Functions:

Today's goal:

understand how to identify a function vs. a non-function

*Why is it important to learn about functions?

*What do you know about them? What would you like to learn about them?!

Why Are Functions Important to Learn About?!

- basis of almost all mathematics
- useful in engineering, science, technology, etc.
- real world depends on them

Short-Term Goals/Objectives:

- identify functions
- create functions
- understand domain : range

Thoughts/Questions About Functions

- more about function tables
ex: input / output

↳ equations, contextual situations, graphs
- many types
..

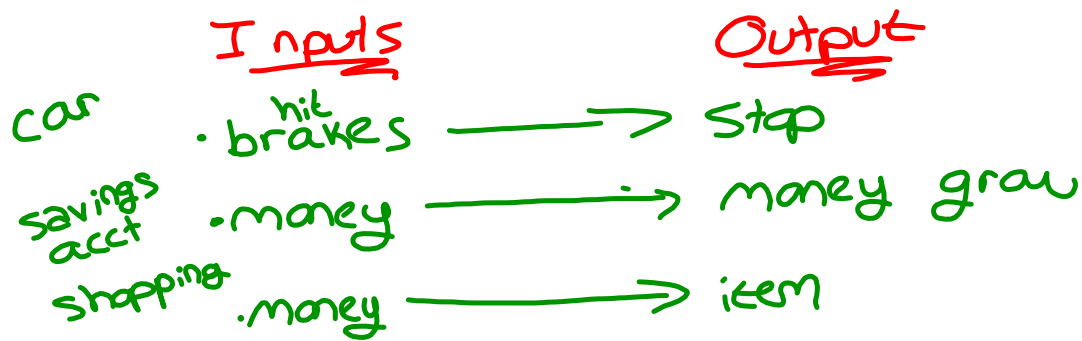## Why Are Functions Important to Learn About?!

- how everything works
- useful & necessary in math, engineering, technology, accounting/ finance...
- (basis of most math)

Thoughts/Questions About Functions

- table format inputs/outputs
- graph format
- equation format

Short-Term Goals/Objectives:

- identify functions
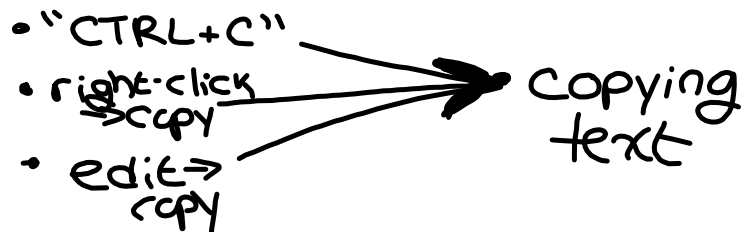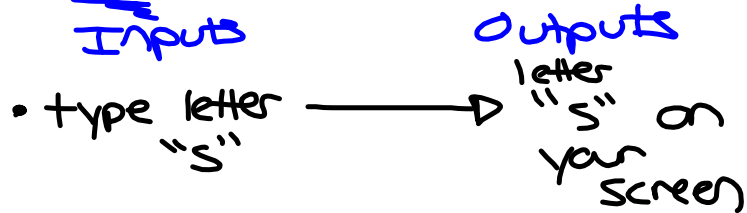- understand domain/range
- creation of functions

Inputs — Output

car → • hit brakes ——→ stop

savings acct → • money ——→ money grow

shopping → • money ——→ item

Computer

• keyboard:

Inputs — Outputs

*every input has to have exactly one output

• type letter "s" ——→ letter "s" on your screen

• "CTRL+C"
• right-click → copy
• edit → copy
——→ copying text

3 inputs → same output
computer functions correctly

"s" → "s"
"s" → "k"
"s" → "i"
> computer is not functioning

ex.
 * pencil:
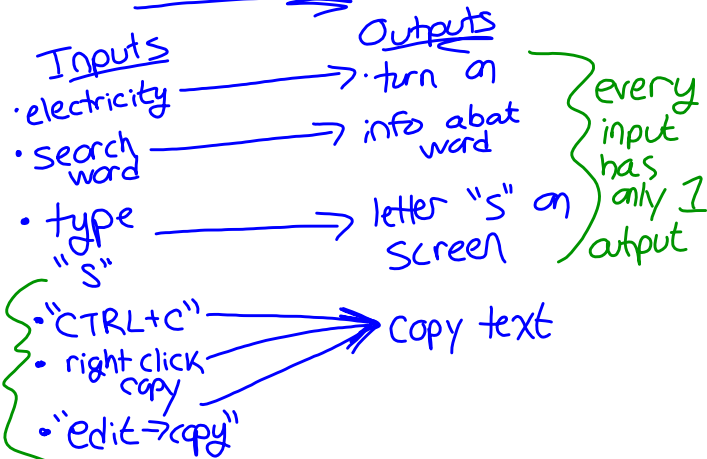
Input   Output
lead   writing

ex. cell phone

ex. car
Input   Output
gas ——> being able to drive
brakes ——> stop

ex. COMPUTER

Inputs   Outputs

· electricity ————————> · turn on

· search ————————> info abut   } every
  word   word   input
                                         has
· type ————————> letter "s" on   only 1
  "s"   screen   } output

