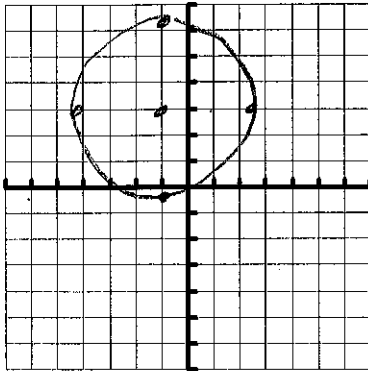


1. Graph and provide the requested information:

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

$c = (-1, 3)$

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



b. $\frac{(x-2)^2}{9} + \frac{y^2}{25} = 1$ $c^2 = a^2 - b^2$
 $c^2 = 25 - 9$
 $c^2 = 16$
 $c = 4$

$c = (2, 0)$

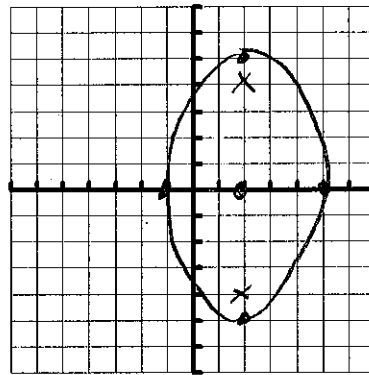
$v = (2, 5) \quad (2, -5)$

$cv = (-1, 0) \quad (5, 0)$

$f = (2, 4) \quad (2, -4)$

major axis length = 10

minor axis length = 6



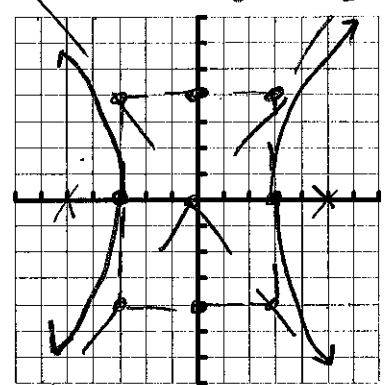
c. $\frac{16x^2}{144} - \frac{9y^2}{144} = 1$

$c = (0, 0)$

$v = (-3, 0) \quad (3, 0)$

$f = (-5, 0) \quad (5, 0)$

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



d. $\frac{(y-2)^2}{25} - \frac{(x+3)^2}{4} = 1$ $c^2 = a^2 + b^2$
 $c^2 = 25 + 4$
 $c^2 = 29$
 $c = \sqrt{29}$
 ≈ 5.39

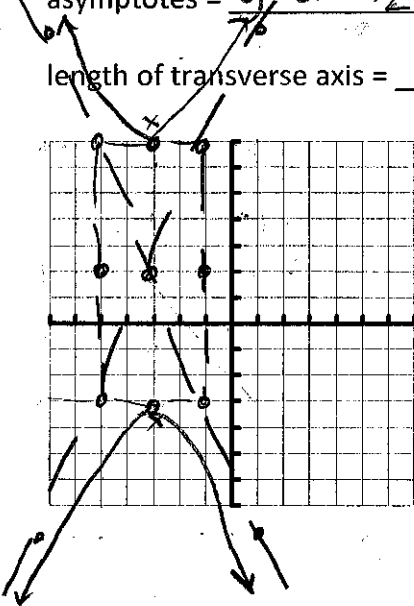
$c = (-3, 2)$

$v = (-3, -3) \quad (-3, 7)$

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

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

length of transverse axis = 10



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

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

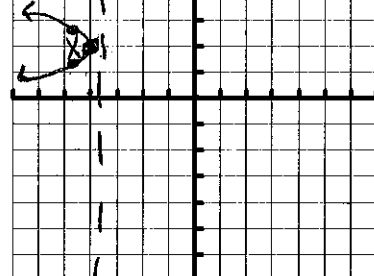
$f = (-4\frac{1}{4}, 2)$ $p = -\frac{1}{4}$

