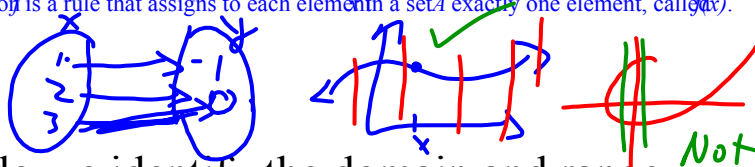


Functions

What is a function?

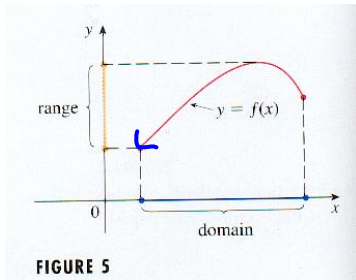
A function is a rule that assigns to each element in a set A exactly one element, called $f(x)$.



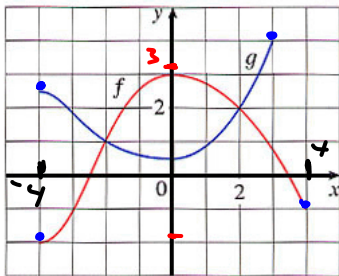
How do we identify the domain and range of a function?

$$y = \sqrt{x+2}$$

- First must know what these terms mean...define each.
- Must know how to indicate domain and range using correct notation (Set and Bracket)



Examples:



$$f$$

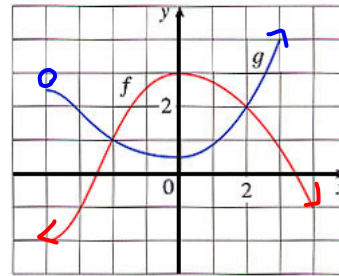
$$D: \{x \mid -4 \leq x \leq 4, x \in \mathbb{R}\}$$

$$R: \{y \mid -2 \leq y \leq 3, y \in \mathbb{R}\}$$

$$g$$

$$D: \{x \mid -4 \leq x \leq 4, x \in \mathbb{R}\}$$

$$R: \{y \mid \frac{1}{2} \leq y \leq 4, y \in \mathbb{R}\}$$



$$f$$

$$D: \{x \mid x \in \mathbb{R}\} \quad (-\infty, \infty)$$

$$R: \{y \mid y \leq 3, y \in \mathbb{R}\}$$

$$g$$

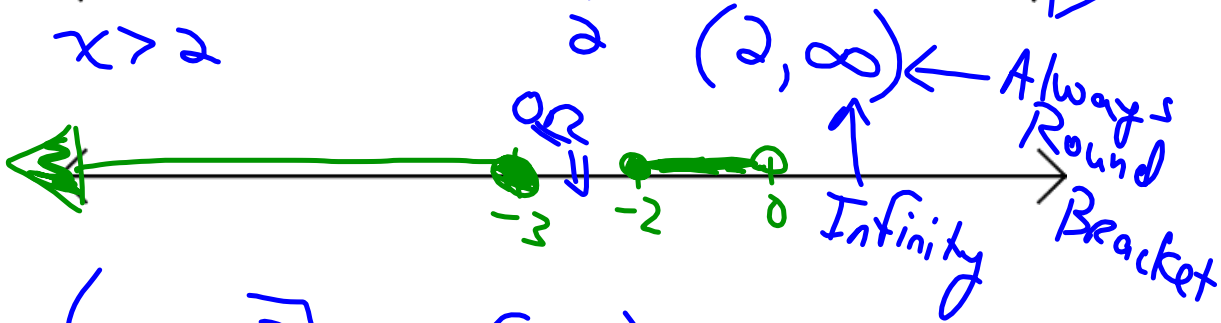
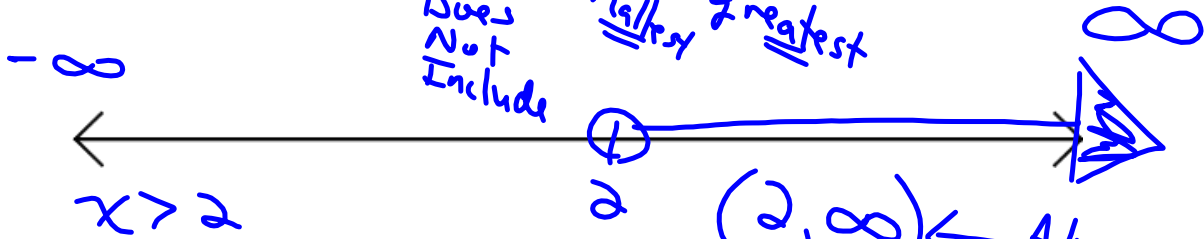
$$D: \{x \mid x > -4, x \in \mathbb{R}\}$$

