

By the end of the lesson, you should be able to:

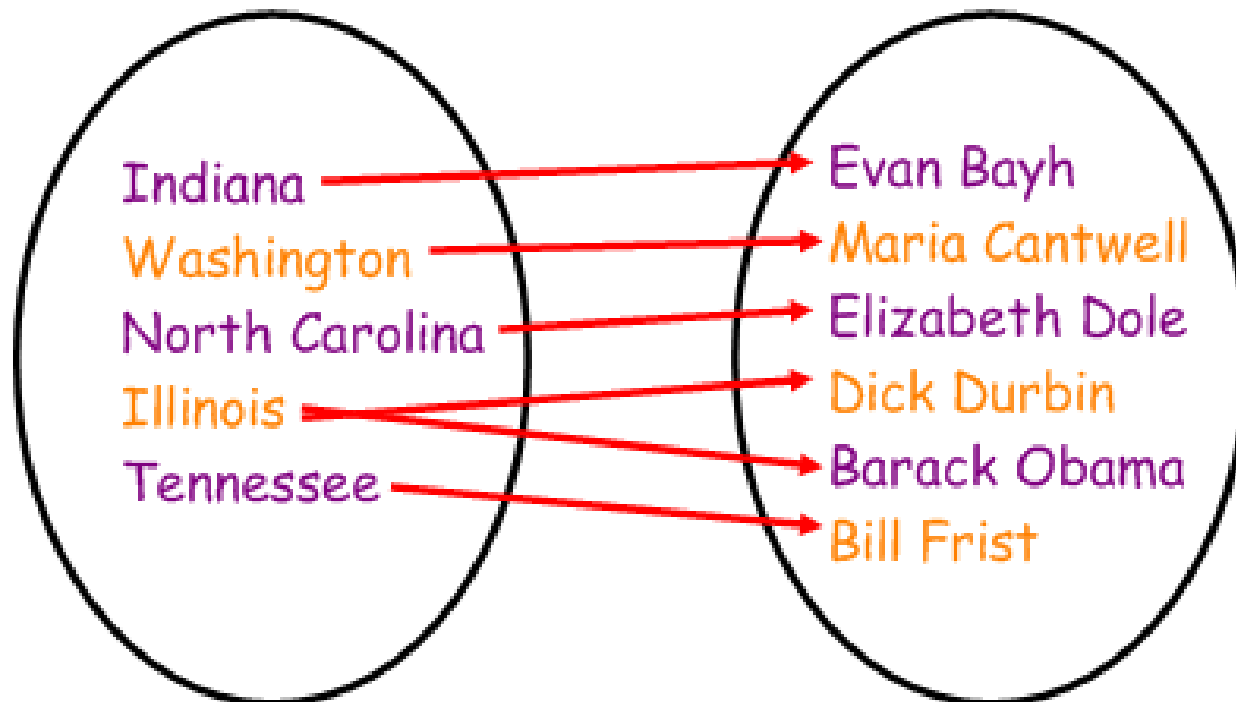
- ~ Tell if a RELATION is a function.
 - *Remember that a relation is a
 - Mapping
 - Set of Coordinate Pairs
 - Equation
 - Graph

- ~ Find the value of a function
- ~ Graph a function

Determine whether a **Mapping** is a function.

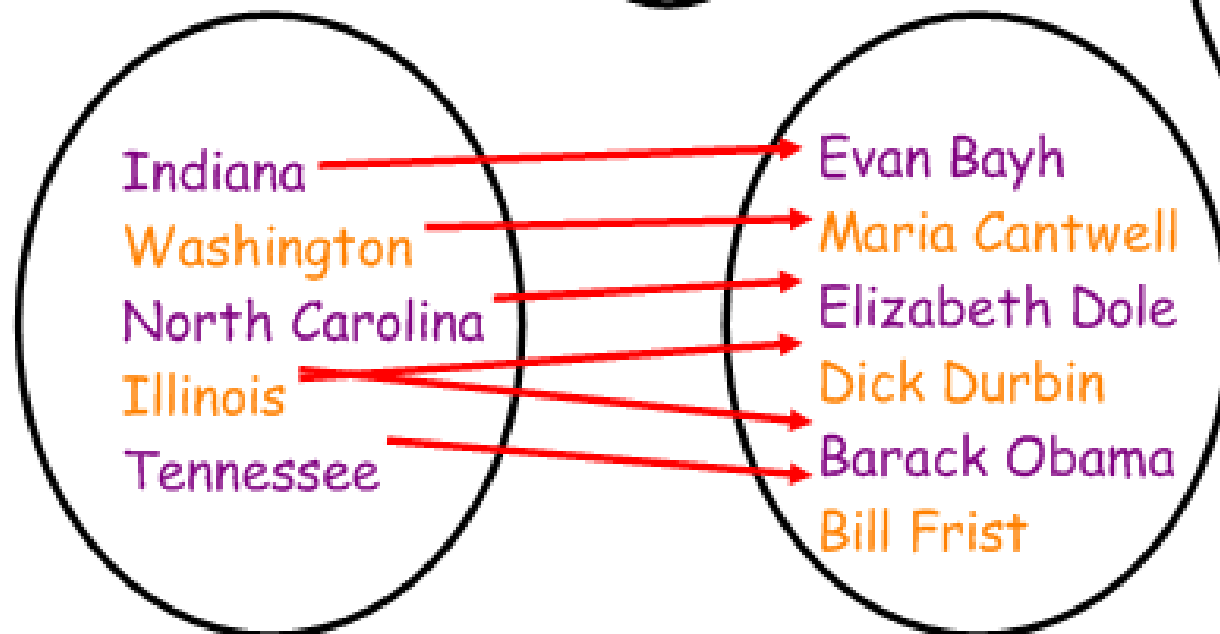
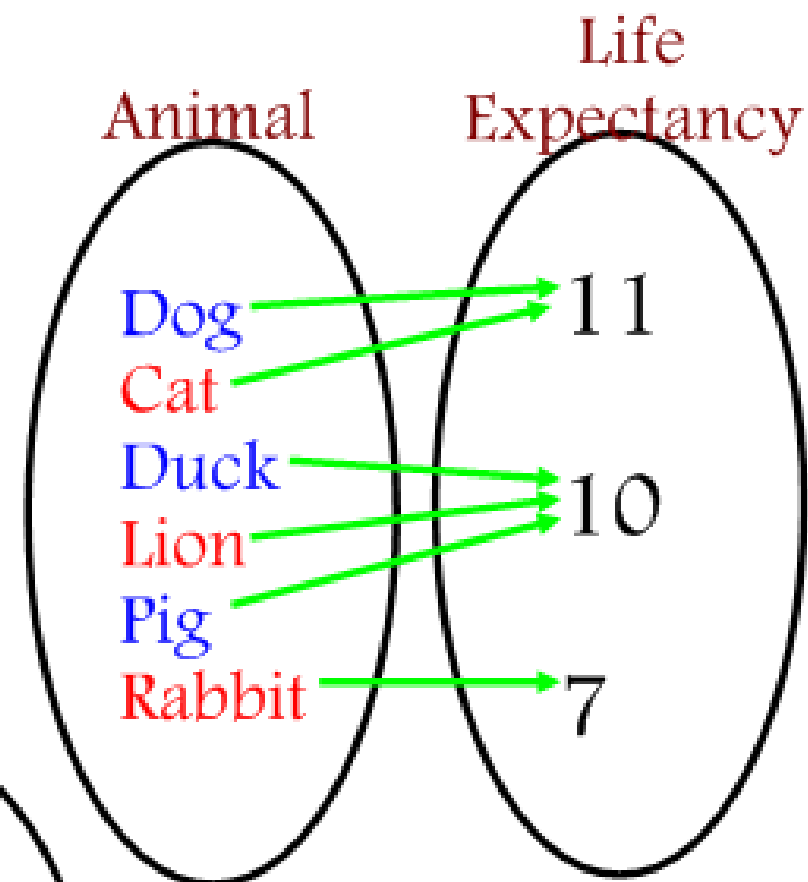
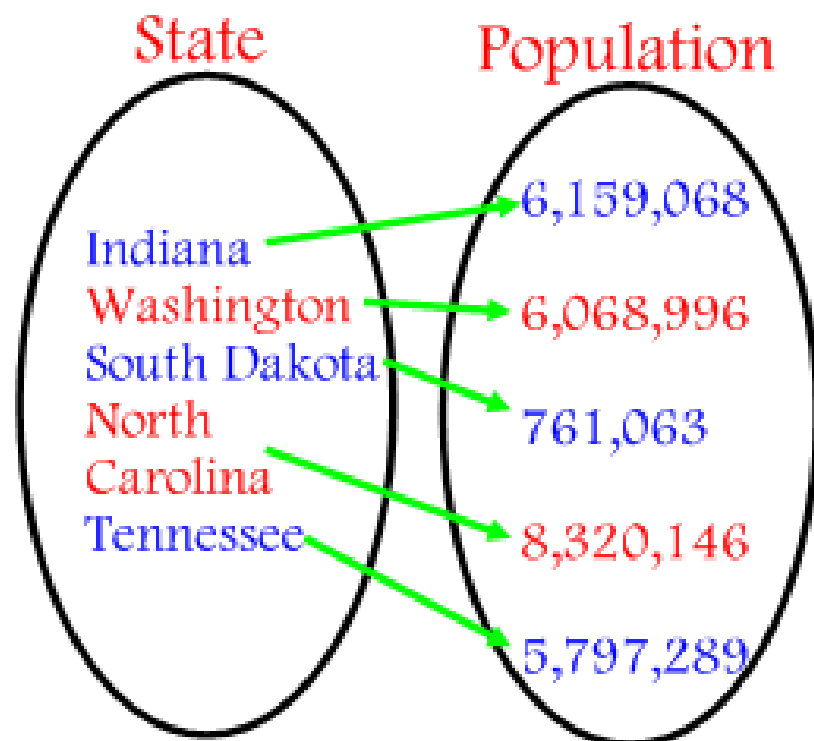
The Mapping shows the relationship between states and randomly selected Senators from 2005. We could say the relation (or relationship) is "is represented by".

