

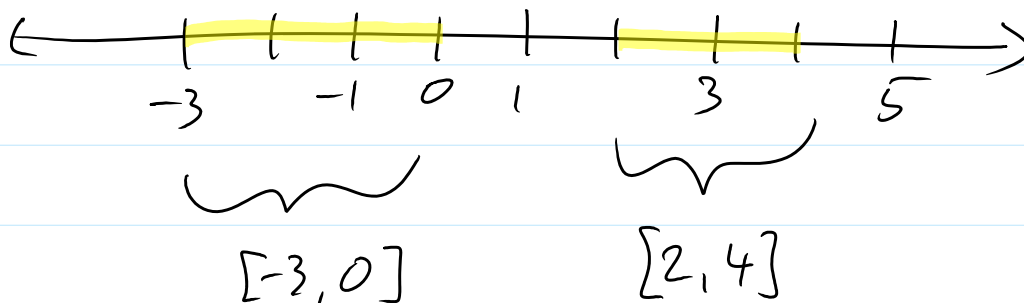
Exam on 10/3

↳ all material covered up to this week
(this week included)

↳ online exam review (online office hour) on
Sunday at 8:30-9:30 PM

↳ review HW, quizzes, worksheets.

Review: Interval notation



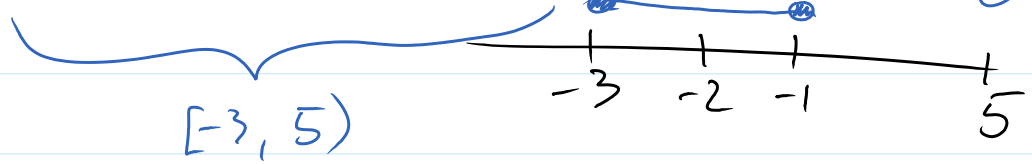
↗
set containing
all numbers greater
or equal to -3 and
less or equal to 0

-3, 0 are not included

$[-3, 0]$ vs $(-3, 0)$

- interval "addition"

$$[-3, -1] \cup [-2, 5)$$



- Intersection of intervals
"what is in common?"

$$[-3, -1] \cap [-2, 5) = [-2, -1]$$

$$[-3, 0] \text{ vs } \{-3, -2, -1, 0\}$$

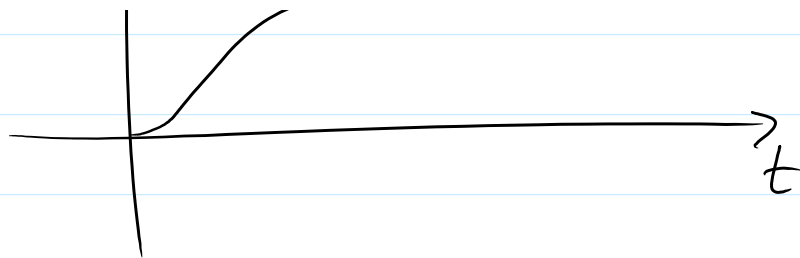
$$[-3, 0] = \{x \mid -3 \leq x \leq 0\}$$

$$[-2, 5) = \{x \mid -2 \leq x < 5\}$$

set builder notation for intervals

Section 2.1

distance



Definition A relation is any set of ordered pairs. The set of all first components of the ordered pairs is called domain of the relation. The set of all second components of the ordered pairs is called range.

Ex: $\{ (\text{MAC 1105}, 49), (\text{MAC 2233}, 30), (\text{MAC 1140}, 50) \}$

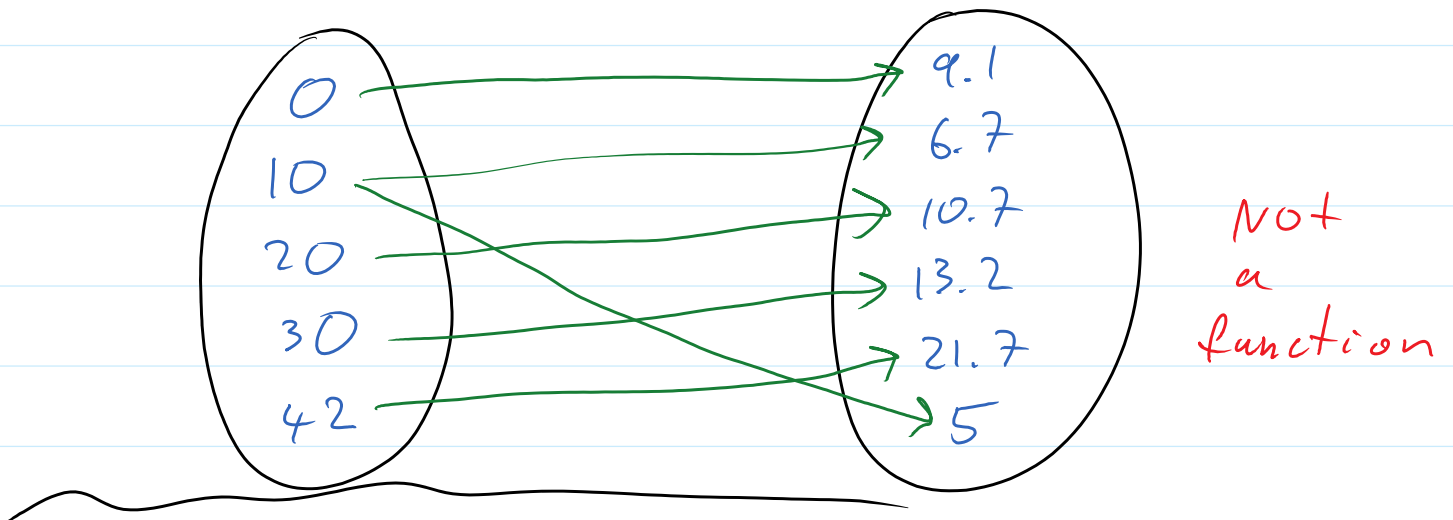
Domain: $\{ \text{MAC 1105}, \text{MAC 2233}, \text{MAC 1140} \}$

