

2-1 Functions

Set & Interval Notation

Function or Not?

Function notation

Domain & Range

Increasing & Decreasing

Rate of Change

Set Notation

- notation used to represent a group of values (elements)

- used with discrete &/or continuous functions

2 ways to use set notation

- {list each element in the set}

examples:

Who are the students sitting in your row?

$\{\text{Sam, Levi, Tyler}\}$

What are the shoe sizes of the students in your row?

using inequalities, equal, or not equal signs

- {variable being defined | variable description}

means "such that"

$$\{x | x \geq 5\}$$

examples:

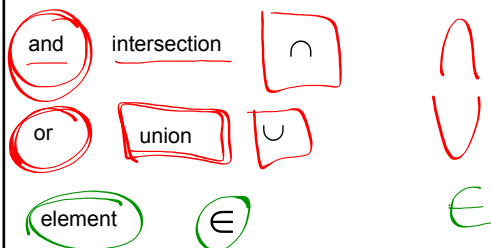
How much money can a person earn in a lifetime?

All numbers less than 7.

$$\{a | a < 7\}$$

$$\leq \quad \geq$$

Notations used when working with sets



Interval Notation:

$()$ not included \circ or $-\infty, \infty$

$[]$ included \bullet

- used to represent an interval (a space in between 2 objects, pts, or units)
- used with continuous functions

	Set	Interval
All real numbers greater than or equal to -3 but less than 5.	$\{v \mid v \geq -3 \text{ and } v < 5\}$	$[-3, 5)$
All real numbers greater than or equal to -100.	$\{m \mid m \geq -100\}$	$[-100, \infty)$
All real numbers greater than -36 and less than or equal to 14		

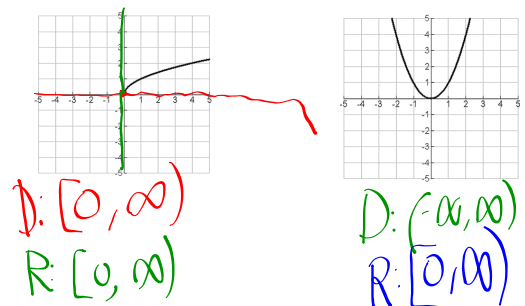
Domain & Range

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

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

distance vs. time
when using versus it is always: dependent vs independent

Find the D & R:



What are the dependent and independent variables? What is a realistic D & R, write it in set or interval notation?

A person gains 225 calories for each sandwich they eat.

calories vs. sandwiches

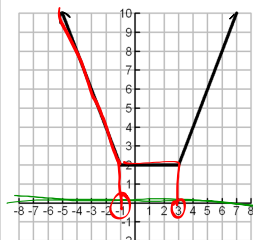
The initial fee for an electrician to come to your home is \$60. Each additional hour is \$10.

Increasing, Decreasing and Constant

- as you move from left to right the y-values increase (the graph is going up)
- as you move from left to right the y-values decrease (the graph is going down)
- as you move from left to right the y-values do not change (the graph is flat)

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

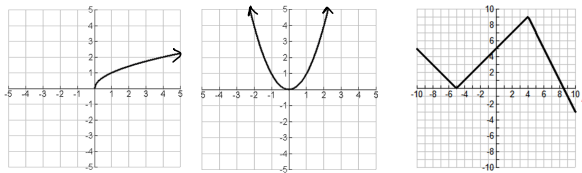
Give the intervals for increasing, decreasing, and constant behavior:



D: $(-\infty, -1)$
C: $(-1, 3)$
I: $(3, \infty)$

x	y1(x) abs(x-1)
-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

Give the intervals for increasing, decreasing, and constant behavior:



Function:

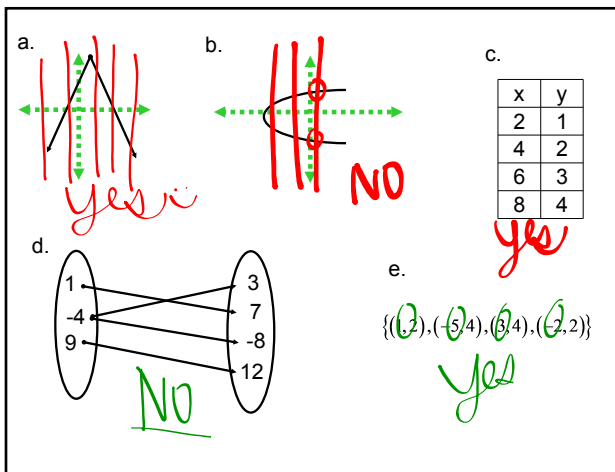
Function: when each domain value is paired with only one range value (no repeating x's)

- 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



Evaluate for a specific value:

$$f(x) = 3x - 5$$

$x = -2$ $f(-2) = 3(-2) - 5$
 $x =$ $f(-2) = -6 - 5$
 $f(3) =$ $f(-2) = -11$

$f(-4) =$

Slope

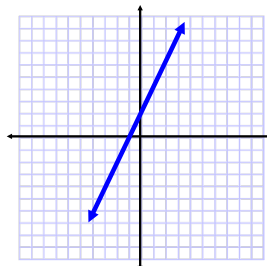
$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

$x_2 \neq x_1$ or the slope is undefined

rate of change $\frac{\$}{\text{hr.}}$ $\frac{\text{miles}}{\text{gallon}}$ mph

What is the slope of the line?

a.



b. $(-2, 3)$ and $(-4, -3)$

Describe the rate of change:

