Notecard:

x & y intercepts

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

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

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

1 Back

$$2x + 3y = 6$$

x-intercept ($y = 0$)

$$2x + 3(0) = 6$$
$$2x = 6$$
$$x = 3$$
$$\boxed{(3, 0)}$$

y-intercept ($x = 0$)

$$2(0) + 3y = 6$$
$$3y = 6$$
$$y = 2$$
$$\boxed{(0, 2)}$$

Characteristics of a Function:

Domain
Range

Increasing
Decreasing

Extrema - max. and min.

Continuity- asymptotes, holes, jumps

Symmetry - odd, even, neither

Function:

#2

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

- graphically: passes the vertical line test

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

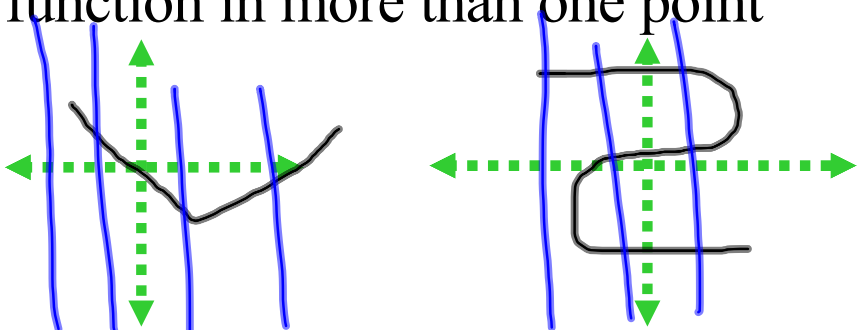
means: function named f is written using x's

f(x) = y

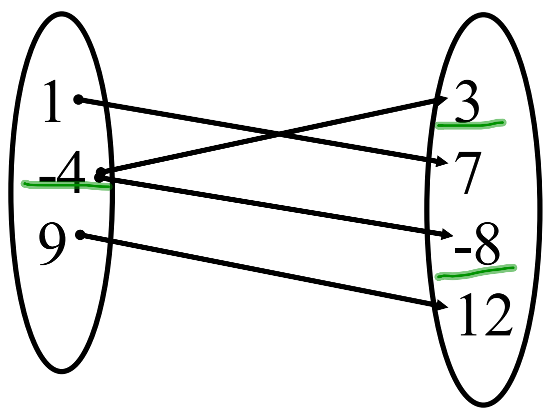
input   output

f(♡)=☆

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

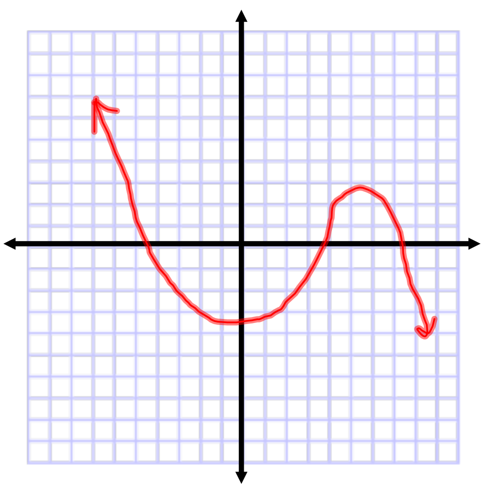


Vocabulary

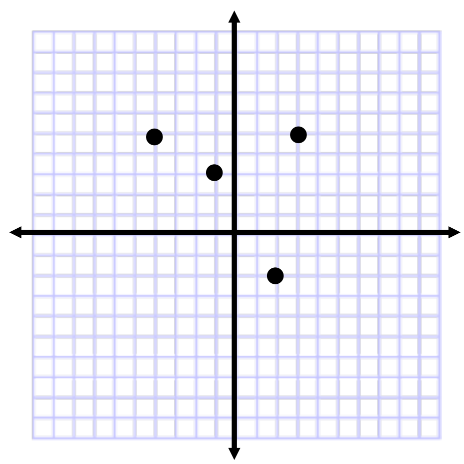
Continuous: A function is continuous if you can draw it in one motion without picking up your pencil.