Range: $\{ 49, 30, 50 \}$

Ex: $\{ (0, 9.1), (10, 6.7), (20, 10.7), (30, 13.2), (42, 21.7), (10, 5) \}$

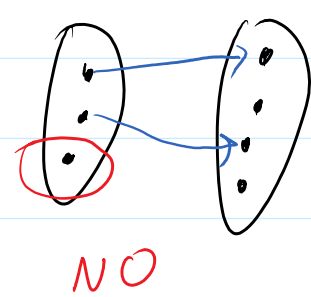
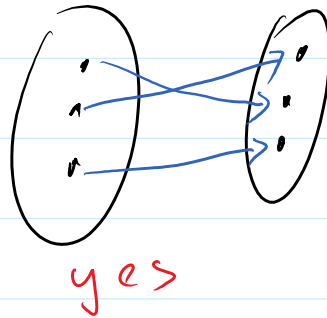
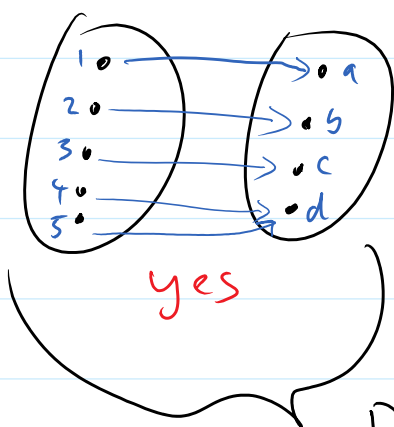
Domain: $\{ 0, 10, 20, 30, 42 \}$

Range: $\{ 9.1, 6.7, 10.7, 13.2, 21.7, 5 \}$



Def: A function is a relation, such that each element in the domain corresponds to exactly one element in the range.

Is this a function?



Domain: $\{1, 2, 3, 4, 5\}$

Range: $\{a, b, c, d\}$

Function: $\{(1, a), (2, b), (3, c), (4, d), (5, d)\}$

Is this a function:

$\{(1, 6), (2, 6), (3, 8), (4, 9)\}$ | ✓ | ✓

$\{(1,6), (2,6), (3,8), (4,9)\}$	✓	✓
$\{(6,1), (6,2), (8,3), (9,4)\}$	✓	✗
	relation	function

Determine whether each equation represents y as a function of x: (can be solved uniquely for y)

x is independent variable
y is dependent variable (it depends on x)

$$\begin{aligned} & \bullet x^2 + y = 4 \\ & \quad \quad \quad -x^2 \quad \quad \quad -x^2 \\ & \quad \quad \quad y = 4 - x^2 \quad \boxed{\text{Yes}} \end{aligned}$$

$$\begin{aligned} & \bullet x^2 + y^2 = 4 \\ & \quad \quad \quad y^2 = 4 - x^2 \\ & \quad \quad \quad y = \pm \sqrt{4 - x^2} \quad \boxed{\text{NO}} \text{ not a function} \end{aligned}$$

Function notation

$$y = 2x - 3 \leftrightarrow f(x) = 2x - 3$$

↙ function name
↖ independent variable

Ex: $f(x) = x^2 + 3x + 5$, Find

function value
1 2 3 4 5

Ex: $f(x) = x^2 + 3x + 5$, Find

function value
↙ at $x=2$ is 15

$$f(2) = 2^2 + 3 \cdot 2 + 5 = 4 + 6 + 5 = \boxed{15}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

