Tues: notes (HW)

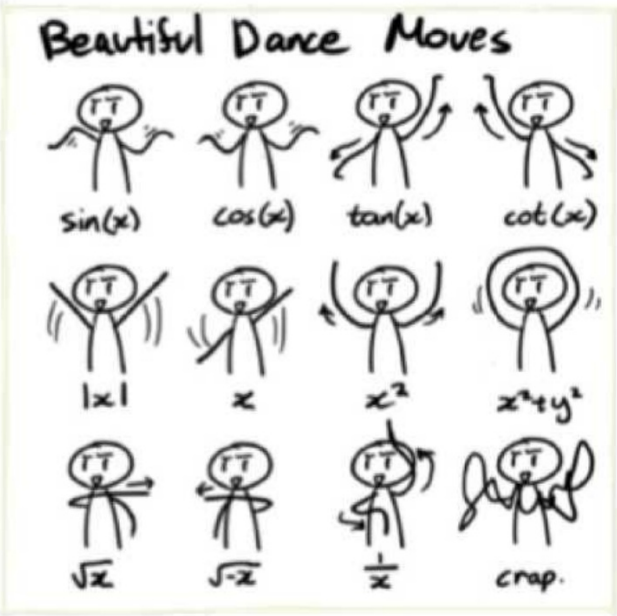
Thurs: work on final exam review

Mon: notes (HW)

Wed. (review)

Friday: last quiz

Library of Functions & Transformations - Day 1



Parent Functions (Mother Functions)

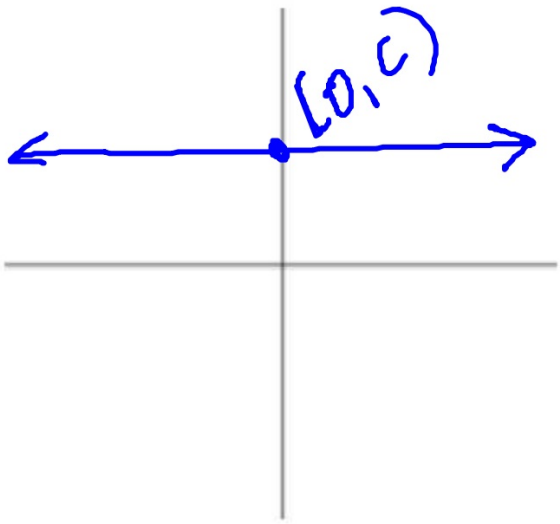
A parent function is the simplest function of a family of functions. For the family of quadratic functions,

$y = ax^2 + bx + c$, the simplest function. of this form is $y = x^2$.

In this lesson we will examine several "families" of functions. A family of functions is a set of functions whose equations have a similar form. The "parent" of the family is the equation in the family with the simplest form. For example, $y = x^2$ is a parent to other functions, such as $y = 2x^2 - 5x + 3$.

