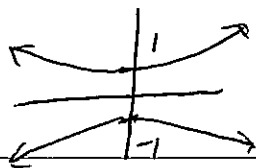
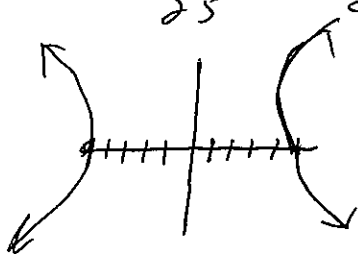


#2) $y^2 - \frac{x^2}{9} = 1$ vertices = $(0, \pm 1)$ = Graph IV



#4) $9x^2 - 25y^2 = 225 = \frac{9x^2}{225} - \frac{25y^2}{225} = \frac{225}{225}$
 $= \frac{x^2}{25} - \frac{y^2}{9} = 1$ vertices = $(\pm 5, 0)$ = Graph I



#6) Find vertices, foci, asymptotes and sketch

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

$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

$$a = \pm\sqrt{9} = \pm 3$$

$$b = \pm\sqrt{16} = \pm 4$$

Vertices = $(0, \pm a) = (0, \pm 3)$

Foci = $(0, \pm c) = (0, \pm 5)$

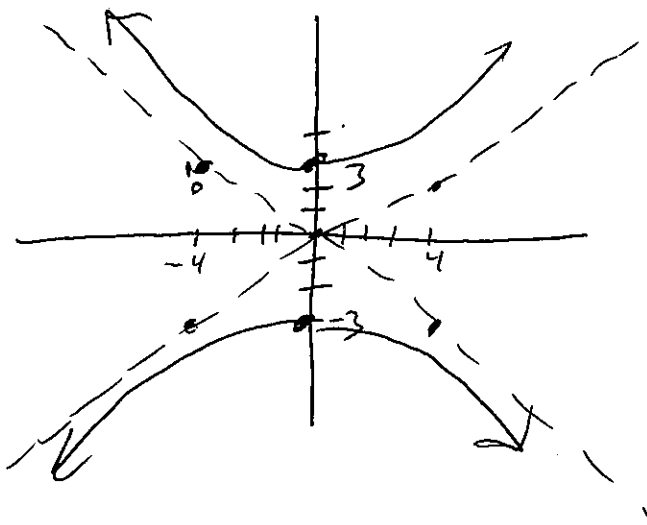
Asymptotes $y = \pm \frac{a}{b}x = y = \pm \frac{3}{4}x$

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

$$c^2 = 9 + 16$$

$$c^2 = 25$$

$$c = \pm 5$$



Asymptotes

$$y = \pm \frac{a}{b}x$$

#16) Find vertices, foci, asymptotes, sketch

$$9x^2 - 16y^2 = 1$$

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

$$a^2 = \frac{1}{9} \rightarrow a = \pm \frac{1}{3} = \text{Vertices}$$

$$b^2 = \frac{1}{16} \rightarrow b = \pm \frac{1}{4}$$

$$c^2 = a^2 + b^2 = \frac{1}{9} + \frac{1}{16} = \frac{25}{144}$$

$$c = \pm \frac{\sqrt{25}}{\sqrt{144}} = \pm \frac{5}{12}$$

(value under y is in numerator)

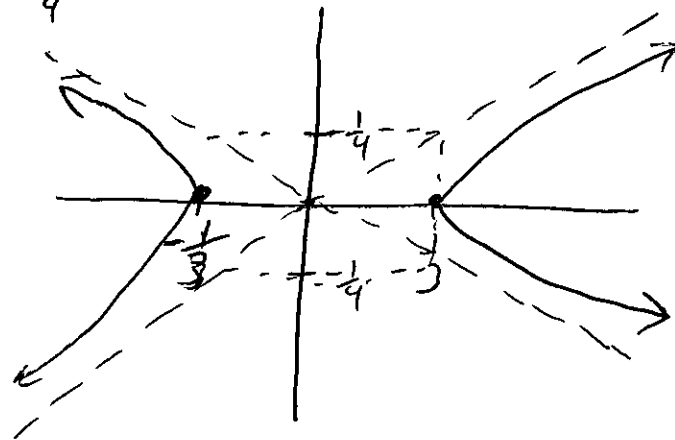
$$\text{Vertices } \left(\pm \frac{1}{3}, 0 \right)$$

$$\text{Foci } = \left(\pm \frac{5}{12}, 0 \right)$$

$$\text{Asymptote } y = \pm \frac{b}{a} x$$

$$y = \pm \frac{\pm \frac{1}{4}}{\frac{1}{3}} = \frac{1}{4} \div \frac{1}{3} = \frac{1}{4} \cdot \frac{3}{1} = \frac{3}{4}$$

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



#18) Given $F(0, \pm 13)$

$V(0, \pm 12)$

From V , $a = 12$

From F , $c = 13$

$b = 5$

Find equation.