$$R: \{y \mid y \geq \frac{1}{2}, y \in \mathbb{R}\}$$

Bracket Notation

Notation used to describe "SETS" of numbers...

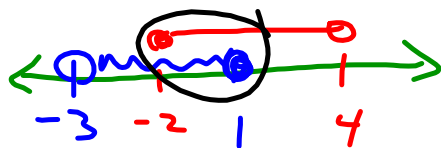
Must be Real Numbers



$(-\infty, -3]$ OR $[-2, 0)$ "Intersection" of sets

$(-\infty, -3] \cup [-2, 0)$

"In Union with"



$\cap: [-2, 1]$

$\cup: (-3, 4)$

$\{\emptyset\}$ "Null set" "Empty set"

Function Notation

- Must understand the notation associated with determining the values of functions

I. From a graph

$f(1) \Rightarrow f(1) = 2$
 "y value when the x-value is equal to 1"

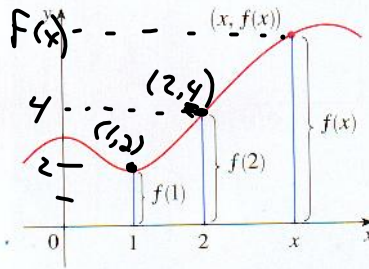


FIGURE 4

II. From a table of values

$f(4) = 5$
 $f(-3) = 7$
 $f(0) = 8$

x	f(x)
-3	7
0	8
4	5

III. From an explicit formula (Equation)

$f(x) = -2x^2 + 5x - 3$ ← Explicit formula!

$f(-3) = ?$
 $= -2(-3)^2 + 5(-3) - 3$
 $= -18 - 15 - 3$
 $= -36$
 $(-3, -36)$

$f(8) = ?$
 $= -2(8)^2 + 5(8) - 3$

$f(x) = -2x^2 + 5x - 3$
 $f(2-h) = ?$ ← $4+h^2$
 $= -2(2-h)^2 + 5(2-h) - 3$ $(x+7)^2$
 $= -2(4-4h+h^2) + 10-5h-3$ $x^2+14x+49$
 $= -8+8h-2h^2+10-5h-3$
 $f(2-h) = -2h^2+3h-1$

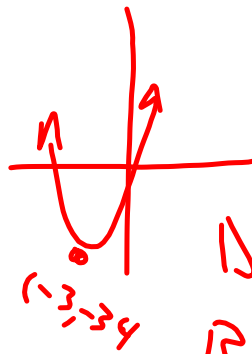
Complete Square

$$3x^2 + 18x - 7$$

$$3(x^2 + 6x + \overset{+27}{\underset{\text{Take } \frac{1}{2} \text{ and square}}{9}}) - 7 - 27$$

$$y = (+3)(x + 3)^2 - 34$$

V(-3, -34)
opens up



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

R: $(-34, \infty)$

Check-Up

- Determine the domain and range of the quadratic $f(x) = -5x^2 + 10x - 3$.

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