1. Constant

$f(x) =$ c



Set

D: $\{x \mid x \in R\}$

R: $\{y \mid y = c\}$

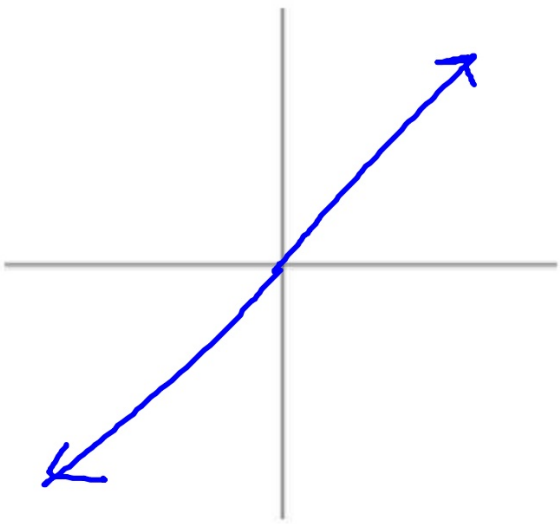
Interval

D: $(-\infty, \infty)$

R: $[c]$

2. Identity

$f(x) =$ x



Set

D: $\{x \mid x \in R\}$

R: $\{y \mid y \in R\}$

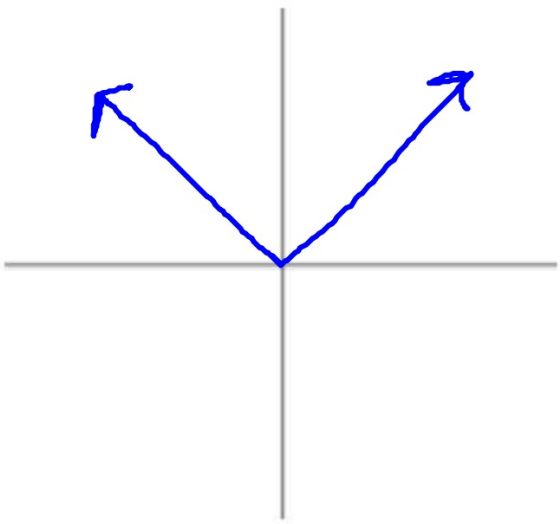
Interval

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

3. Absolute Value

$f(x) =$ $|x|$



Set

D: $\{x \mid x \in R\}$

R: $\{y \mid y \geq 0\}$

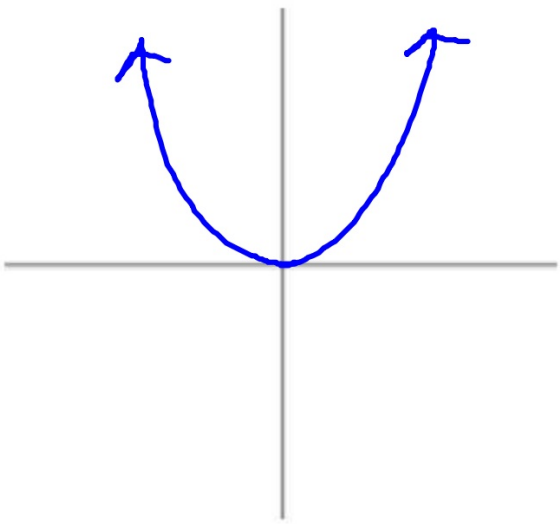
Interval

D: $(-\infty, \infty)$

R: $[0, \infty)$

4. Quadratic

$f(x) =$ x^2



Set

D: $\{x \mid x \in R\}$

R: $\{y \mid y \geq 0\}$

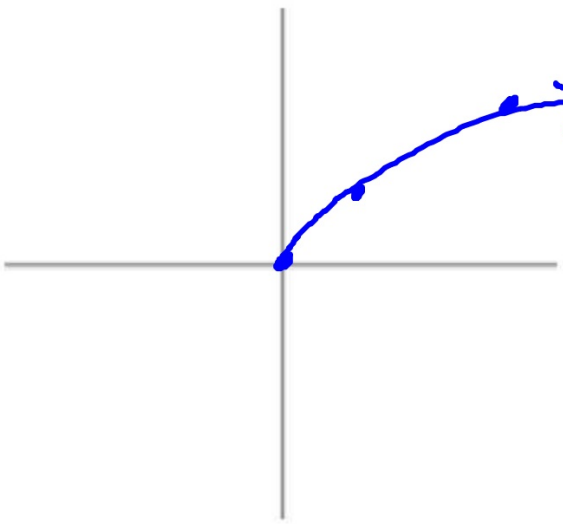
Interval

D: $(-\infty, \infty)$

R: $[0, \infty)$

5. Square Root

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



Set

D: $\{x \mid x \geq 0\}$

R: $\{y \mid y \geq 0\}$