Discrete: made of ordered prs. or individual pts.

Continuous
Function



Discrete
Function



Domain & Range

#3

Domain: x-values - input
read x's from left to rt. (smallest to largest)

discontinuities

*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~~

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

inside square root

Range: y-values - output
read y's from bottom to top (smallest to largest)

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:

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

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

$(-\infty,3]$

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

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

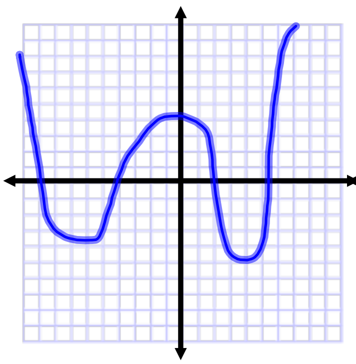
$(-\infty,-1)\cup(-1,-2/3)\cup(-2/3,\infty)$

$x+1=0$
$-1 \quad -1$
$x=-1$

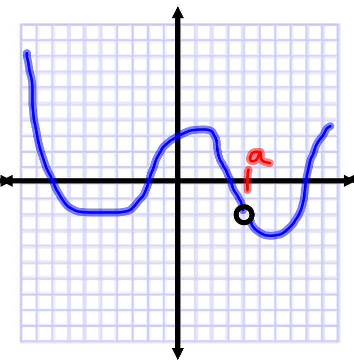
$3x+2=0$
$-2 \quad -2$
$\frac{3x}{3}=\frac{-2}{3}$
$x=-2/3$

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.)

- removable: hole
- essential: jump
  infinite (asymptotes)

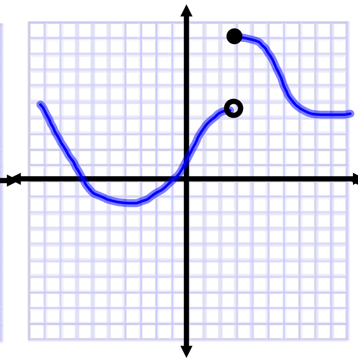


Continuous for all values of x



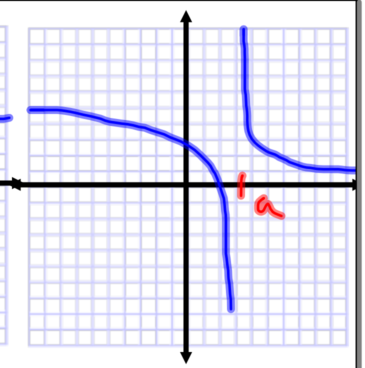
Removable discontinuity at x=a

(removable because we could fill it)



Jump discontinuity

(cant plug the hole)

