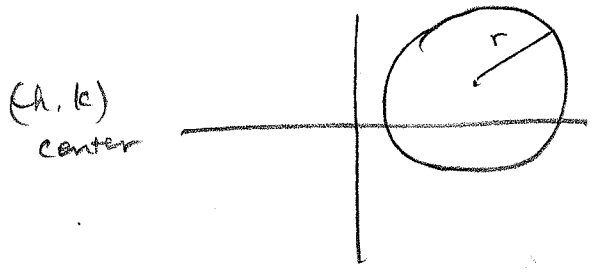
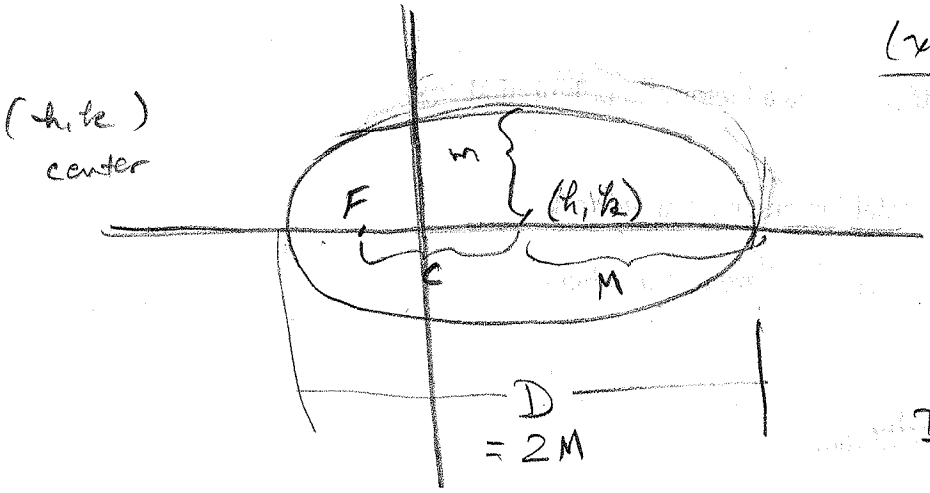
Circle



$(x-h)^2 + (y-k)^2 = r^2$

same coeff on x & y

(note: when $r=1$, it's a unit circle)