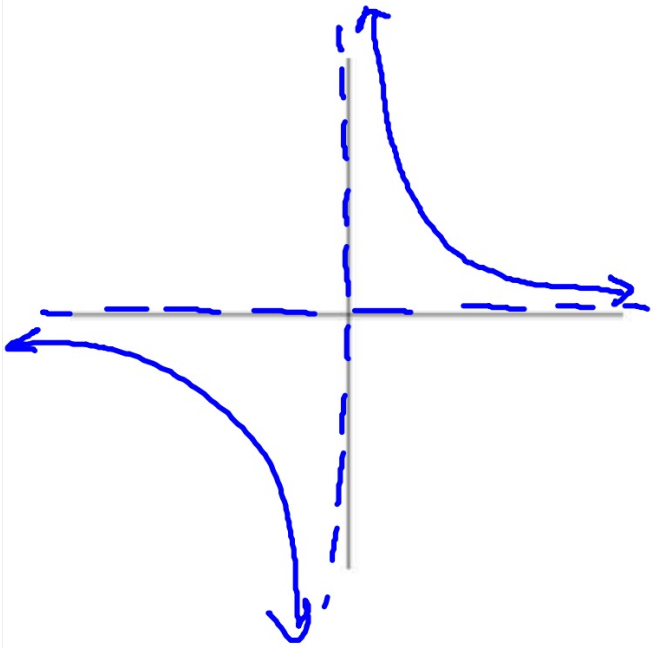
Interval

D: $[0, \infty)$

R: $[0, \infty)$

6. Reciprocal

$$f(x) = \frac{1}{x}$$



Set

D: $\{x \mid x \neq 0\}$

R: $\{y \mid y \neq 0\}$

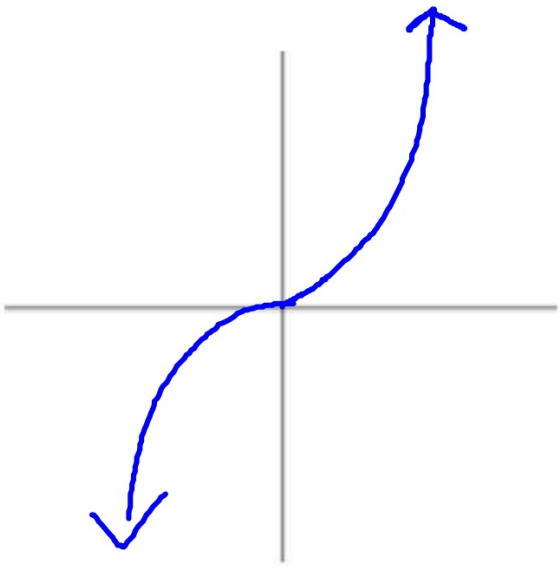
Interval

D: $(-\infty, 0) \cup (0, \infty)$

R: $(-\infty, 0) \cup (0, \infty)$

7. Cubic

$f(x) =$ x^3



Set

D: $\{x \mid x \in R\}$

R: $\{y \mid y \in R\}$

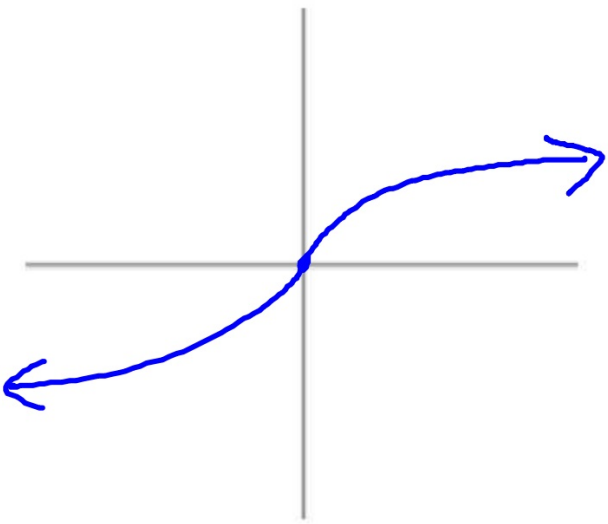
Interval

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

8. Cube Root

$f(x) = \sqrt[3]{x}$



Set

D: $\{x \mid x \in R\}$

R: $\{y \mid y \in R\}$

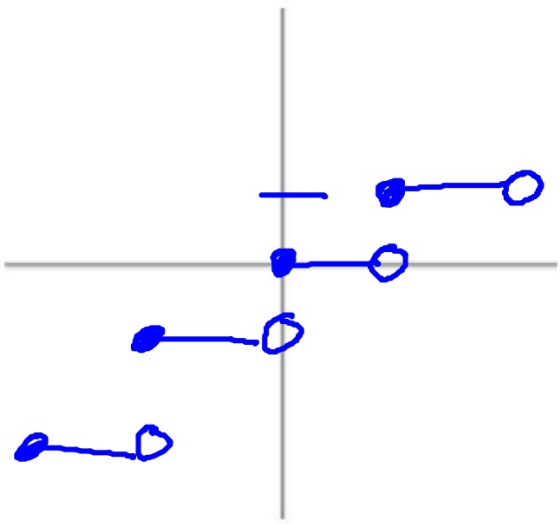
Interval

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

9. Greatest Integer

$f(x) =$ $[x]$



Set

D: $\{x \mid x \in R\}$

R: $\{y \mid y \in Z\}$ integers

Interval

D: $(-\infty, \infty)$

R: N/A

Shifts

$y = af(b(x-h)) + k$

$$\boxed{y = f(x-h) + k}$$

Vertical Shifts

Consider: k

k>o up

k<o down

Horizontal Shifts

Consider: h

h>o right

h<o left

$(x-2)^2$

$(x+2)^2$

$(x--2)^2$

a.) $f(x) = |x+7| + 4$

Abs. value

$y = |x|$

up 4

left 7

b.) $f(x) = (x-1)^2$

Quadratic

$h = 1$; right 1

c.) $f(x) = \sqrt[3]{x} - 5$

cube root

down 5

d.) $f(x) = 6 + [x - 7]$

greatest integer

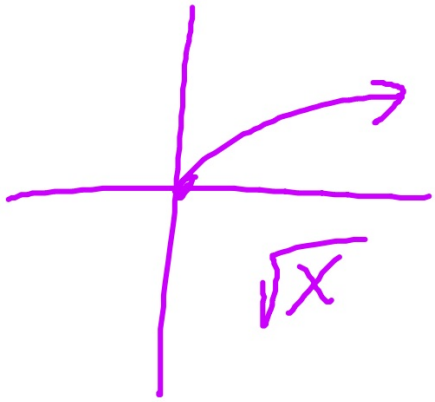
up 6

right 7

Describe the transformations necessary to transform the graph of f(x) into the graph of g(x)

a) $f(x) = \sqrt{x}$

$g(x) = -\sqrt{x+4}$



left 4
reflect w/ x-axis

Describe the transformations necessary to transform the graph of f(x) into the graph of g(x)

b)

$$f(x) = |x|$$

$$g(x) = -|x-6| + 1$$

right 6

up 1

reflect x-axis

Transform the given function f(x) as described and write the resulting function as an equation.

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

VP 2 ; reflect w/ x-axis

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

Transform the given function f(x) as described and write the resulting function as an equation.

b) $f(x) = \sqrt{x}$

left 2, down 6, reflect x-axis

$f(x) = -\sqrt{x+2} - 6$

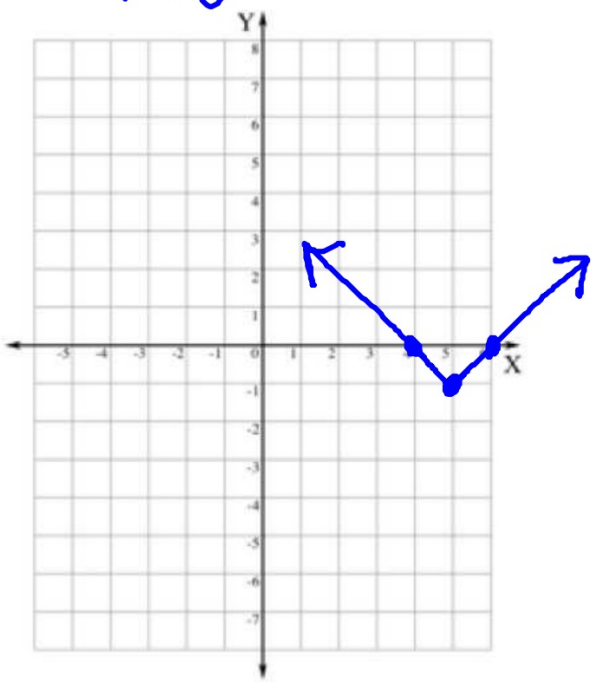
ex: Sketch and state the D/R.

down 1
right 5

a) $y = |x-5| - 1$

key: $(5, -1)$
(vertex)

x	y
4	0
5	-1
6	0



Domain:	Range:
$\{x \mid x \in \mathbb{R}\}$	$\{y \mid y \geq -1\}$

Set

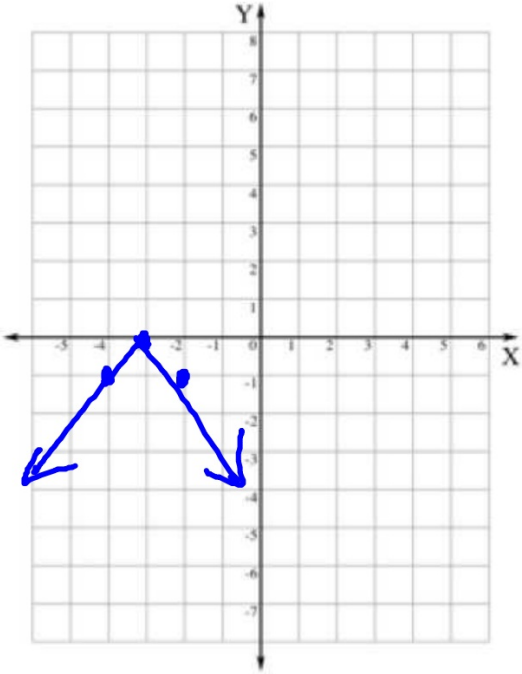
ex: Sketch and state the D/R.

reflect x axis
left 3

b) $f(x) = -|x+3|$

Key: $(-3, 0)$

x	y
-4	-1
-3	0
-2	-1



Domain:	Range:
$(-\infty, \infty)$	$(-\infty, 0]$

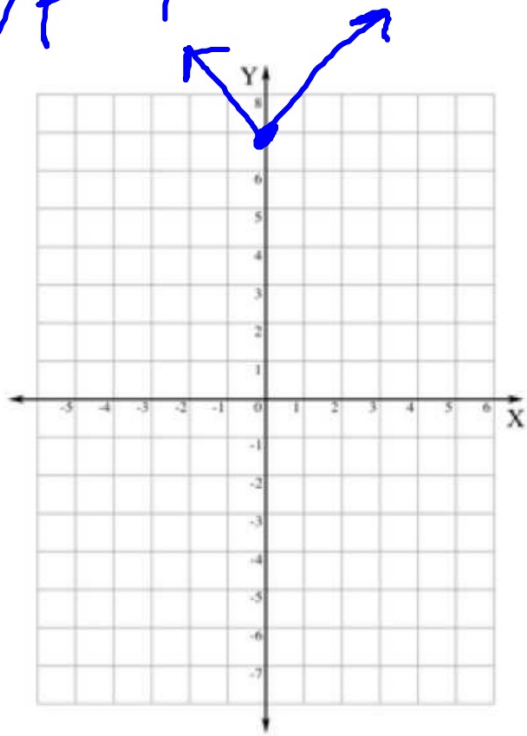
ex: Sketch and state the D/R.

