Notecard:

x & y intercepts

y-intercepts: where the graph crosses the y-axis and x = 0

x-intercepts: where the graph crosses the x-axis and y = 0

intercepts are points on a graph & should be written as ordered pairs!!!

$$2x + 3y = 6$$

x-intercept ($y = 0$)

$2x + 3(0) = 6$

$2x = 6$

$x = 3$

$(3, 0)$

y-intercept ($x = 0$)

$2(0) + 3y = 6$

$3y = 6$

$y = 2$

$(0, 2)$

Characteristics of a Function:

Domain
Range

Increasing
Decreasing

Extrema - max. and min.

Continuity- asymptotes, holes, jumps

Symmetry - odd, even, neither

Function:

Function: when each domain value is paired with only one range value (no repeating x's)

- graphically: passes the vertical line test

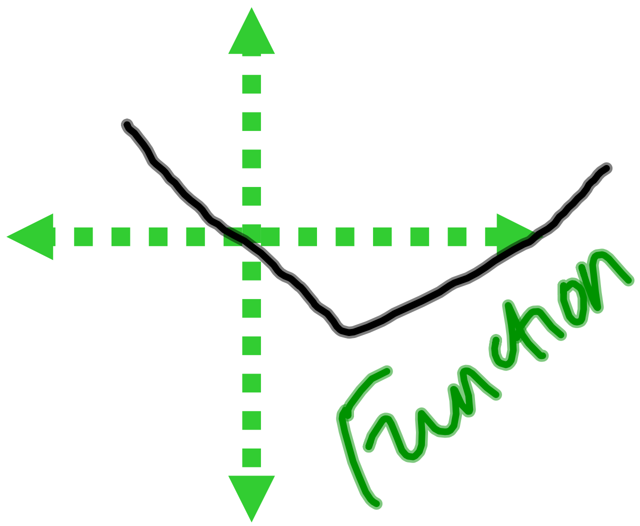
Function notation: f(x) "f of x"

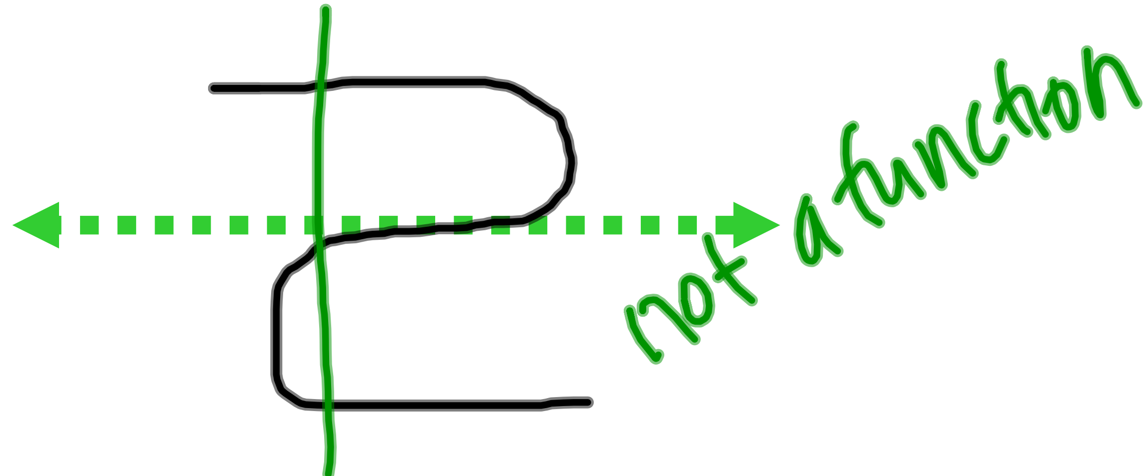
means: function named f is written using x's