Which senator represents Illinois?



Each input "state" does not correspond to a single output "senator".

Determine whether a Mapping is a function.



What do they
have in common?
What is different?

Defintion

Function: A function is a relation in which each element in the domain (the inputs) of the relation corresponds to exactly one element in the range (the outputs) of the relation.

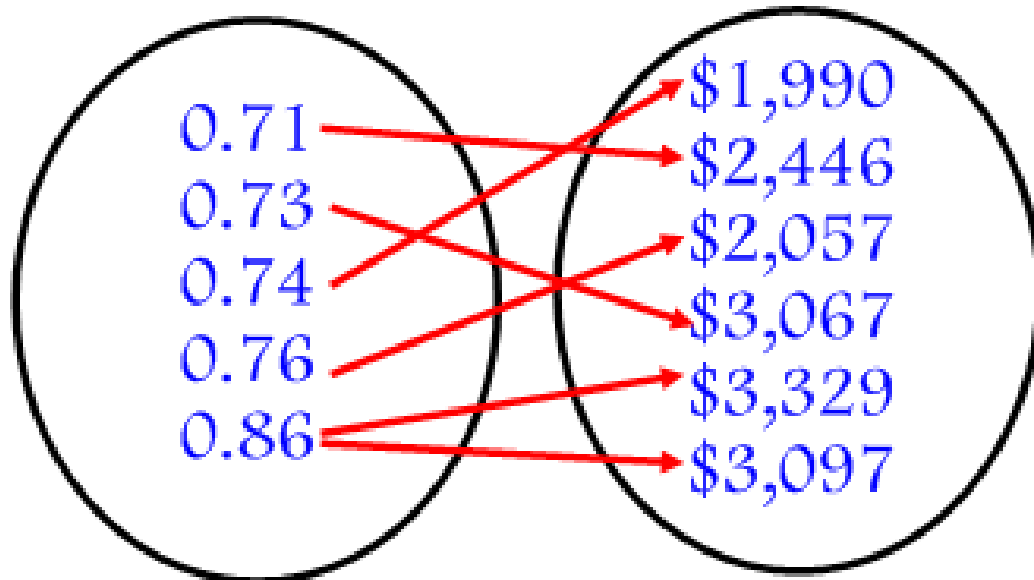
Lesson 2.3: Graphs, Relations, and Functions

Determine whether a **Mapping** is a function.

Karats for
Daimonds

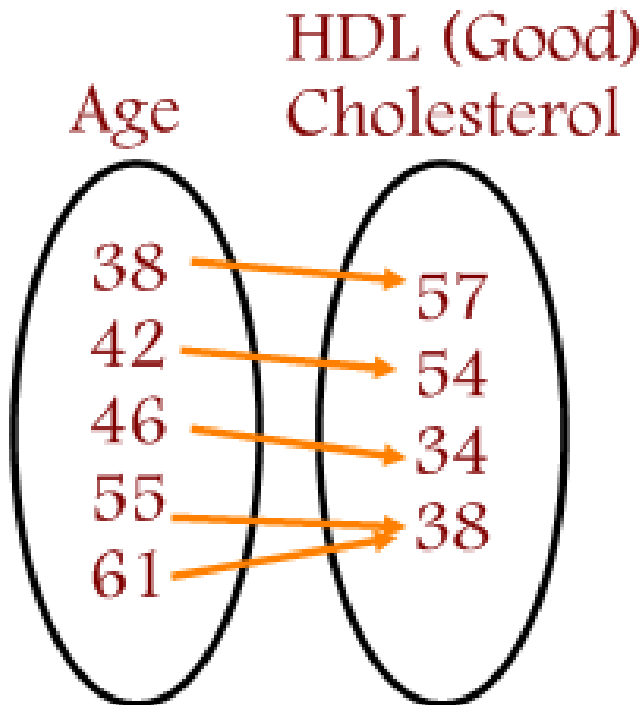
Price

Function or not?