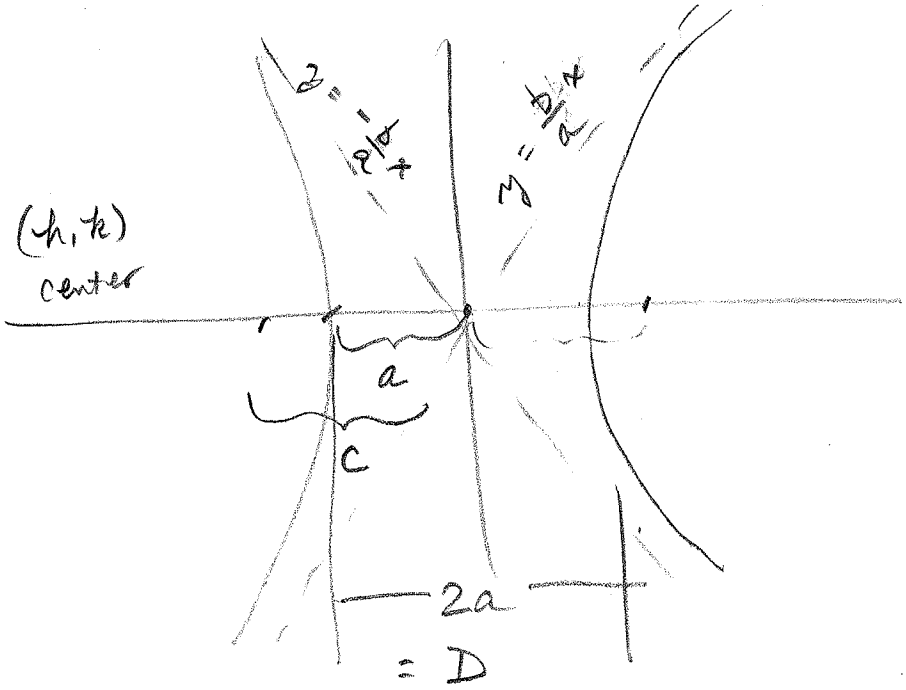


$$\frac{(x-h)^2}{M^2} + \frac{(y-k)^2}{m^2} = 1$$

$m^2 + c^2 = M$

$2M = D$

D is called sum of lengths



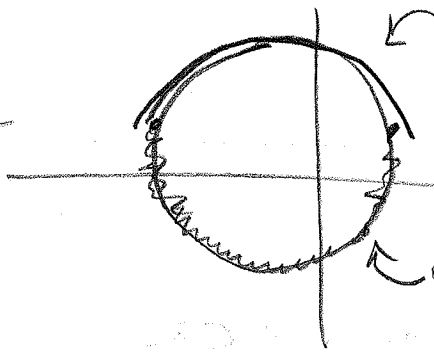
$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$

$a^2 + b^2 = c^2$, $y = \frac{b}{a}x$

D is called the difference distance

Semi Circle

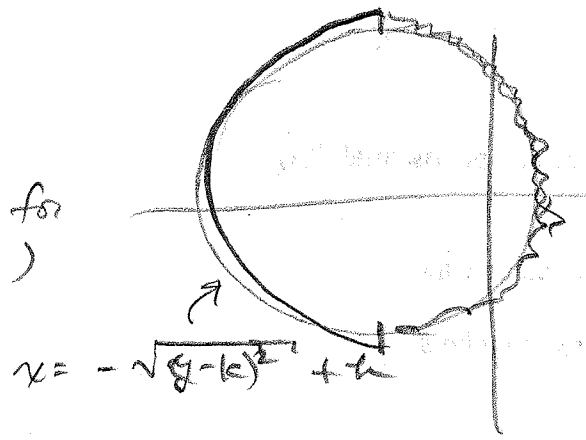
(Solve for y)



$$y = +\sqrt{(x-h)^2} + k$$

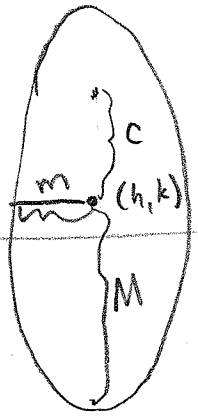
$$y = -\sqrt{(x-h)^2} + k$$

(Solve for x)