f(x) = y

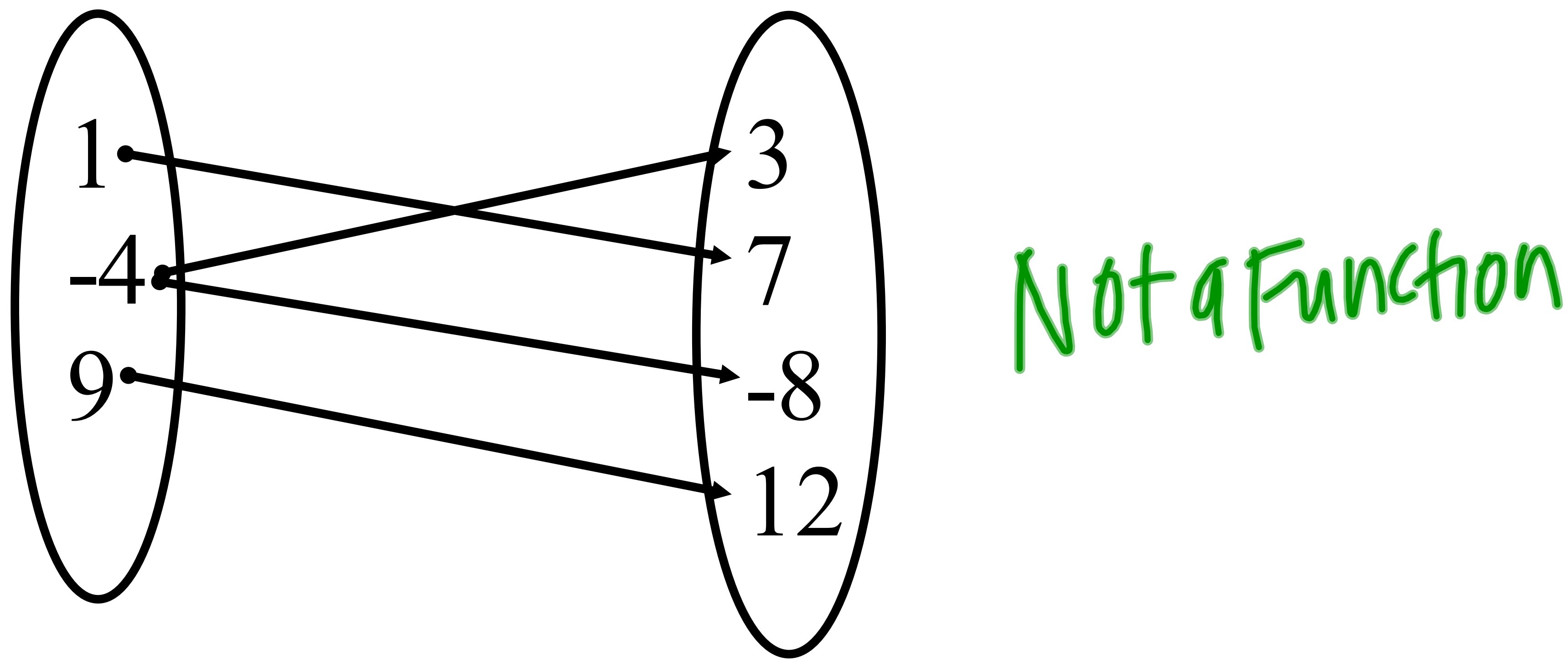
input output

Vertical Line Test: no vertical line will intersect a function in more than one point





Mapping Form: are there any x's that have been repeated



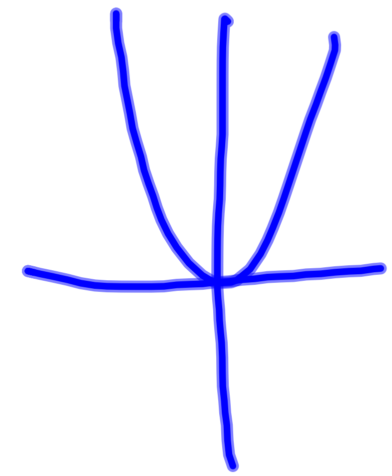
Is it a function?

f(x)=y

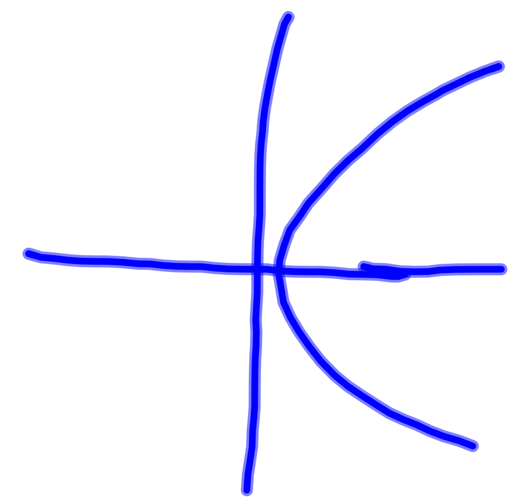
y equals f of x

the value of f at x

$$y = x^2$$



$$x = 2y^2$$



Domain & Range (card)

Domain: x-values - input

read x's from left to rt. (smallest to largest)

*some functions have domain restrictions - can't divide by zero

to find: set the den. = 0 and solve for x. These are the restrictions.

