

# 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?

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

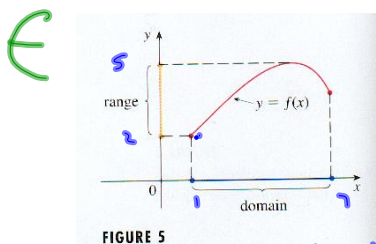


FIGURE 5

Domain:  $\{x \mid 1 \leq x \leq 7, x \in \mathbb{R}\}$

Range:  $\{y \mid 2 \leq y \leq 5, y \in \mathbb{R}\}$

Bracket Notation:

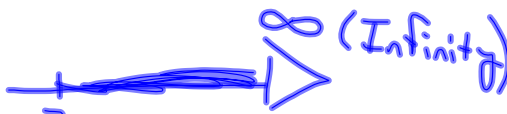
Domain:  $[1, 7]$

Range:  $[2, 5]$

ex.  $-3 < x \leq 7$

$(-3, 7]$

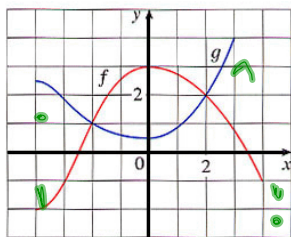
ex.  $x > 7$   
 $(7, \infty)$



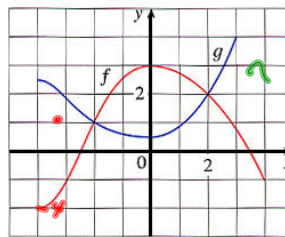
ex.  $x \leq -3$

$(-\infty, -3]$

Examples:



$f(x) \dots$   
Domain:  $[-4, 4]$   
Range:  $[-2, 3]$



$g(x) \dots$   
D:  $\{x \mid x \geq -4, x \in \mathbb{R}\}$   
 $[-4, \infty)$   
R:  $\{y \mid y \geq \frac{1}{2}, y \in \mathbb{R}\}$   
 $[\frac{1}{2}, \infty)$

# Function Notation

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

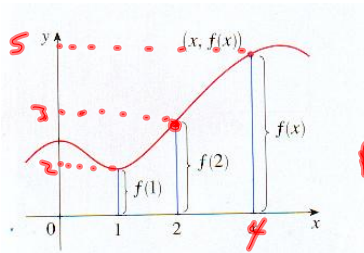
## I. From a graph

$$f(2) = 3 \Rightarrow (2, 3)$$

"Determine the y-value when  $x=2$ "

$$f(1) = 2$$

$$(1, 2)$$



$$f(x) = 5$$

$$x = 4$$

## II. From a table of values

$$f(3) = 8$$

$$f(x) = 7$$

$$x = -1$$

$x$	$f(x)$
-1	7
0	5
3	8

## III. From an explicit formula (Equation)

$$f(x) = -2x^2 + 5x - 3 \quad \leftarrow \text{Explicit formula!}$$

$$f(-3) = ?$$

$$= -2(-3)^2 + 5(-3) - 3$$

$$= -2(9) - 15 - 3$$

$$= -36$$

$$(-3, -36)$$

$$f(8) = ?$$

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

$$f(2-h) = ?$$

$$f(x) = -2x^2 + 5x - 3$$

$$f(2-h) = -2(2-h)^2 + 5(2-h) - 3$$

$$= -2(4 - 4h + h^2) + 10 - 5h - 3$$

$$= -8 + 8h - 2h^2 + 10 - 5h - 3$$

$$= -2h^2 + 3h - 1$$

\*

$$f(x) = -2x^2 + 5x - 3$$

$$f(-h) - 2f(-1+3h)$$

$$[-2(-h)^2 + 5(-h) - 3] - 2[-2(-1+3h)^2 + 5(-1+3h) - 3]$$