directrix = $X = 4$

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

e of LR = $(-4\frac{1}{4}, \frac{1}{2}), (-4\frac{1}{4}, \frac{7}{2})$

LR = 1



f. $4(y-1)^2 = 16(x-5)$
 $\frac{4(y-1)^2}{4} = \frac{16(x-5)}{4}$

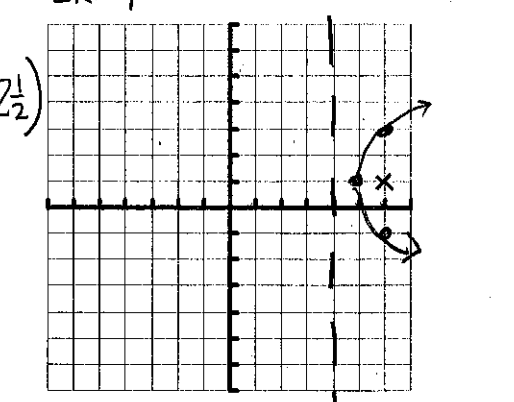
$v = (5, 1)$

$f = (6, 1)$

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

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

LR = 4



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

a. $x^2 + y^2 - 6x - 2y + 1 = 0$ **Circle** $x^2 - 6x + 9 + y^2 - 2y + 1 = -1 + 9 + 1$
 $(-\frac{6}{2})^2 = 9$ $(-\frac{2}{2})^2 = 1$
 $(x-3)^2 + (y-1)^2 = 9$

b. $6x^2 - 12 = 6y^2$ **Hyperbola** $\frac{6x^2}{12} - \frac{6y^2}{12} = \frac{12}{12}$ $\frac{x^2}{2} - \frac{y^2}{2} = 1$

c. $9x^2 + 4y^2 + 54x - 16y + 61 = 0$ **ellipse** $9x^2 + 54x + 4y^2 - 16y = -61$
 $9(x^2 + 6x + 9) + 4(y^2 - 4y + 4) = -61 + 81 + 16$
 $(\frac{6}{2})^2 = 9$ $(-\frac{4}{2})^2 = 4$

d. $9x^2 - 4y^2 + 36x - 8y - 40 = 0$ **Hyperbola** $9x^2 + 36x - 4y^2 - 8y = 40$
 $9(x^2 + 4x + 4) - 4(y^2 + 2y + 1) = 40 + 36 - 4$
 $(\frac{4}{2})^2 = 4$ $(\frac{2}{2})^2 = 1$
 $\frac{9(x+3)^2}{36} - \frac{4(y-2)^2}{36} = \frac{72}{36}$
 $\frac{(x+3)^2}{4} - \frac{(y-2)^2}{9} = 1$

e. $x^2 + x - y = 5$ **Parabola**
 See side for $\odot \rightarrow$ $x^2 + x + \frac{1}{4} = y + 5 + \frac{1}{4}$
 $(\frac{1}{2})^2 = \frac{1}{4}$
 $(x + \frac{1}{2})^2 = y + \frac{21}{4}$

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

a. circle with center $(-2, 3)$ and diameter 8
 h, k $r=4$ $(x-h)^2 + (y-k)^2 = r^2$
 $(x+2)^2 + (y-3)^2 = 16$

b. horizontal ellipse with center at $(3, -4)$; major axis length 8; minor axis length 4
 h, k $a=4$ $b=2$ $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$
 $\frac{(x-3)^2}{16} + \frac{(y+4)^2}{4} = 1$

c. circle with center $(1, 4)$ and passes through $(2, -1)$
 h, k x, y $(x-h)^2 + (y-k)^2 = r^2$
 $(2-1)^2 + (-1-4)^2 = r^2$ $1 + 25 = r^2$ $26 = r^2$
 $(x-1)^2 + (y-4)^2 = 26$