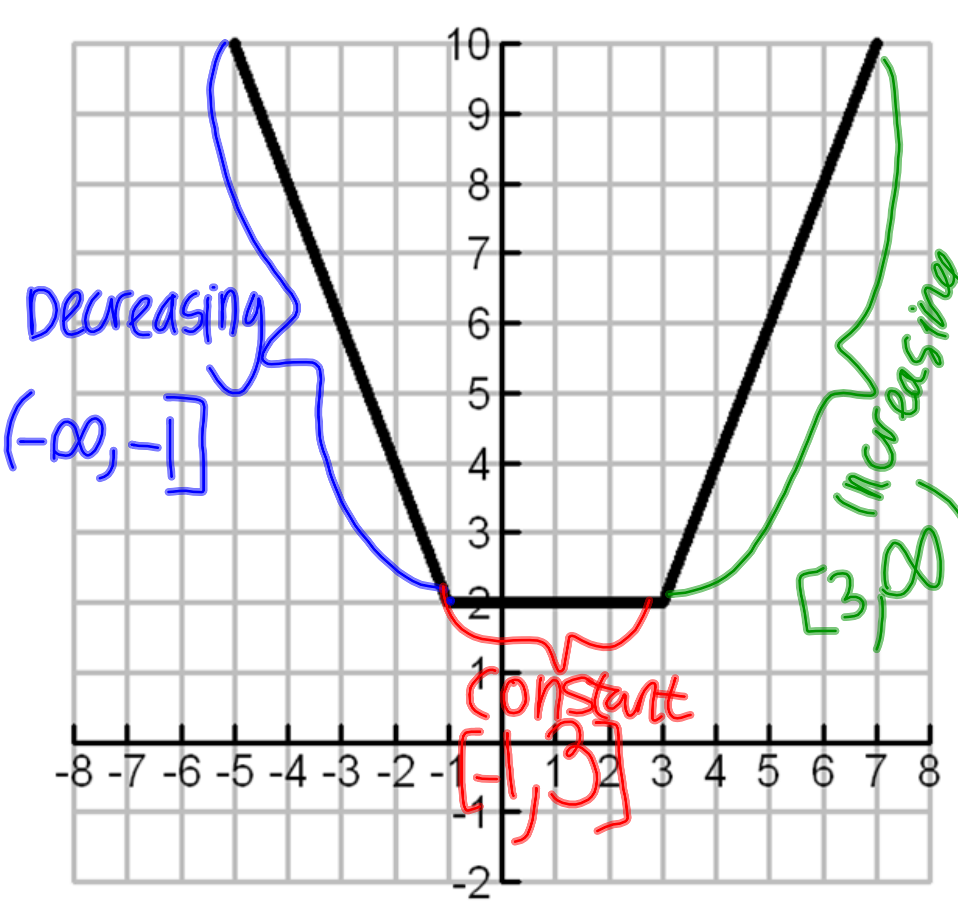


Infinite discontinuity at x=a

Increasing, Decreasing and Constant #4

- as you move from left to right the y-values increase
- as you move from left to right the y-values decrease
- as you move from left to right the y-values do not change

this behavior is reported using interval notation for the x-values where the graph has a certain behavior



x	y1(x) abs(x-
-7	14
-6	12
-5	10
-4	8
-3	6
-2	4
-1	2
0	2
1	2
2	2
3	2
4	4
5	6
6	8
7	10
8	12
9	14
10	16
11	18
12	20
13	22
14	24
15	26
16	28