$$x = \sqrt{(y-k)^2} + h$$

$$x = -\sqrt{(y-k)^2} + h$$



$$\frac{(x-h)^2}{m^2} + \frac{(y-k)^2}{M^2} = 1$$

$$m^2 + c^2 = M^2$$

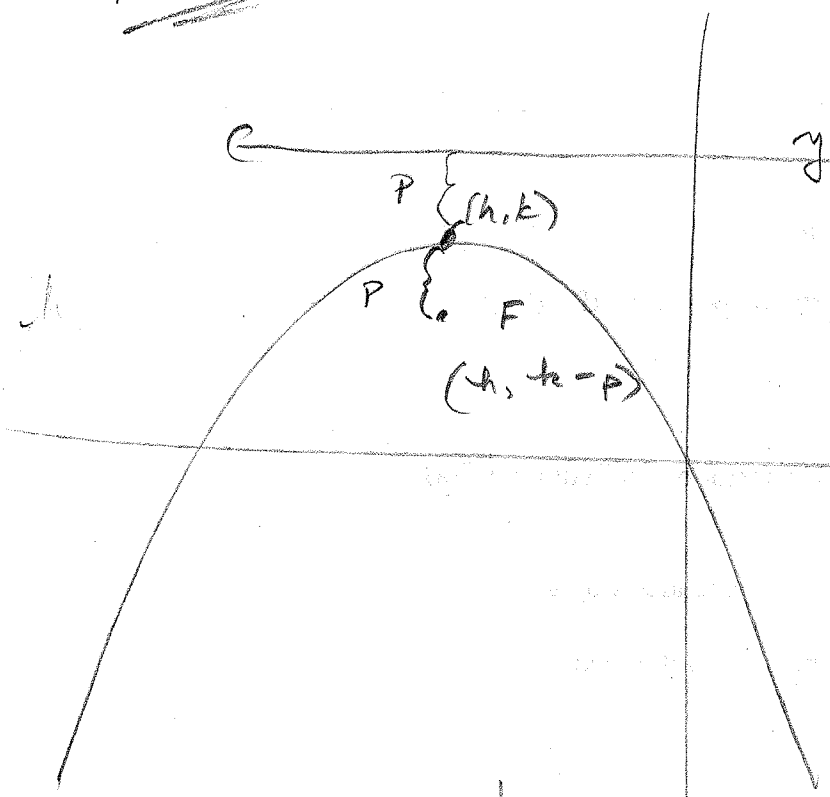
$$2M = D$$

$$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$$

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