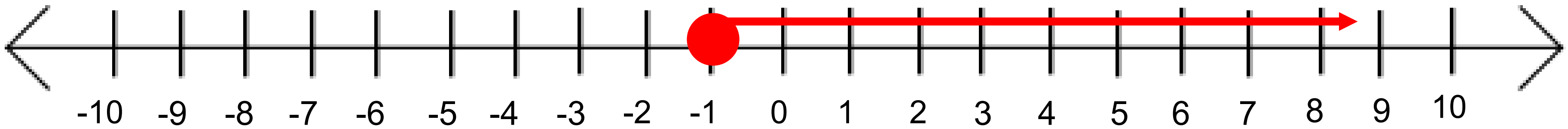
can't have a neg. # in a sq. root $\sqrt{x-7}$ $x-7 \geq 0$ $x \geq 7$

to find: set the radicand ≥ 0 and solve for x.

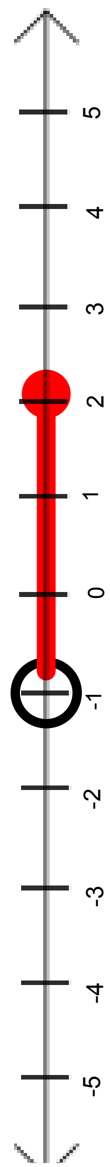
Range: y-values - output

read y's from bottom to top (smallest to largest)

Find the D:



Find the R:



Domain Restrictions:

1. Exclude any value that makes the denominator = 0

2. Exclude values that lead to the $\sqrt{}$ of a negative number

Find the Domain:

$$f(x)=\sqrt{3-x}$$

$3-x \geq 0$
$+x \quad +x$
$3 \geq x$
$x \leq 3$

$(-\infty, 3]$

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

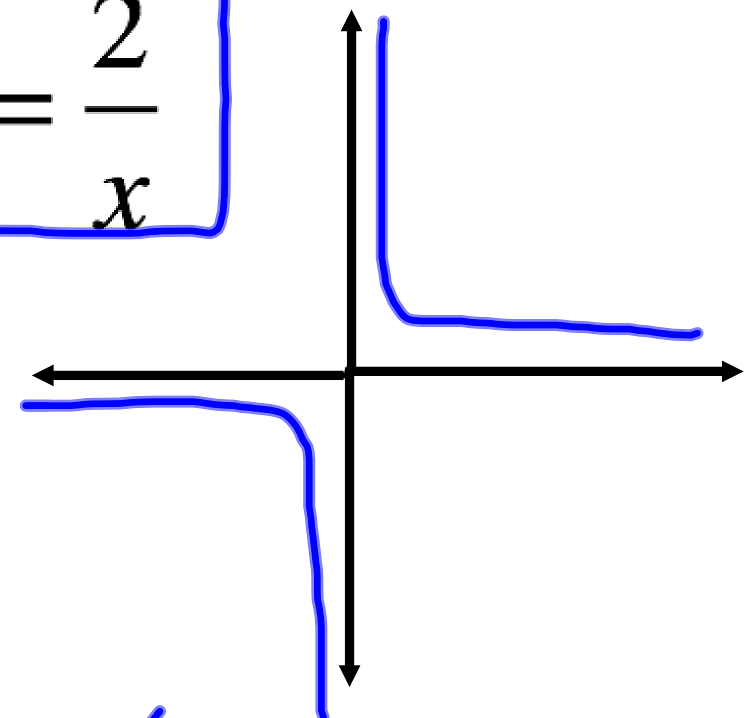
$x+1 \neq 0$
$x \neq -1$

$3x+2 \neq 0$
$-2 \quad -2$
$\frac{3x}{3} \neq \frac{-2}{3}$
$x \neq -2/3$

Domain: $\mathbb{R}, x \neq -1, -2/3$

Range

$$f(x) = \frac{2}{x}$$



Graphically:
domain: we look for the x-values that correspond to points on our graph

Range: we look for y-values that correspond to points on our graph

$$x \cdot y = \frac{2}{x} \cdot x$$

$$\frac{xy}{y} = \frac{2}{y}$$

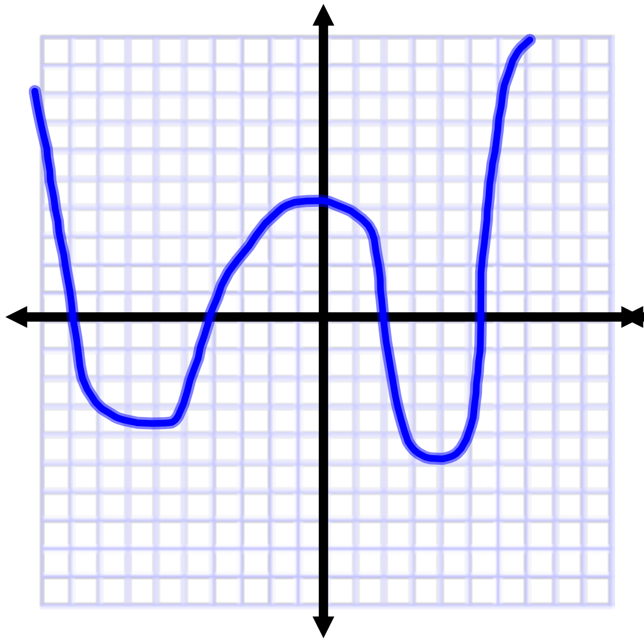
$$x = \frac{2}{y}$$

Continuity: A function is continuous if you can draw it in one motion without picking up your pencil. (It is frequently related to the denominator and restrictions in the domain.)

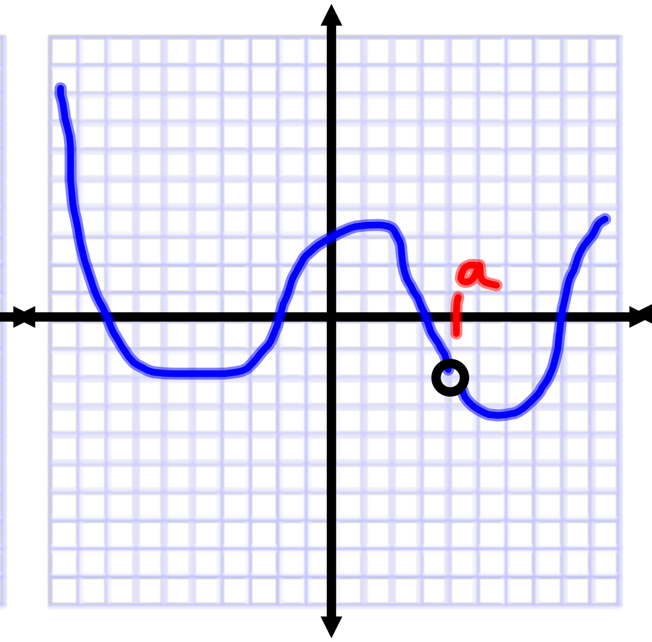
Discontinuities

- removable: hole

- essential: jump
  infinite (asymptotes)