Extrema

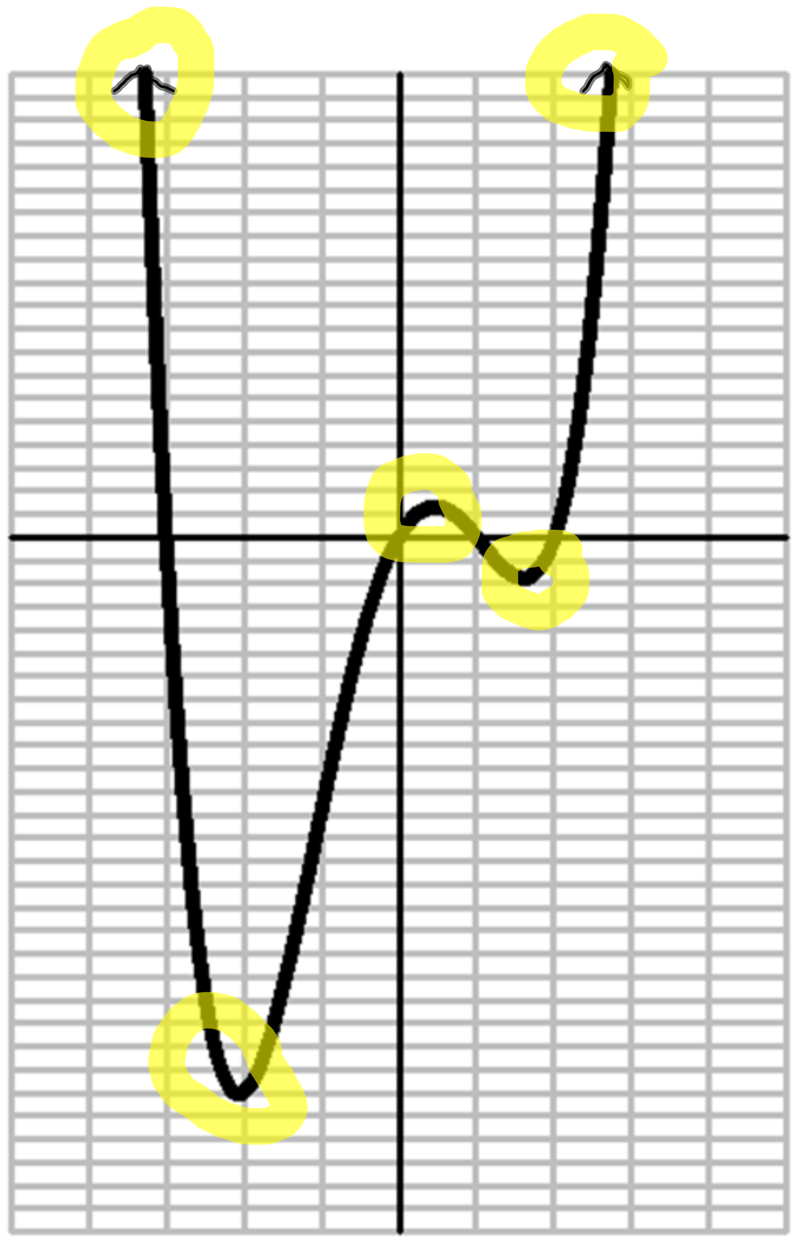
#5

maximums

- relative (local)
- absolute (upper bound)

minimums

- relative (local)
- absolute (lower bound)



Odd/Even/Neither Symmetry

#6

Odd $\boxed{f(-x) = -f(x)}$

symmetry with respect to the origin

Even $\boxed{f(-x) = f(x)}$

symmetry with respect to the y-axis

Neither

Split back into 3rds $f(-x) = f(x)$

$$y = x^2$$

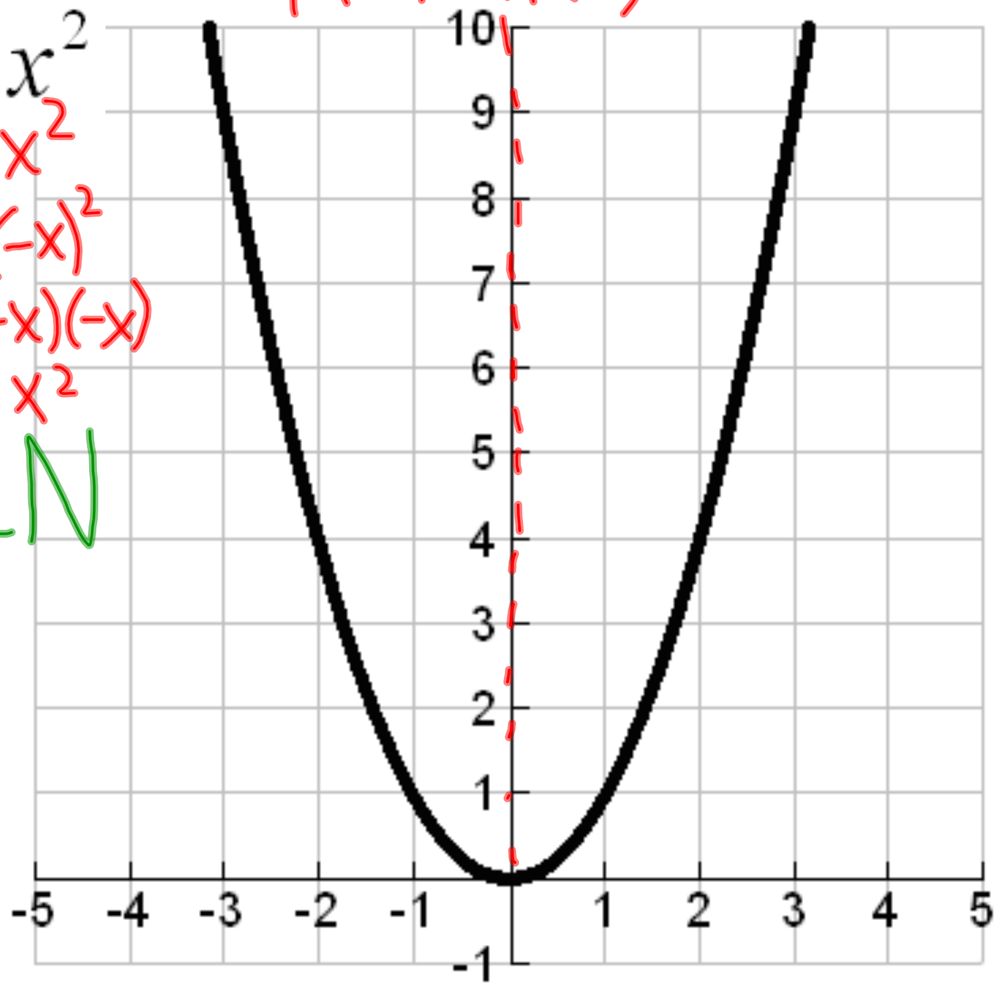
$f(x) = x^2$

$f(-x) = (-x)^2$

$= (-x)(-x)$

$= x^2$

EVEN



$f(-x) = -f(x)$

$$y = x^3$$

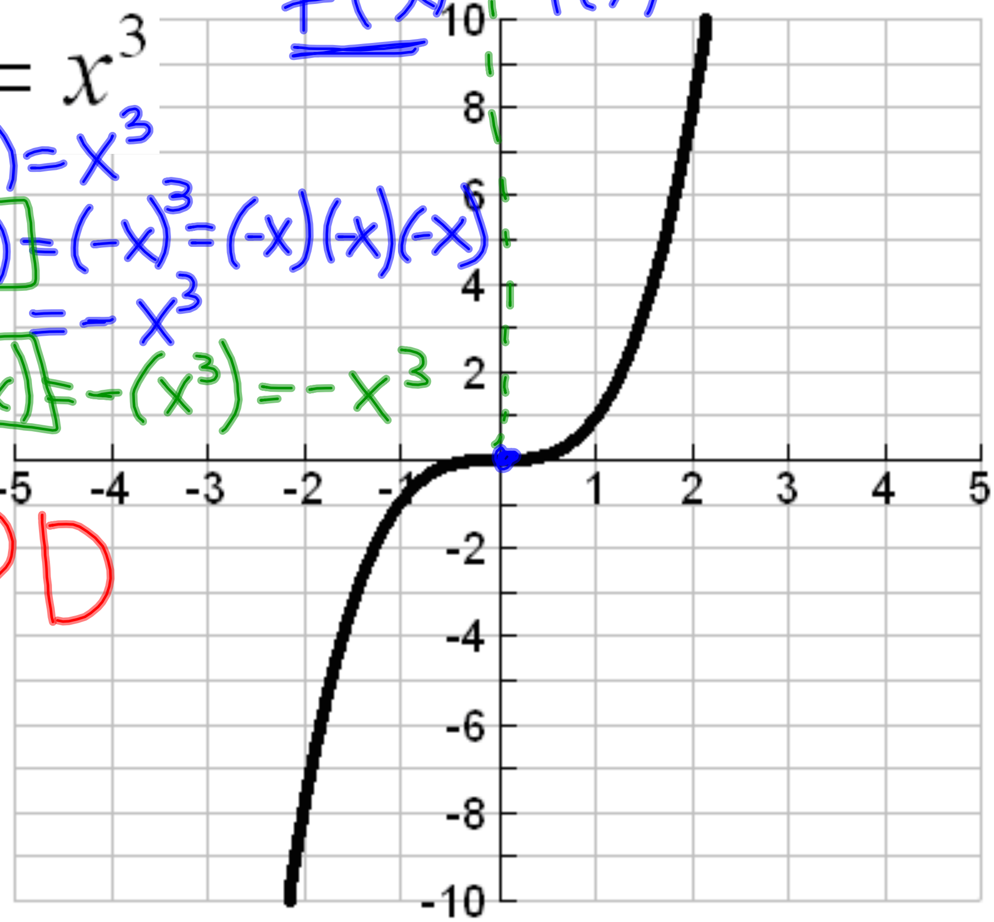
$f(x) = x^3$

$\boxed{f(-x)} = (-x)^3 = (-x)(-x)(-x)$

$= -x^3$

$\boxed{-f(x)} = -(x^3) = -x^3$

ODD

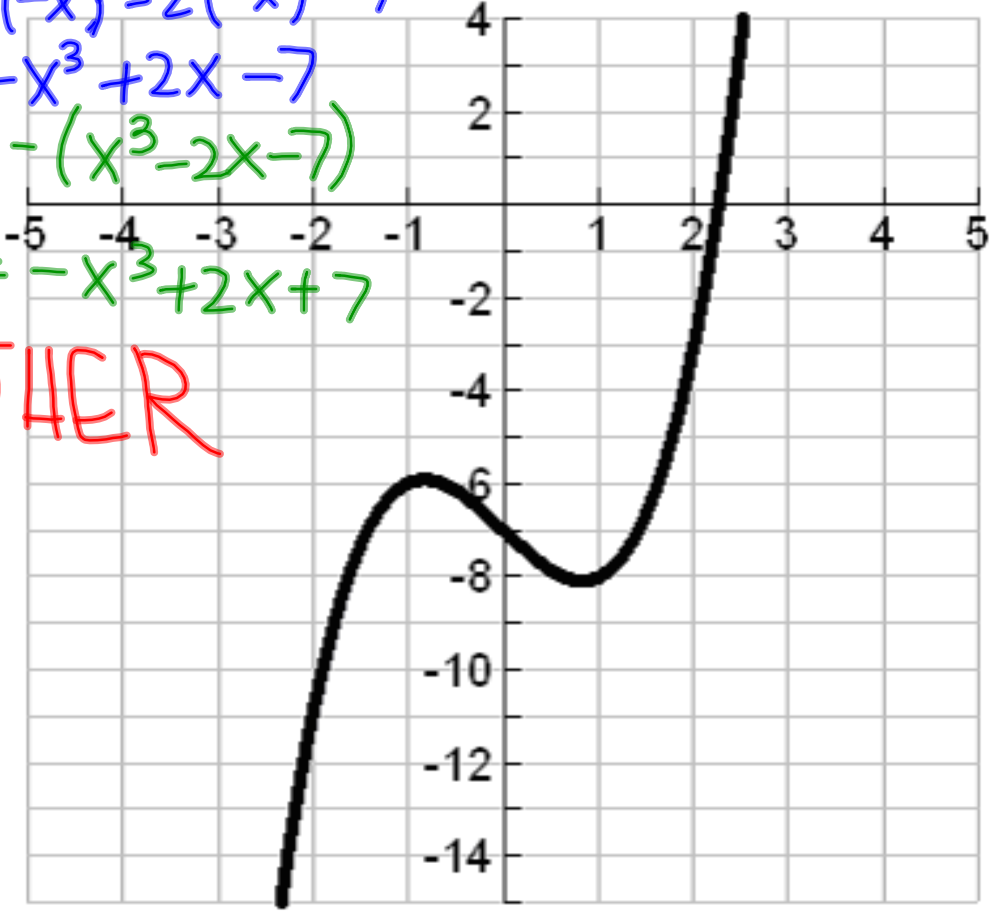


$$y = x^3 - 2x - 7$$

$$f(-x) = (-x)^3 - 2(-x) - 7$$
$$= -x^3 + 2x - 7$$

$$-f(x) = -(x^3 - 2x - 7)$$
$$= -x^3 + 2x + 7$$

NEITHER



Asymptotes:

#7

vertical (VA): caused by dividing by 0

the graph approaches $-\infty \quad or \quad \infty$

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

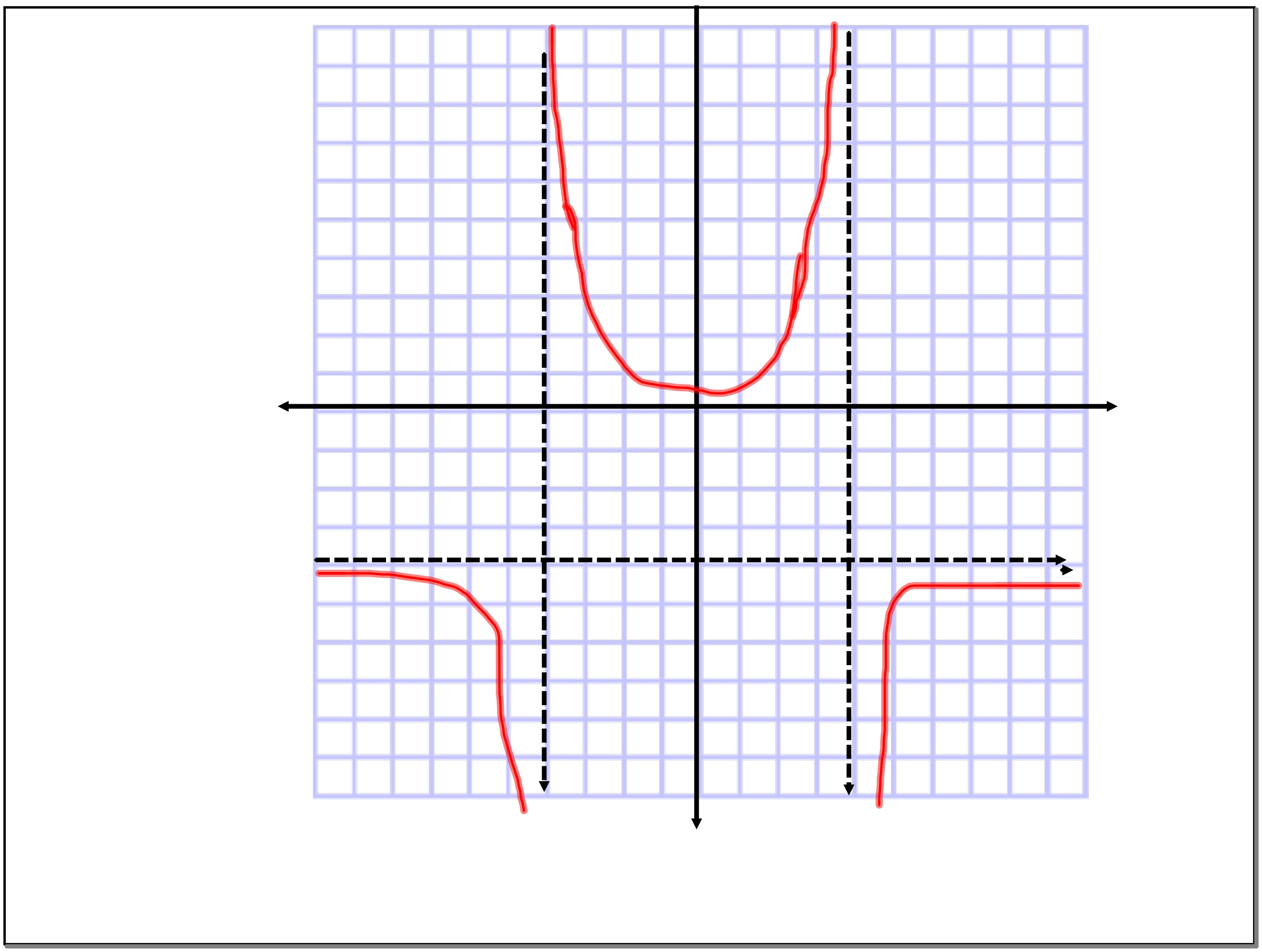
highest exponent

top heavy (OA):

bottom heavy (HA): y = 0

equal (HA): divide coefficients

oblique: (more later)



Find the vertical asymptotes:

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

$x-5=0$
$+5 \quad +5$
$x=5$

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

$x^2-4=0$
$+4 \quad +4$
$\sqrt{x^2}=\sqrt{4}$
$x=\pm 2$

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

NO V.A.

Find the horizontal asymptotes:

$$y = \frac{2-x}{x-5}$$ D: 1 D: 1 $\frac{-1}{1} = -1$ $y = -1$

$$y = \frac{1}{x^2-4}$$ D: 0 D: 2 $y = 0$

$$y = \frac{4x^2+5}{x^2+5}$$ D: 2 D: 2 $\frac{4}{1}$ $y = 4$

$$y = \frac{3x^2}{x-7}$$ D: 2 D: 1 oblique

August 23, 2012