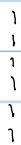


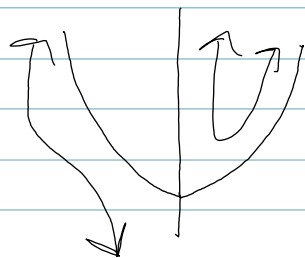
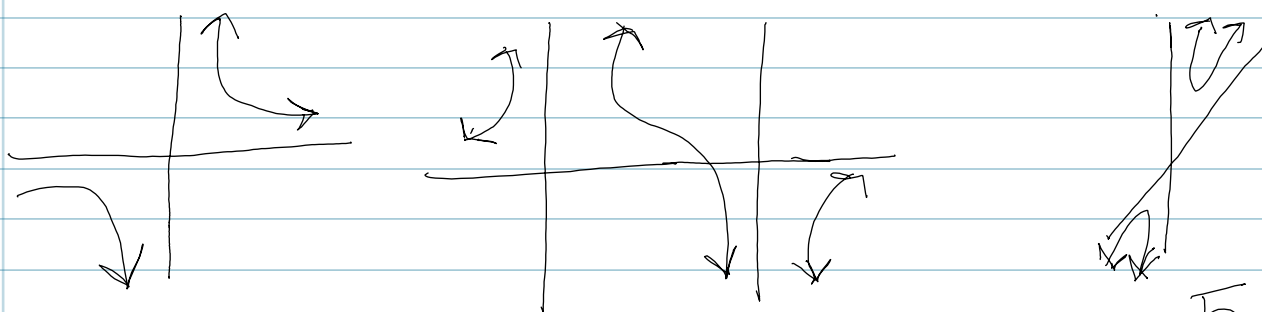
# Section 5.2 Graphing rational expressions (Functions)

$$f(x) = \frac{3}{x}$$

Vertical asymptotes (VA)



Horizontal asymptotes (HA)



5.3

Vertical asymptotes (VA)

denominator = 0

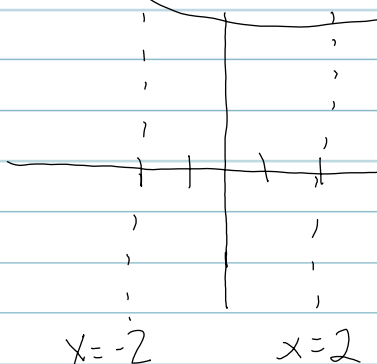
$$f(x) = \frac{x+3}{x^2-4}$$

$$x^2 - 4 = 0$$

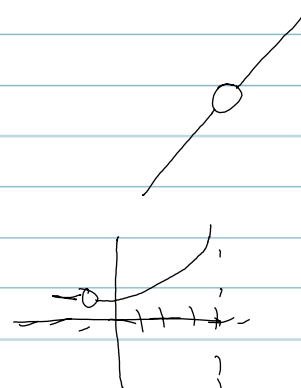
$$(x+2)(x-2) = 0$$

$x = -2$     $x = 2$

A graph can never cross a vertical asymptote!



$$f(x) = \frac{x+2}{(x+2)(x-4)}$$



# Horizontal Asymptotes

$$f(x) = \frac{ax^n + \dots}{bx^d + \dots}$$

If  $n > d$ , then no HA (others exist)

