 4p(2-(-1))$

$2^2 = 4p(3)$

$\frac{4}{12} = \frac{12p}{12}$

$\frac{1}{3} = p$

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

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

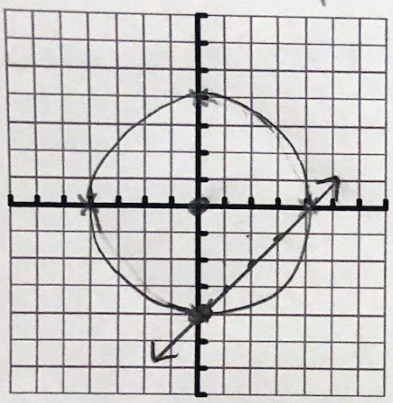
4. Solve the systems of equations by graphing.

a. $x^2 + y^2 = 16$ → C: (0,0), r: 4

$x - y = 4$

$-y = -x + 4$

$y = x - 4$ $m = \frac{1}{1}$



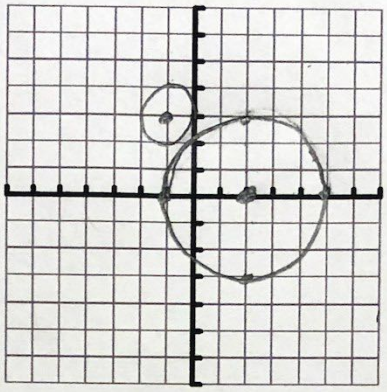
(0,-4) (4,0)

b. $(x+1)^2 + (y-3)^2 = 1$ C: (-1,3) r: 1

$x^2 + y^2 - 4x - 5 = 0$

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

$(x-2)^2 + y^2 = 9$ C: (2,0) r: 3

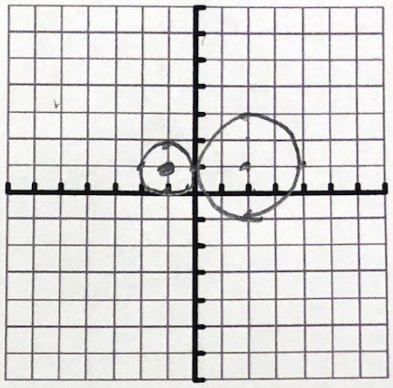


No Solution

$\emptyset$

c. $(x+1)^2 + (y-1)^2 = 1$ C: (-1,1) r: 1

$(x-2)^2 + (y-1)^2 = 4$ C: (2,1) r: 2



(0,1)

5. Solve the systems algebraically.

a. $x^2 + y^2 = 5$

$y = -x + 3$

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

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

$x^2 + x^2 - 6x + 9 - 5 = 0$

$\frac{2x^2 - 6x + 4 = 0}{2}$

$x^2 - 3x + 2 = 0$

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

$x = 2$	$x = 1$
$y = -2 + 3$	$y = -1 + 3$
$y = 1$	$y = 2$

(2,1) (1,2)

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

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

$9 - 4x + 3 = 0$

$-4x + 12 = 0$

$-4x = -12$

$x = 3$

$3^2 + y^2 = 9$

$9 + y^2 = 9$

$y^2 = 0$

$y = 0$

(3,0)

c. $4x^2 + 9y^2 - 36y = 0$

$x^2 + 9y - 27 = 0$ → $x^2 = -9y + 27$

$4(-9y+27) + 9y^2 - 36y = 0$

$-36y + 108 + 9y^2 - 36y = 0$

$\frac{9y^2 - 72y + 108 = 0}{9}$

$y^2 - 8y + 12 = 0$

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

$y = 6$	$y = 2$
$x^2 = -9(6) + 27$	$x^2 = -9(2) + 27$
$x^2 = -54 + 27$	$x^2 = -18 + 27$
$x^2 = -27$	$x^2 = 9$
$\sqrt{x^2} = \sqrt{-27}$	$x = \pm 3$
x = imag	(3,2) (-3,2)