VP 7

c) $f(x) = |x| + 7$

Key (0, 7)

x	y
-1	8
0	7
1	8



Domain:	Range:
$\{x \mid x \in R\}$	$\{y \mid y \geq 7\}$

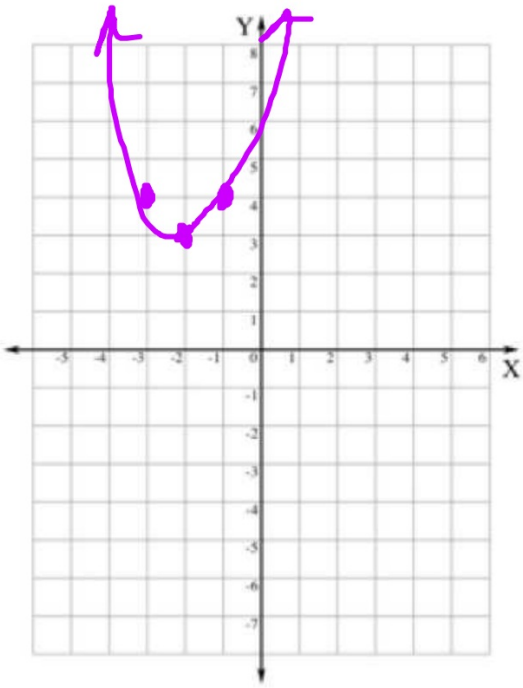
ex: Sketch and state the D/R.

left 2; up 3

a) $f(x) = (x+2)^2 + 3$

Key: $(-2, 3)$

x	y
-3	4
-2	3
-1	4



Domain:	Range:
$(-\infty, \infty)$	$[3, \infty)$

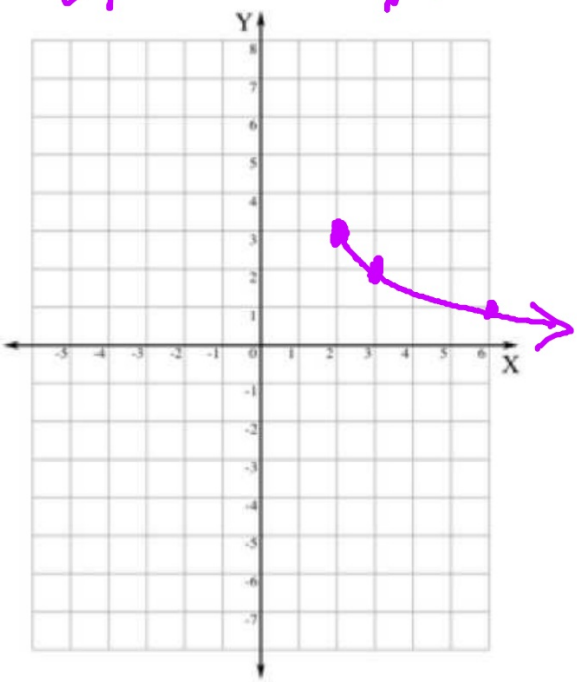
ex: Sketch and state the D/R.

b) $y = 3 - \sqrt{x-2}$

right 2
up 3
reflect x-axis

Key (2, 3)

x	y
2	3
3	2
6	1



Domain:	Range:
$\{x \mid x \geq 2\}$	$\{y \mid y \leq 3\}$

$$y = -x^2 + 1$$

$$y = -(-1)^2 + 1$$

$$-1 + 1$$

$$0$$

x	y
-1	0
0	1