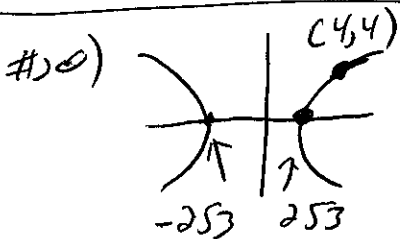
$$c^2 = a^2 + b^2$$

$$13^2 = 12^2 + b^2$$

$$169 = 144 + b^2$$

$$b^2 = 25 \Rightarrow b = 5$$

$$\text{Equation } \frac{y^2}{144} - \frac{x^2}{25} = 1$$



$a = \pm 253$, point on graph = $(4, 4) = (x, y)$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

$$\frac{16}{12} - \frac{1}{1} = \frac{16}{b^2}$$

$$\frac{4^2}{(253)^2} - \frac{4^2}{b^2} = 1$$

$$\frac{4}{12} = \frac{16}{b^2}$$

$$4b^2 = 192$$

$$\underline{\underline{b^2 = 48}}$$

$$a^2 = 12, b^2 = 48$$

$$\frac{x^2}{12} - \frac{y^2}{48} = 1$$

$$a^2 = 12 \leftarrow \frac{16}{12} - \frac{16}{b^2} = 1$$

p 968-69

#28) Find the equation given: $F(0, \pm 10)$
 $V(0, \pm 8)$

$a = \pm 8, c = \pm 10$

$c^2 = a^2 + b^2 \quad 100 = 64 + b^2 \quad b^2 = 36 \quad b = 6$

$$\boxed{\frac{y^2}{64} - \frac{x^2}{36} = 1}$$

p 981 #10)

Find center, foci, vertices, asymptotes, sketch.

$(x-8)^2 - (y+6)^2 = 1$

Shift = right 8, down 6

Shift = +8, -6

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

$a = \pm 1 \quad b = \pm 1$

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

$c^2 = 1 + 1$

$c = \pm \sqrt{2}$

original	$\xrightarrow{+8, -6}$
center (0,0)	(8, -6)
vertices (1,0)	(9, -6)
(-1,0)	(7, -6)

b-coordinates

(0, -1)	(8, -7)
(0, 1)	(8, -5)

Foci ($\sqrt{2}, 0$)	(8 + $\sqrt{2}$, -6)
(- $\sqrt{2}, 0$)	(8 - $\sqrt{2}$, -6)

Asymptote

$y = \pm \frac{b}{a} x$

$y = \pm \frac{1}{1} x \quad m = \pm 1$

shift shift
 $(y-k) = \pm m(x-h)$

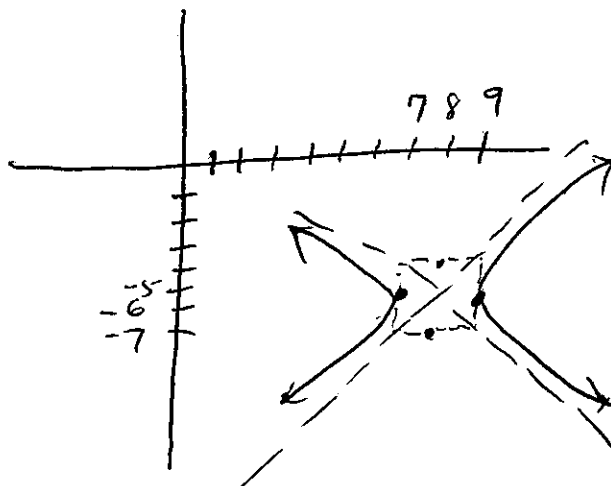
$(y+6) = \pm 1(x-8)$

$y+6 = x-8$

$y = x - 14$

$y+6 = -x+8$

$y = -x + 2$



781) #12

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

Shift = 3 left, up 1
 $(-3, +1)$

original

$$\frac{y^2}{25} - \frac{x^2}{1} = 1$$

$a = \pm 5 = \text{vertices}$

$b = \pm 1$

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

$$c^2 = 25 + 1$$

$$c^2 = 26$$

$$c = \pm \sqrt{26}$$

Asymptotes

$$y = \pm \frac{a}{b}x = \pm \frac{5x}{1}$$

$$(y-1) = m(x+3)$$

$$(y-1) = \pm 5(x+3)$$

$$y-1 = 5x+15$$

$$y = 5x + 16$$

$$y-1 = -5x-15$$

$$y = -5x - 14$$

original	Shift
	$(-3, 1)$

Center $(0, 0) \rightarrow (-3, 1) = \text{center}$

Vertices $(0, 5) \rightarrow (-3, 6)$
 $(0, -5) \rightarrow (-3, -4)$] vertices

$(1, 0) \rightarrow (-2, 1)$
 $(-1, 0) \rightarrow (-4, 1)$] b coordinates

Foci $(0, \sqrt{26}) \rightarrow (-3, 1 + \sqrt{26})$
 $(0, -\sqrt{26}) \rightarrow (-3, 1 - \sqrt{26})$] Foci

Asymptotes

$$y = 5x + 16$$

$$y = -5x - 14$$