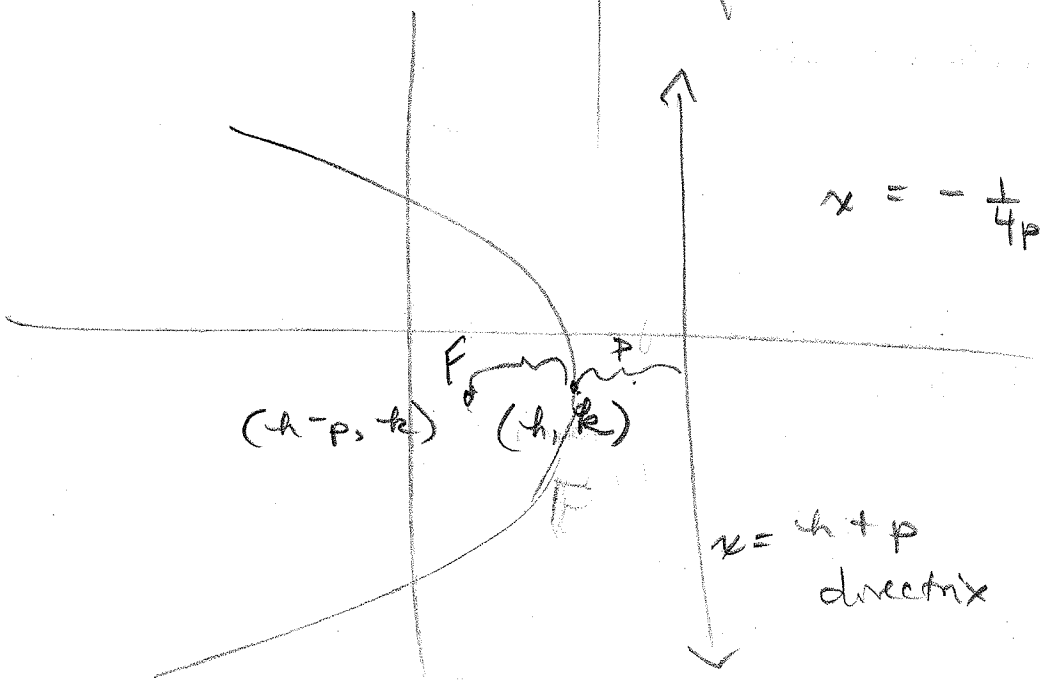
$$2a = D$$

Parabolas

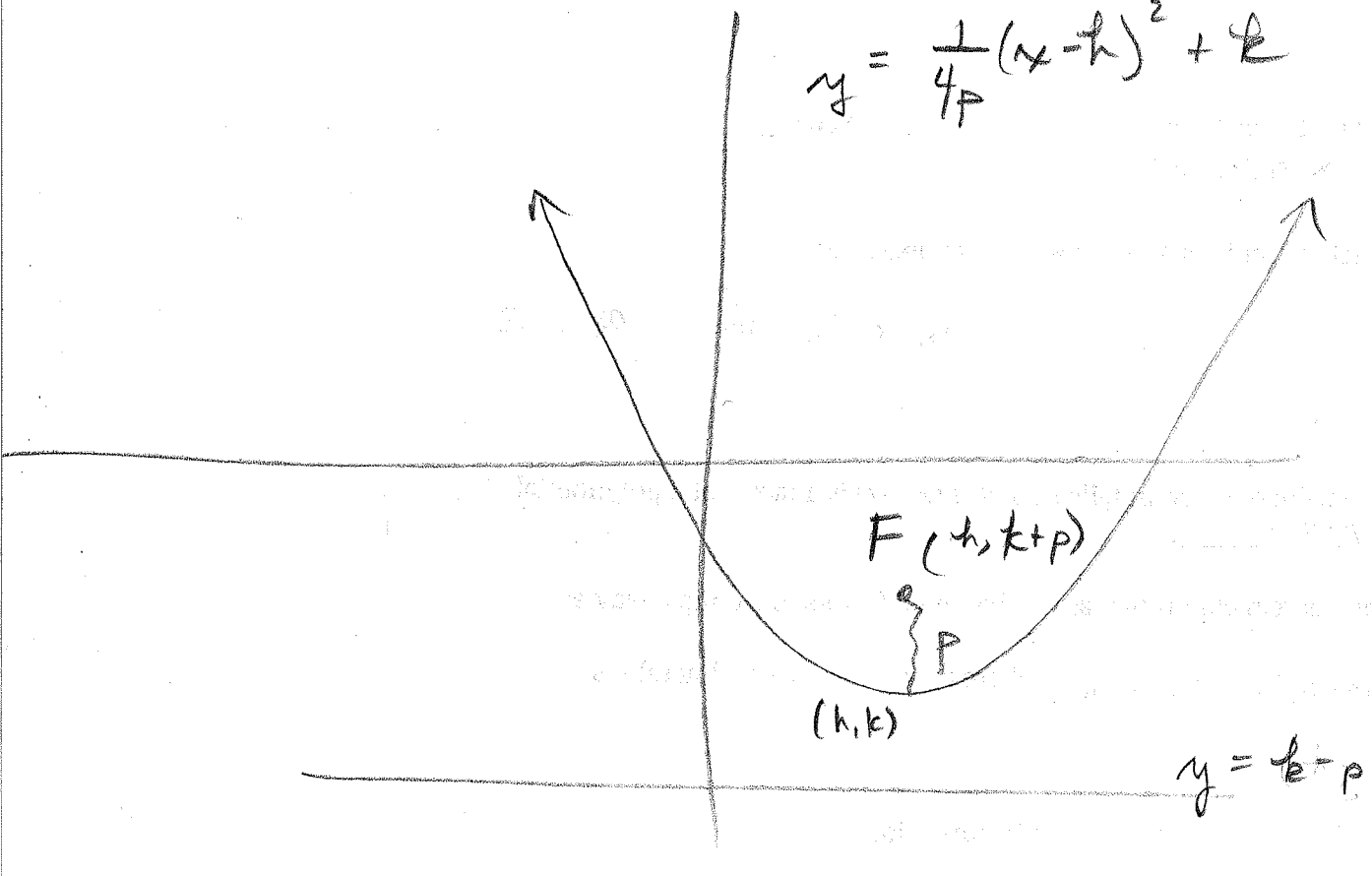


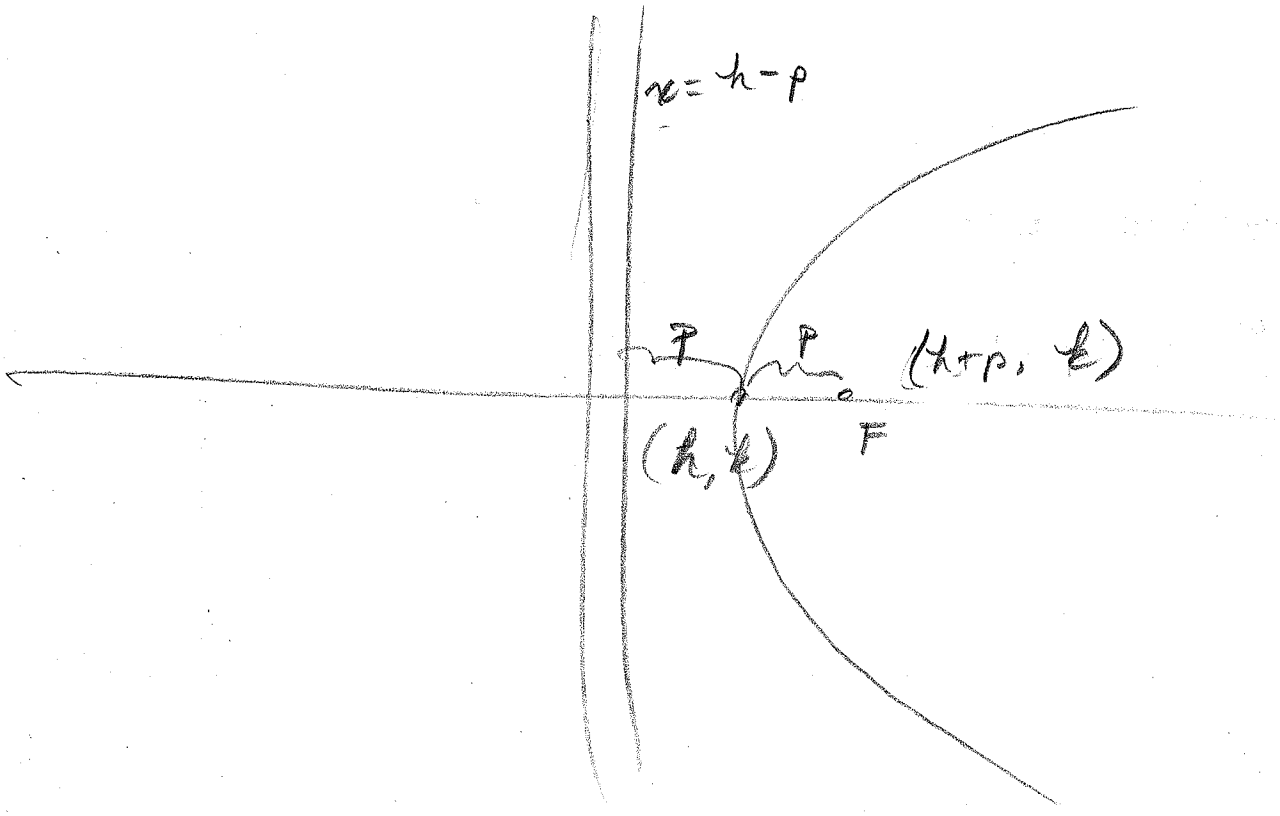
$$y = -\frac{1}{4p}(x-h)^2 + k$$

(h, k) vertex always



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


$y = \frac{1}{4p}(x-h)^2 + k$
$F(h, k+p)$
p
(h,k)
$y = k-p$


$x = h-p$
p
$(h+p, k)$
F
(h,k)

Review H.A. + S.A. + V.A.

1. Dom → VA $R(x) = \frac{P(x)}{Q(x)}$

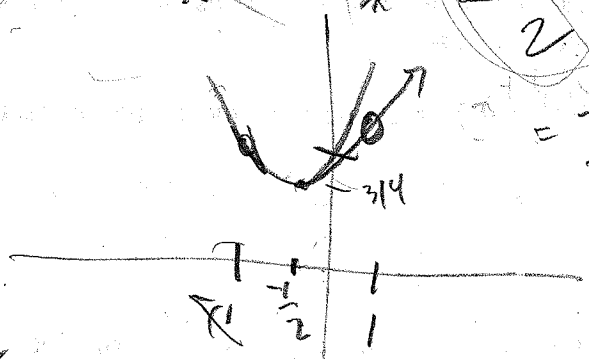
$n > m$

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

$x \neq -1$

$$x = \frac{-1 \pm \sqrt{1-4}}{2} = \frac{-1 \pm i\sqrt{3}}{2}$$

Dom: $\{x \mid x \neq 1\}$



Hole (1, 3)