Lesson 2.3: Graphs, Relations, and Functions

Determine whether a **Mapping** is a function.



Function or not?

Note:

Functions are always relations,
but
not all relations are functions!

Function or not?

a.) $\{(1,3), (-1,4), (0,6), (2, 8)\}$

b.) $\{(-2, 6), (-1,3), (0,2), (1,3), (2, 6)\}$

c.) $\{(0,3), (1,4), (4, 5), (9,5), (4, 1)\}$

Function or not?

a.) $\{(1,3), (-1,4), (0,6), (2, 8)\}$

Function

b.) $\{(-2, 6), (-1,3), (0,2), (1,3), (2, 6)\}$

Function

c.) $\{(0,3), (1,4), (4, 5), (9,5), (4, 1)\}$

Not a Function - 4 goes to too many outputs.

Note:

- ~ 2 x's or (domains) go to 1 y (range) is OK.
- ~ 1 x (domain) go to 2 y's (range) is BAD.

Lesson 2.3: Graphs, Relations, and Functions

Determine if an equation is a function.

To determine if an equation is a function, we need to:

1. Solve for y
2. Check to see if one input (x) results in ONLY one y (output).

Lesson 2.3: Graphs, Relations, and Functions

Examples:

a.) $y = -2x + 5$

b.) $y = \pm 3x$

c.) $y = x^2 + 5x$

d.) $x + y^2 = 9$

Lesson 2.3: Graphs, Relations, and Functions

Examples:

a.) $y = -2x + 5$

Yes

b.) $y = \pm 3x$

No

c.) $y = x^2 + 5x$

Yes

d.) $x + y^2 = 9$

No

Determine if a graph is a function.

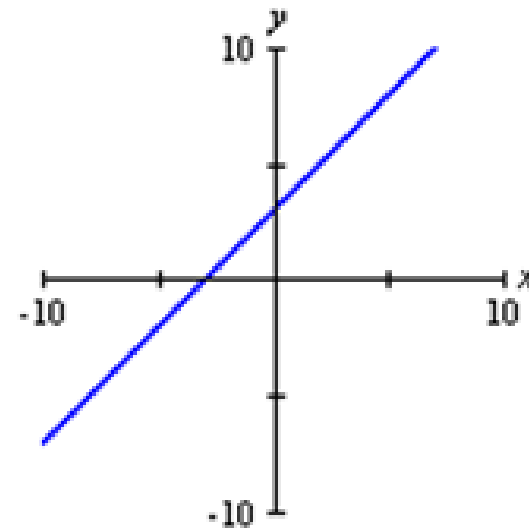
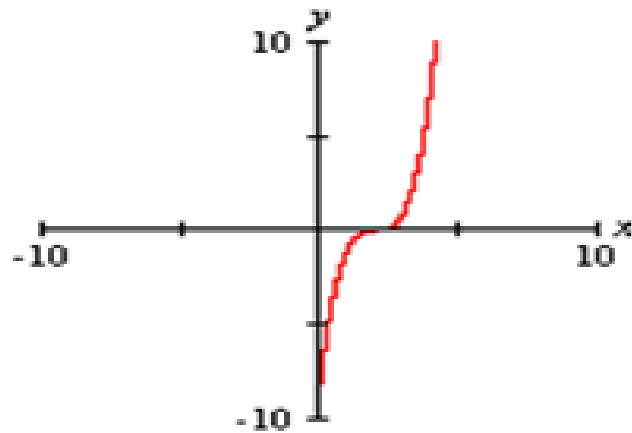
To determine if an equation is a function, we need to use the Vertical Line Test.

The Vertical Line Test states:

A set of points in the xy -plane is the graph of a function if and only if every vertical line intersects the graph in at MOST one point.