· "CTRL+C" ———
· right click   ————> Copy text
  copy
· "edit ⇒ copy"
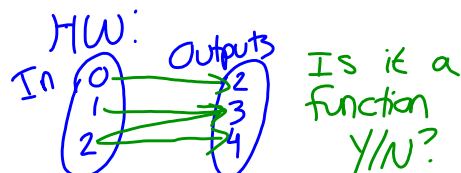
3 inputs produce the same output
computer is functioning

· "s" key —→ "s"   Computer is
          —→ "d"   NOT
             "a"   functioning
                        correctly

* A function is
  a relation in
  which every input has
  exactly 1 output.

HW:
In   Outputs   Is it a
  0   2   function
  1   3   Y/N?
  2   4

NO b/c
"2" maps to
more than 1
output

🕊 **Objective:** Today you will be able to identify whether or not relations are functions, and explain why.

_____

Think about a vending machine…

- How does the vending machine function?

- What would you consider an "input?"

- Is each input unique? Explain.

- What would you consider an "output?"

- What situation(s) may signal that the machine is NOT functioning correctly?

What about a computer?!

Is it possible for one input result to more than one output??

Is it possible for more than one input to result in the same output?

Relations and Functions Class Work

✒ **Objective:** You will be able to identify whether or not relations are functions, support your identification, and state the domain and range of relations.

___

In the world of Algebra, there are a few vocabulary terms you must understand in order to grasp mathematical functions!

❧ **Definitions:**

☆ **Relation:** relationship btwn 2 sets of info.

☆ **Domain:**

☆ **Range:**

✳ **FUNCTION:** a relation in which each input has exactly output

❧ **Guided Examples:** Day 1: Determine whether or not each relation is a function.
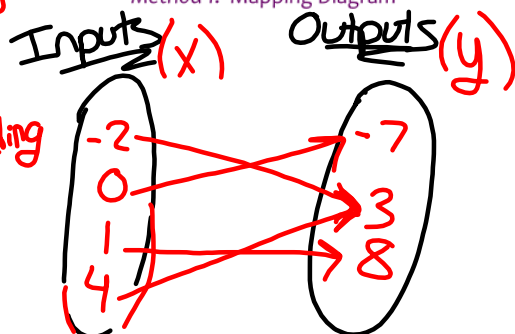Day 2: Identify the domain and range of each relation.

A. SET OF POINTS

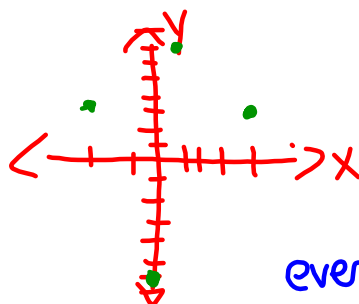Consider the relation: {(-2,3), (1,8), (0,-7), (4,3)}

alphabetical order

Method 1: Mapping Diagram

Inputs (x)   Outputs (y)

ascending order

-2 → -7
0 → 3
1 → 8
4 →

Method 2: Vertical Line Test (VLT)

plot the points

every vertical line should pass through only once

Function **yes** / no

Justification(s):

each input produces only one output

Domain:

Range:

NOT a function

3 outputs (y's) for 1 input (x)
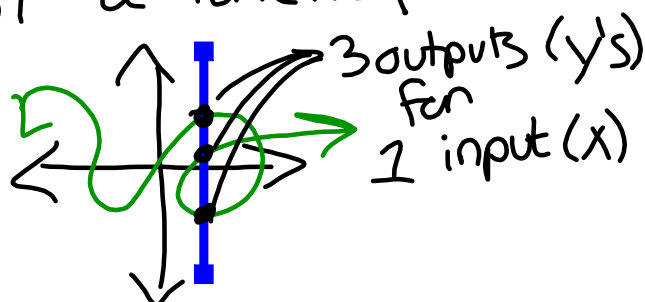
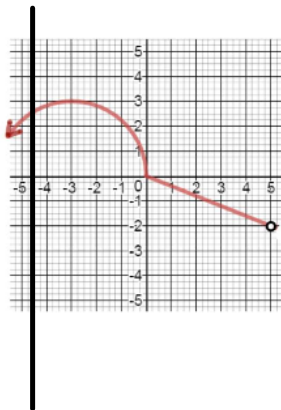**B. EQUATION**   Is the equation $\sqrt{x} + 1 = y$ a function?

ex. $x = 4$ $\sqrt{4} + 1 = y$ $y = 2 + 1 = 3$

Function; every x produces only one y

If it were $\pm\sqrt{x} + 1 = y$

ex. $x = 4$, $y = \pm 2 + 1$, $y = 3$; $y = -1$ Not a function

What is the domain of the relation?   What is the range of the relation?