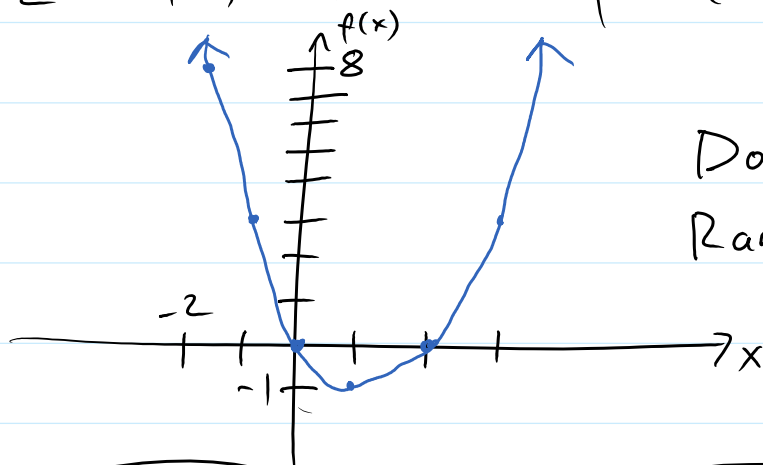
$$f(x+3) = (x+3)^2 + 3(x+3) + 5 = x^2 + 6x + 9 + 3x + 9 + 5$$
$$= \boxed{x^2 + 9x + 23}$$

$$f(-x) = (-x)^2 + 3(-x) + 5 = \boxed{x^2 - 3x + 5}$$

Graphing

• Graph $f(x) = x^2 - 2x$

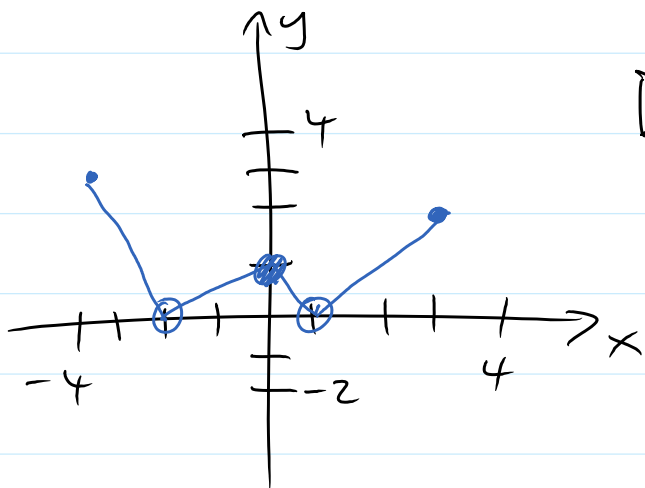
x	y	(x,y)
-2	$f(-2) = 4 + 4 = 8$	(-2, 8)
-1	$f(-1) = 1 - 2(-1) = 3$	(-1, 3)
0	$f(0) = 0$	(0, 0)
1	$f(1) = 1 - 2 \cdot 1 = -1$	(1, -1)
2	$f(2) = 4 - 2 \cdot 2 = 0$	(2, 0)



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

Range: $[-1, \infty)$

Find domain and range:

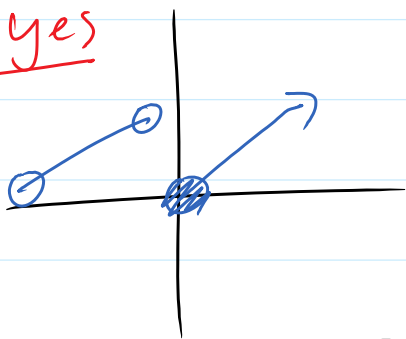


Domain: $[-4, -2) \cup (-2, 1) \cup (1, 3]$
 $\hookrightarrow \{x \mid -4 \leq x \leq 3 \text{ and } x \neq -2, x \neq 1\}$

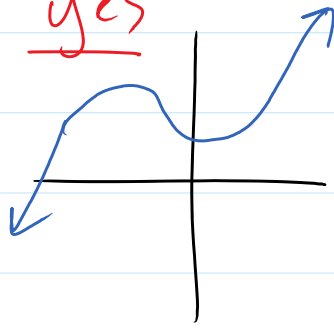
Range: $(0, 3]$

Is this a function?

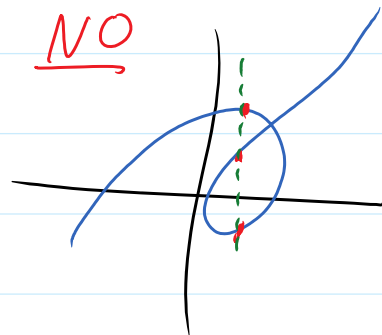
yes



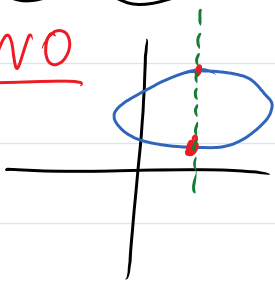
yes



NO



NO



vertical line test

Notes A graph is not a function if there is a vertical line that crosses the graph at more than one point.