No HA

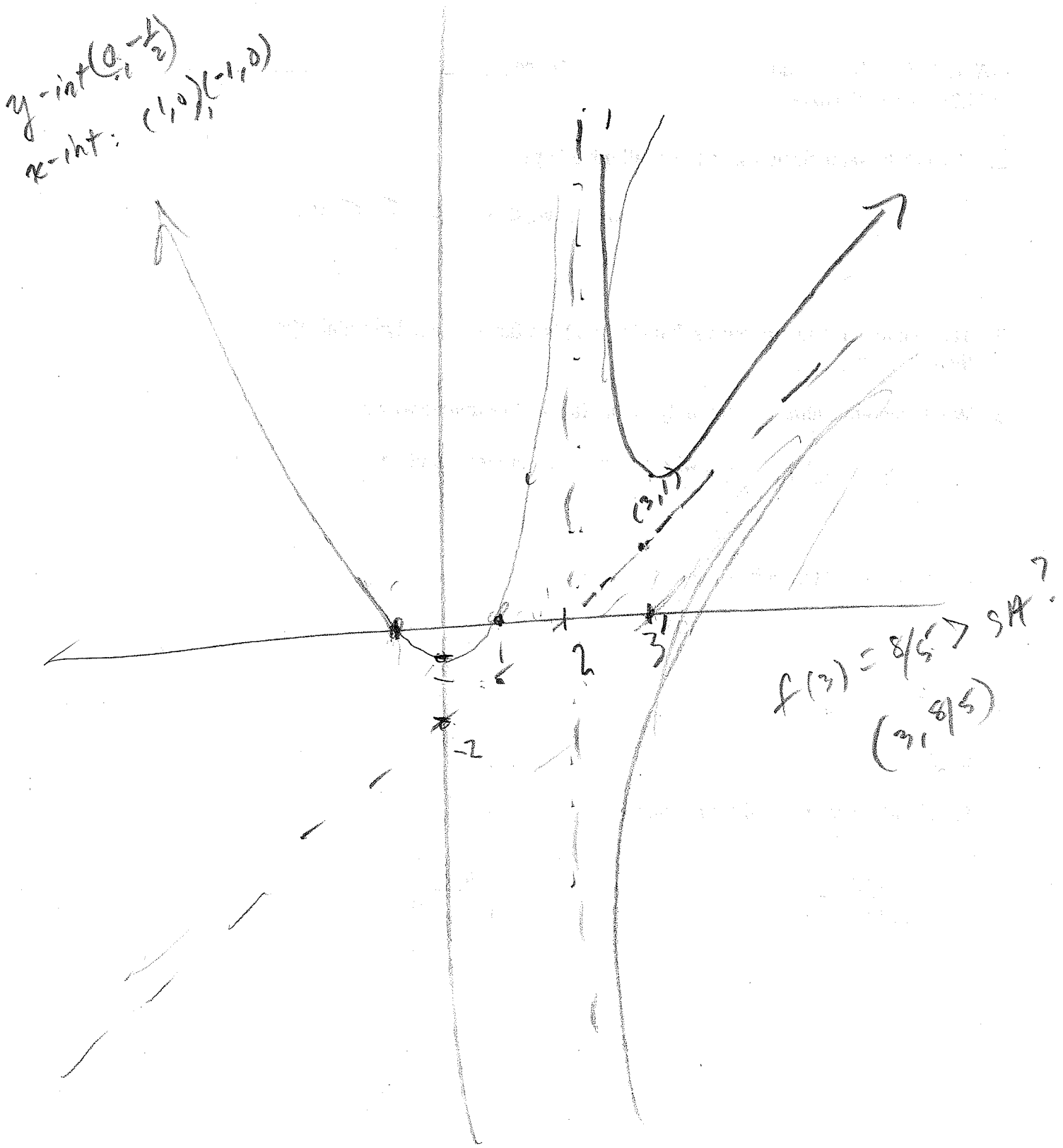
2. $f(x) = \frac{4}{x - 3}$ $n < m$

$y = 0$ HA

$x = 3$ VA

$\lim_{x \to \infty} f(x) = 0$

$$\frac{k}{\infty} = 0 \qquad \frac{k}{0} = \infty$$


y-int $(0, -\frac{1}{2})$
x-int: $(1,0)$, $(-1,0)$
(3,1)
$f(x) = 8/5$ SA
$(x, 8/5)$
1
2
3
-1
-2

3. $n = m$ HA $y =$ ratio l.c.s.

$y \neq \frac{1x^4 - 3x + 1}{2x^4 + 9x^2 - 6}$ $y = \frac{1}{2}$ HA

$y = \frac{1x^4 - 3x + 1}{2x^4 + 9x^2 - 6}$

4. SA $n = m + 1$

$n > m$ by 1

$y = \frac{x^2 - 1}{x + 2}$ $n = 2$, $m = 1$ → SA

$x - 2$ +

$x + 2 \overline{)\, x^2 + 0x - 1}$

$-(x^2 + 2x)$

$-2x - 1$

$-(-2x - 4)$

3

$y = x - 2$

VA: $x = -2$

- change of index