

Ch 9 (unit 3) Conics

1) a) $y^2 - 8x = 0$

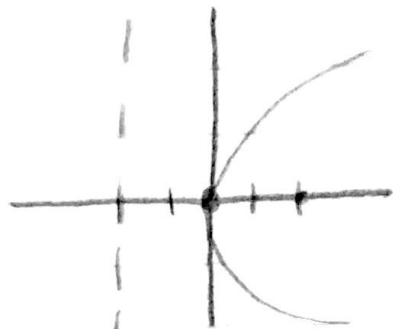
$$y^2 = 8x$$

8
2
v: (0,0)

opens right

focus: (2,0)

directrix: $x = -2$



b) $\frac{(x-3)^2}{81} + \frac{(y-2)^2}{100} = 1$

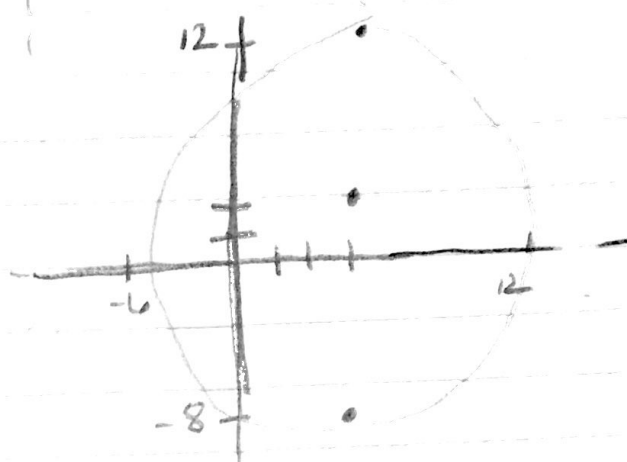
Vertical ellipse

center: (3,2)

$a = 10$

$b = 9$

$c = \sqrt{19}$



c) $x^2 - 6x + 2y + 9 = 0$

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

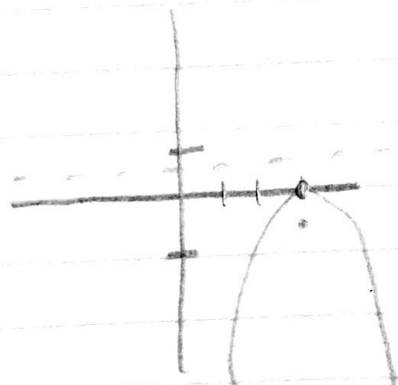
$$(x-3)^2 = -2y$$

v: (3,0)

opens down

$4p = -2$

$p = -1/2$



d) $x^2 - 4y^2 - 4x = 0$

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

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

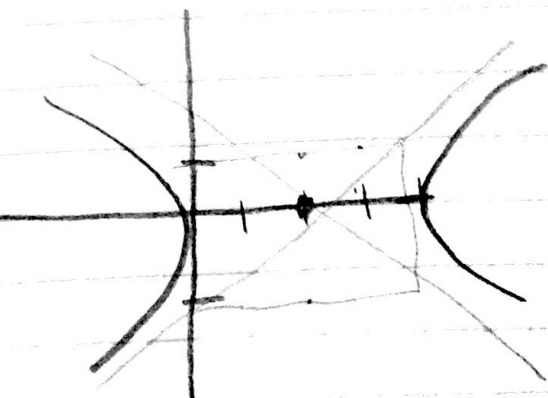
$$\frac{(x-2)^2}{4} - \frac{y^2}{1} = 1$$

center: (2,0)

$a = 2$

$c = \sqrt{5}$

asymptotes:



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

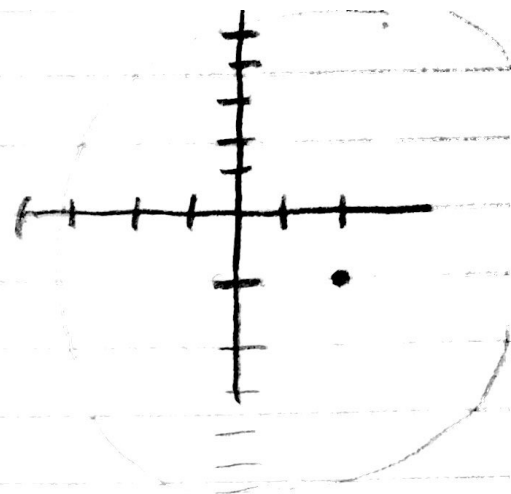
$$e) x^2 + y^2 - 4x + 2y - 31 = 0$$

$$(x^2 - 4x + 4) + (y^2 + 2y + 1) = 31 + 4 + 1$$

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

Center: $(2, -1)$

radius = 6



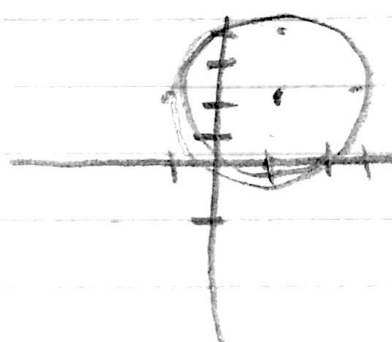
$$f) x^2 + y^2 - 2x - 4y + 1 = 0$$

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

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

Center: $(1, 2)$

radius: 2



$$g) 9x^2 - y^2 - 72x - 7y - 12 = 0$$

$$9(x^2 - 8x + 16) - (y^2 + 7y + 16) = -12 + 144 - 16$$

$$9(x-4)^2 - (y+3)^2 = 9$$

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

Center: $(4, -4)$

$a=1$

$c = \sqrt{10}$

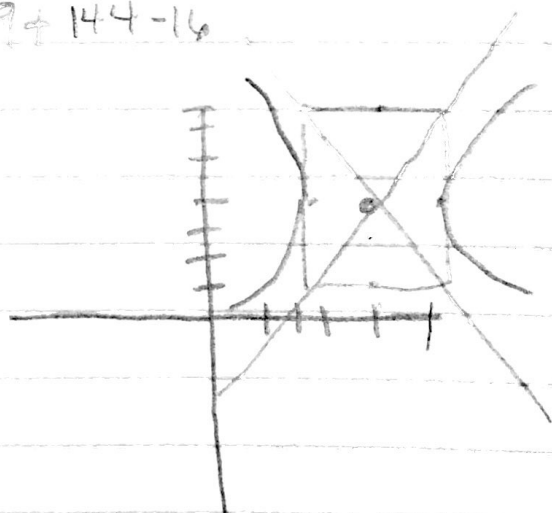
$b=3$

asymptotes:

$$y = 3(x-4) - 4 \quad \text{or} \quad y = -3(x-4) - 4$$

$$= 3x - 16$$

$$y = -3x + 16$$



$$h) 16x^2 + 9y^2 - 32x + 72y = -16$$

$$16(x^2 - 2x + 1) + 9(y^2 + 8y + 16) = -16 + 16 + 144$$

$$16(x-1)^2 + 9(y+4)^2 = 144$$

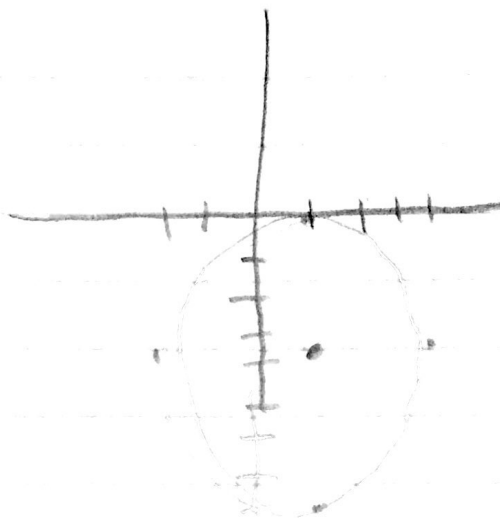
$$\frac{(x-1)^2}{9} + \frac{(y+4)^2}{16} = 1$$

Center: $(1, -4)$

$$a=4$$

$$b=3$$

$$c = \sqrt{7}$$



$$i) x^2 - 2x + 8y + 9 = 0$$

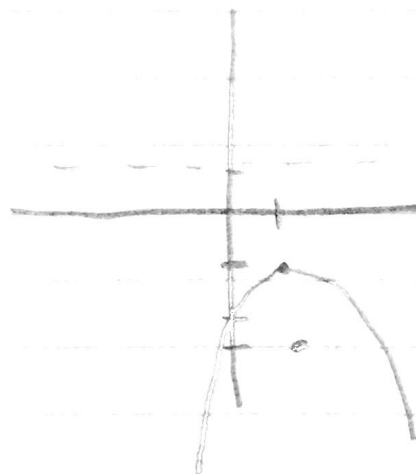
$$(x^2 - 2x + 1) = -8y - 9 + 1$$

$$(x-1)^2 = -8(y-1)$$

Vertex: $(1, 1)$

$$4p = -8$$

$$p = -2$$



$$j) 6x^2 + 12x + 6y^2 - 12y = -6$$

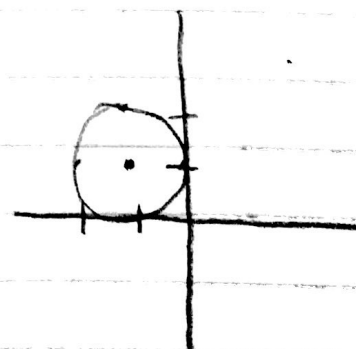
$$6(x^2 + 2x + 1) + 6(y^2 - 2y + 1) = -6 + 6 + 6$$

$$6(x+1)^2 + 6(y-1)^2 = 6$$

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

Center: $(-1, 1)$

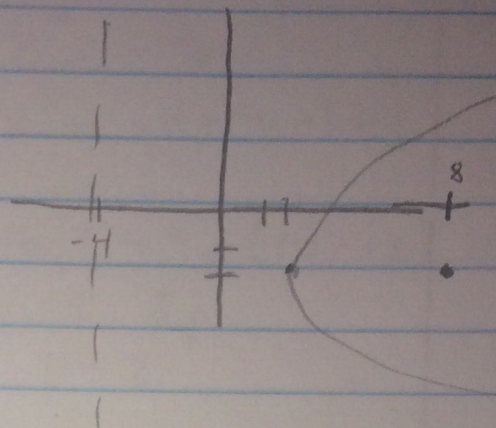
radius = 1



- 2) focus $(8, -2)$
 directrix $x = -4$
 vertex: $(2, -2)$

$$p = 6$$

$$(y + 2)^2 = 24(x - 2)$$



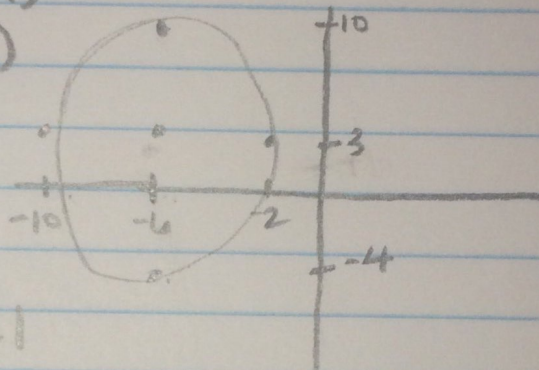
- 3) $V: (-6, 10) (-6, 4)$
 $(-10, 3) (-2, 3)$

center: $(-6, 3)$

$$a = 7$$

$$b = 4$$

$$\frac{(x + 6)^2}{16} + \frac{(y - 3)^2}{49} = 1$$

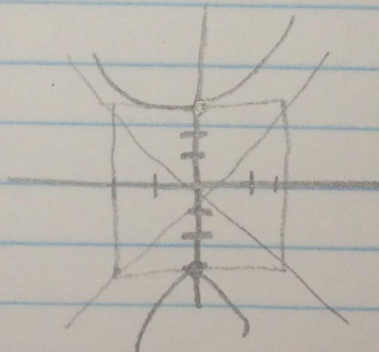


- 4) $V: (0, \pm 3)$
 center: $(0, 0)$

$$a = 3$$

$$b = 2$$

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

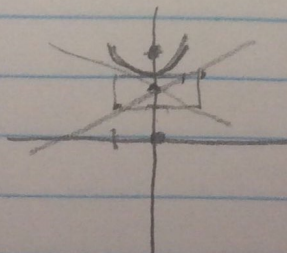


- 5) foci $(0, 0) (0, 4)$
 center $(0, 2)$
 vertices: $(0, 3) (0, 1)$

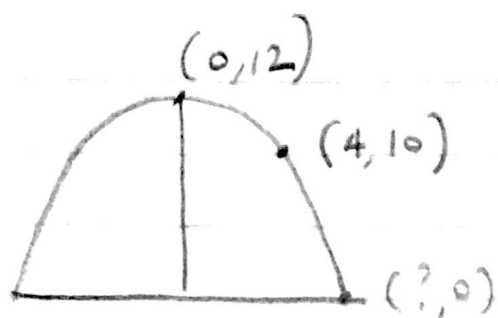
$$a = 1$$

$$b = 2$$

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



b)



$$x^2 = -8(y-12)$$

$$x^2 = -8(0-12)$$

$$x^2 = 96$$

$$x = 9.8$$

width: 19.6 m

$$x^2 = -4py$$

$$x^2 = -4p(y-12)$$

$$16 = -4p(10-12)$$

$$16 = 8p$$

$$p = 2$$