If  $n = d$ , then HA  $y = \frac{a}{b}$

If  $n < d$ , then HA  $y = 0$

$$f(x) = \frac{x^3 + 3x^2 - 2x + 1}{2x^4 + 7x^2 - 1}$$

$$\frac{x^3}{2x^4} \quad n < d \quad y = 0$$

$$\frac{1}{2x} \rightarrow \frac{1}{2(\infty)} = \frac{1}{\text{really big}}$$

$$f(x) = \frac{x^5 + 3}{x^3 + 2}$$

$$\frac{x^5}{x^3} = x^2$$

$n > d = \text{no HA}$

$$f(x) = \frac{-3x^4 + 2x - 1}{2x^4 + 5x - 2}$$

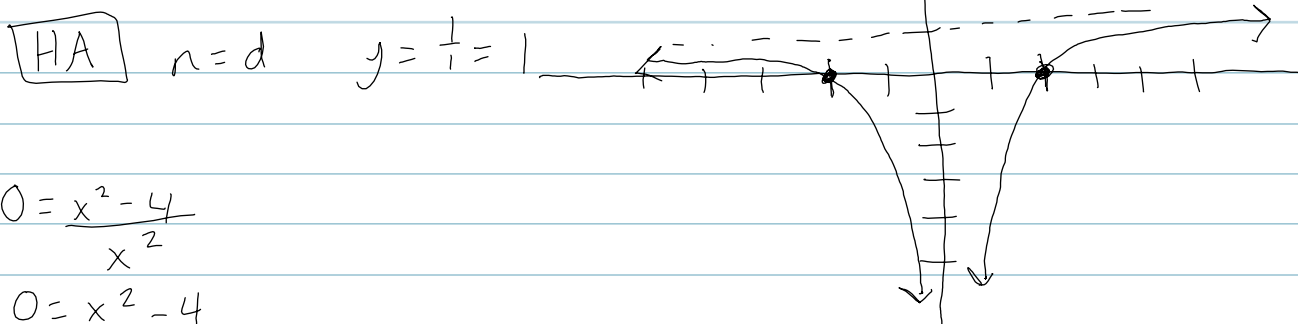
$$\frac{-3x^4}{2x^4} = \frac{-3}{2}$$

$$y = -3/2$$

## Section 5.2

41)  $f(x) = \frac{x^2 - 4}{x^2}$

VA  $x^2 = 0$   
 $x = 0$



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

$$0 = x^2 - 4$$

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

$$x+2 = 0$$

$$x-2 = 0$$

$$x = -2$$

$$x = 2$$

Does it cross the HA? **No**

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

$$x^2 - 4 = x^2$$

$$-4 = 0$$

$$f(x) = \frac{-3}{(x+5)(x-1)}$$

X-interc

$$\frac{-3}{(x+5)(x-1)} = 0$$

$$-3 = 0$$

none

VA

$$x+5 = 0$$

$$x = -5$$

$$x-1 = 0$$

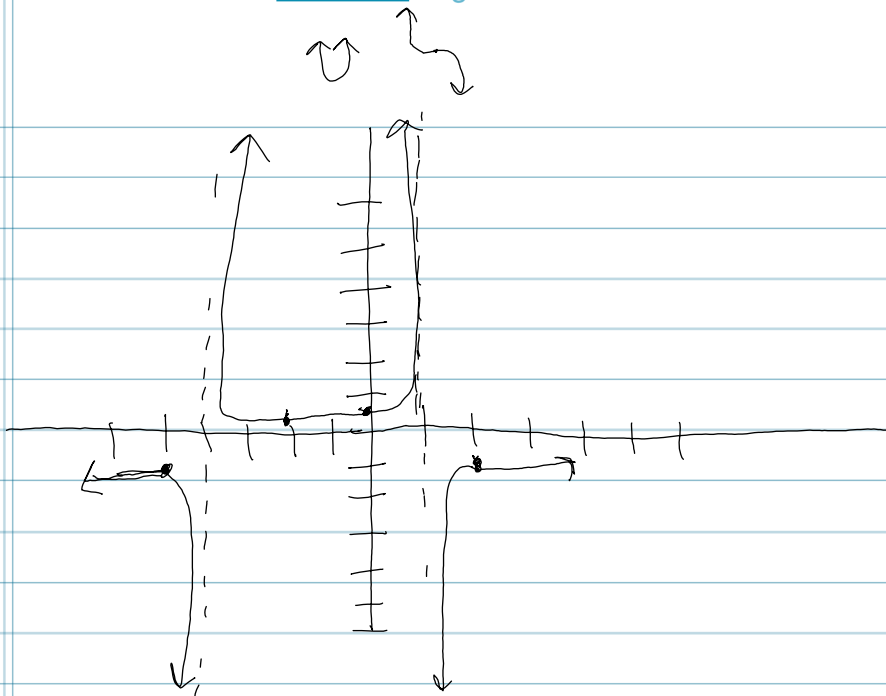
$$x = 1$$

HA

$$\frac{-3}{x^2}$$

$n < d$

$$y = 0$$



x	y
-6	$\frac{-3}{(-1)(-7)} = \frac{-3}{7}$
2	$\frac{-3}{(7)(1)} = \frac{-3}{7}$
0	$\frac{-3}{(5)(-1)} = \frac{3}{5}$
-2	$\frac{-3}{(-3)} = \frac{1}{3}$