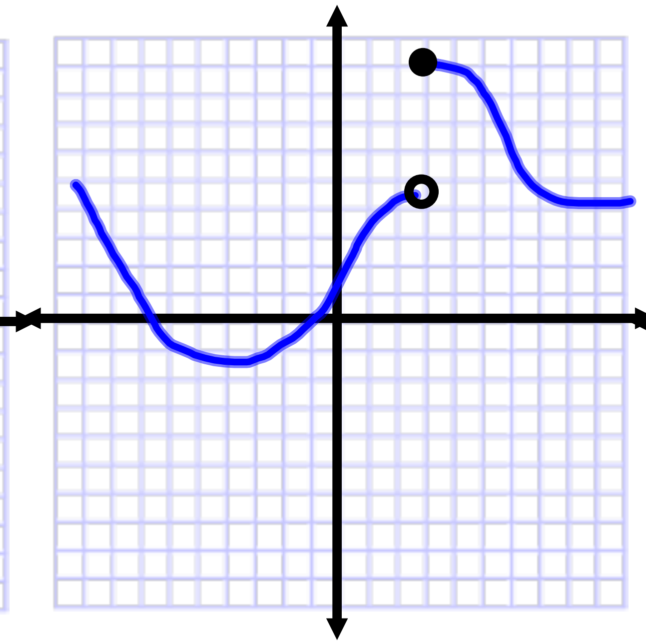


Continuous for all values of x



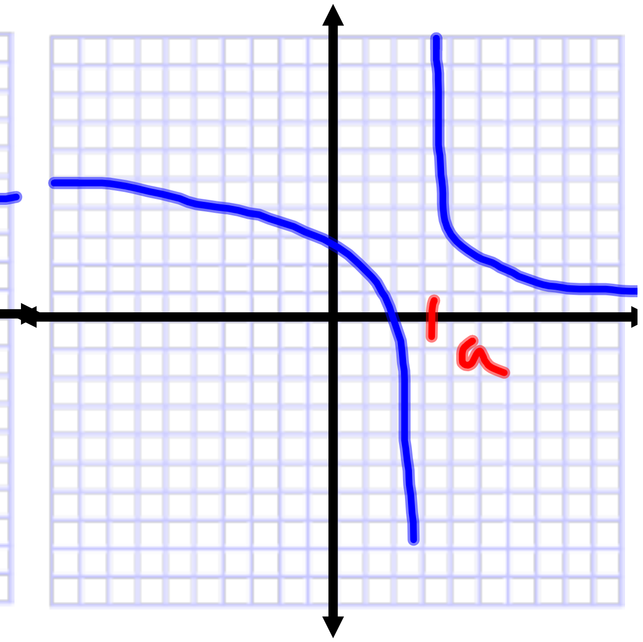
Removable discontinuity at x=a

(removable because we could fill it)



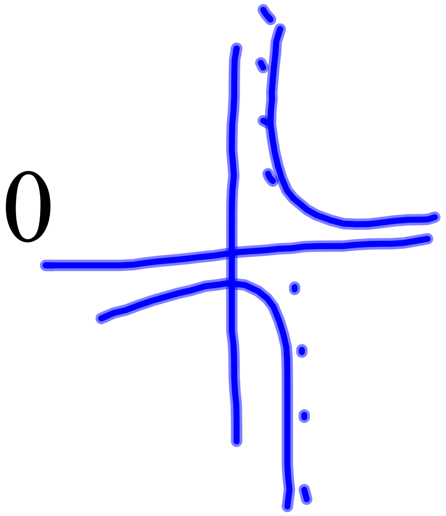
Jump discontinuity

(cant plug the hole)



Infinite discontinuity at x=a

Asymptotes:



vertical (VA): caused by dividing by 0

the graph approaches $-\infty$ *or* ∞ on each side of the asymptote

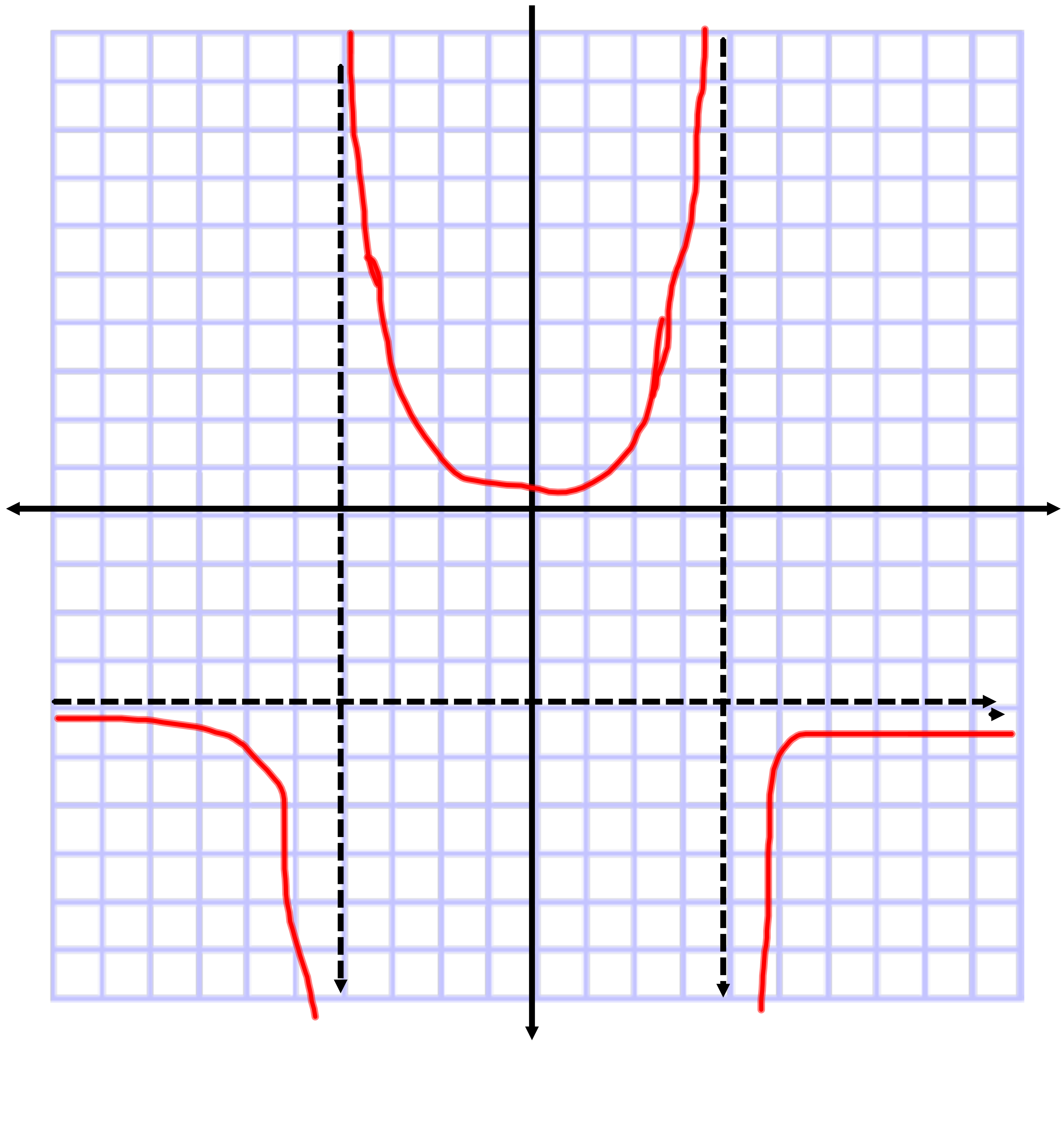
to find the asymptote set den = 0 and solve

end behavior: (horizontal (HA) or oblique (OA)):

to find the asymptote - compare the degrees of the num and den. if

- top heavy (OA): $\frac{x^2+3}{x-2}$
- bottom heavy (HA): y = 0 — $\frac{x-3}{x^2+7}$ HA y=0
- equal (HA): divide coefficients — $\frac{4x-3}{2x+1}$ $\frac{4}{2}=2$ HA y=2

oblique: (more later)



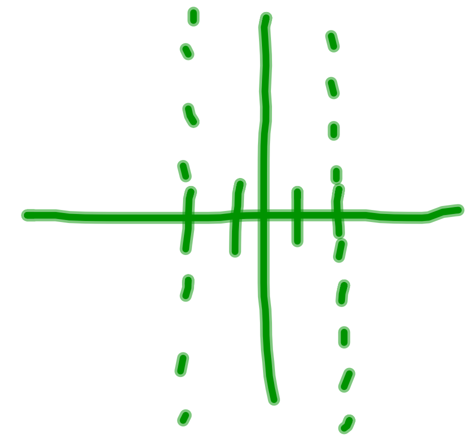
Find the vertical asymptotes:

$$y = \frac{2-x}{x-5}$$

$x - 5 = 0$

$x = 5$

V.A @ $x = 5$



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

$x^2 - 4 = 0$

$+4 \quad 4$

$\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$

V.a @ $x = 2$, $x = -2$

$$y = \frac{x+5}{x^2+5}$$

$x^2 + 5 = 0$

$-5 \quad -5$

$x^2 = -5$

NO V.A

Find the horizontal asymptotes:

$$y = \frac{2 - x}{x - 5}$$

degrees equal $\frac{-1}{1} = -1$ H.A @ $y = -1$

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

HA $y = 0$

$$y = \frac{4x^2 + 5}{x^2 + 5}$$

$\frac{4}{1}$ H.A @ $y = 4$

$$y = \frac{3x^2}{x - 7}$$