d. hyperbola with vertices $(1, 2)$ and $(5, 2)$ and the slope of one asymptote is $\frac{3}{2}$
 h, k $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$ $\frac{(x-3)^2}{2^2} - \frac{(y-2)^2}{3^2} = 1$ $\frac{(x-3)^2}{4} - \frac{(y-2)^2}{9} = 1$

e. ellipse with vertices at $(2, 1)$ and $(6, 1)$; co-vertices at $(4, 2)$ and $(4, 0)$
 h, k $a=2$ $b=1$ $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ $\frac{(x-4)^2}{4} + (y-1)^2 = 1$

f. hyperbola with vertices $(0, \pm 2)$ and foci $(0, \pm 4)$
 $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$ $c:(0,0)$ $c^2 = a^2 + b^2$ $16 = 4 + b^2$ $12 = b^2$
 $\frac{y^2}{4} - \frac{x^2}{12} = 1$

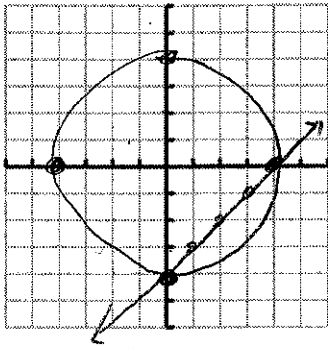
g. parabola with focus $(5, 5)$, directrix: $y = -3$
 h, k $p:4$ $(x-h)^2 = 4p(y-k)$ $(x-5)^2 = 16(y-1)$

h. parabola with vertex $(2, -1)$, passes through $(4, 2)$, $p > 0$, axis of symmetry: $x = 2$
 h, k x, y $(x-h)^2 = 4p(y-k)$
 $(4-2)^2 = 4p(2 - (-1))$ $4 = 12p$ $\frac{4}{12} = \frac{12p}{12}$ $\frac{1}{3} = p$
 $2^2 = 4(p)(3)$ $(x-2)^2 = 4(\frac{1}{3})(y - (-1))$
 $(x-2)^2 = \frac{4}{3}(y+1)$

4. Solve the systems of equations by graphing.

a. $x^2 + y^2 = 16$

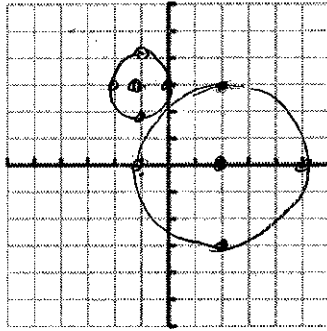
$x - y = 4$ $-y = -x + 4$
 $y = x - 4$



$(0, -4)$
 $(4, 0)$

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

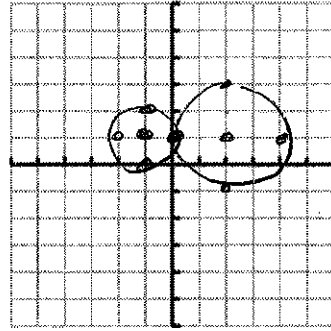
$x^2 + y^2 - 4x - 5 = 0$



\emptyset

c. $(x+1)^2 + (y-1)^2 = 1$

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



$(0, 1)$

$x^2 - 4x + 4 + y^2 = 5 + 4$
 $(\frac{-4}{2})^2$
 $(x-2)^2 + y^2 = 9$

5. Solve the systems algebraically.

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

$y = -x + 3$

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

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

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

$2x^2 - 6x + 4 = 0$

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

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

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

$(2, 1)$ $(1, 2)$

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

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

$x^2 = -9y + 27$

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

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

$9y^2 - 72y + 108 = 0$

$9(y^2 - 8y + 12) = 0$

$9(y-6)(y-2) = 0$

$y = 6$	$y = 2$
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$x^2 = -54 + 27$

$\sqrt{x^2} = \sqrt{-27}$

$x = \text{imag}$

$x^2 = -18 + 27$

$x^2 = 9$

$x = \pm 3$

$(3, 2)$ $(-3, 2)$