C. GRAPH

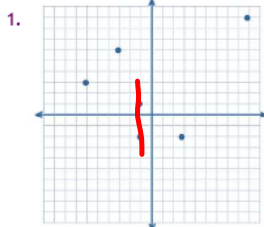**Function:** (yes) / no   **Justification:** passes VLT

Domain:

Range:

✎ **Now You Try Some!**

Day 1: Determine whether or not each relation is a function.
Support your answer! ☺
Day 2: Identify the domain and range of each relation, using ALL appropriate notations.

1.

Function: yes / ~~no~~ ⟵(circled)

Justification: input of -1 produces 2 outputs

Domain:

Range:

---

2. $x = y^2$

ex.
$x = 9$
$9 = y^2$
$y = 3$
$y = -3$

Function: yes / ~~no~~ (circled)

Justification: every input has a pos. & neg. output

Domain:

Range:

3.

Function: yes (circled) / no
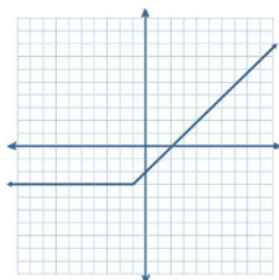
Justification: passes VLT

Domain:

Range:

4. {(0,2), (3,2), (-7,1), (9,1), (3,8)}

Function: yes / ~~no~~

Justification: "3" has two different outputs

Domain:

Range:
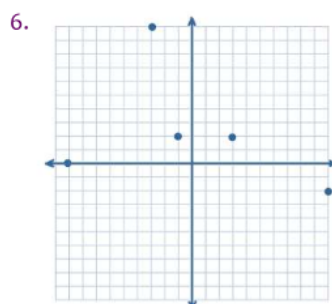
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ex
x = 5
y = 18

5. $y = |2x + 8|$

Function: yes / no

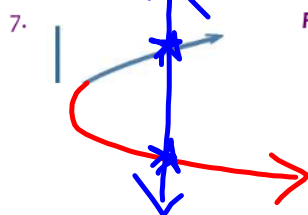Justification: every input produces 1 output

Domain:

Range:

6.

Function: yes / no

Justification: passes VLT

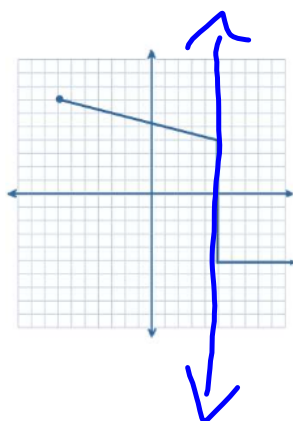Domain:

Range:

7.

Function: yes / no

Justification: fails VLT

Domain: **Range:**

_____

8.

Function: yes ~~no~~

fails VLT

Justification:

Domain: **Range:**

9. Consider the input output table below.

Input	-15	23	0	12	-3	
Output	3	0	8	2	3	9

a. Choose any value to place in the empty cell so that the table of values satisfies the definition of a function. Explain your choice.

-5,-4,8,1,-1,...

b. Choose any value to place in the empty cell so that the table of values does not satisfy the definition of a function. Explain your choice.

0,-15,23,12,-3
already have outputs

10. Choose all values that can be placed in the empty cell so that the table of values satisfies the definition of a function.

Input	9	13	28	-12	-2	
Output	0	4	-8	4	-3	0

☐ -3   ☐ -13   ☐ 4

☐ 0   ☐ 9   ☐ 28

Day 1:

Complete A is your favorite season is Summer or Winter.

Complete B if your favorite season is Spring or Fall.

A. Create any relation that IS a function. Explain your decision.

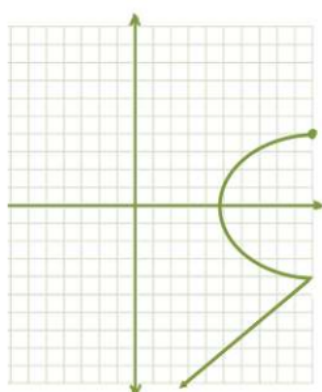B. Create any relation that is NOT a function. Explain your decision.

Write/Draw your function on the front of your post-it note, & the answer on the back. ☺

Day 2:

1. Determine whether or not each relation is a function. Then state the domain and range of each.

A. {(–2,4), (–1,3), (0,4)}

B.

2. Write any questions you still have regarding functions, domain, and/or range. If you do not have any questions, create a problem that could be solved using any of these ideas. ☺