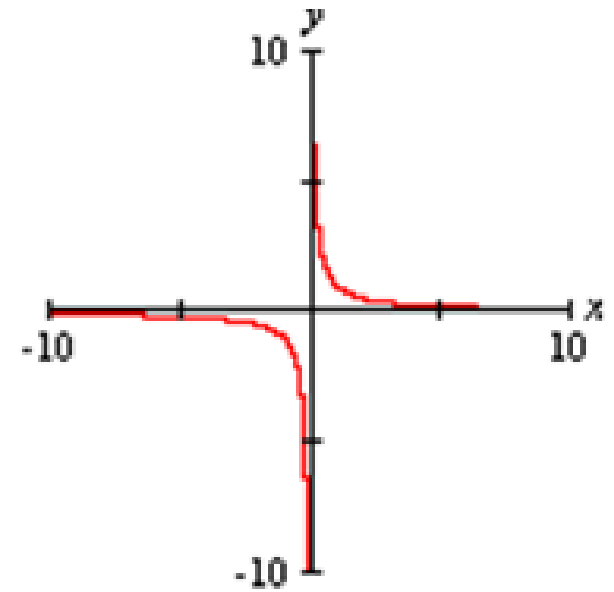
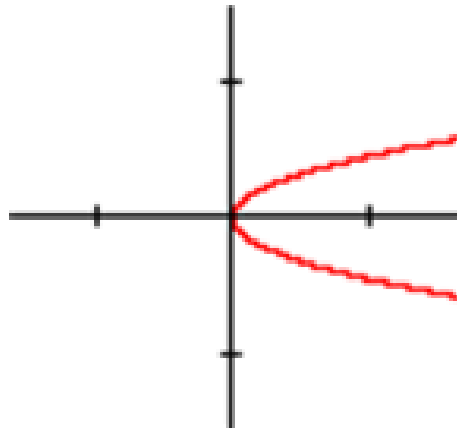
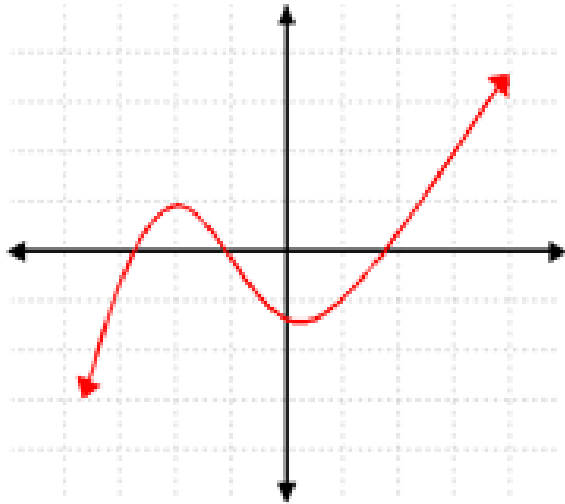
Lesson 2.3: Graphs, Relations, and Functions

These graphs pass the Vertical Line Test so they are **FUNCTIONS**.

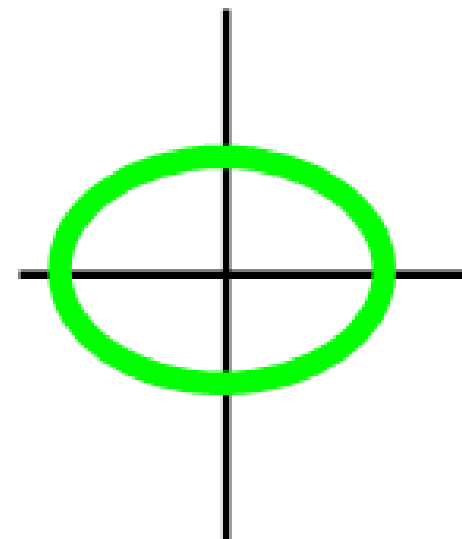
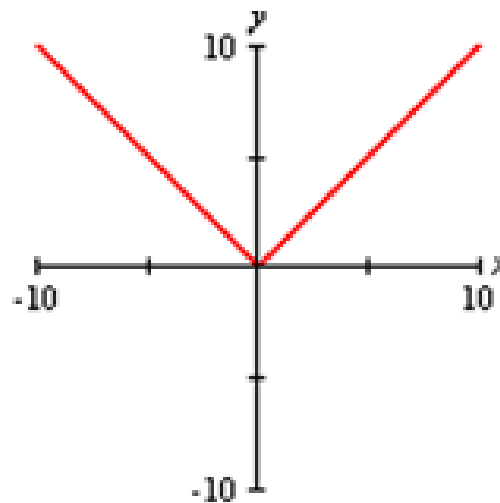
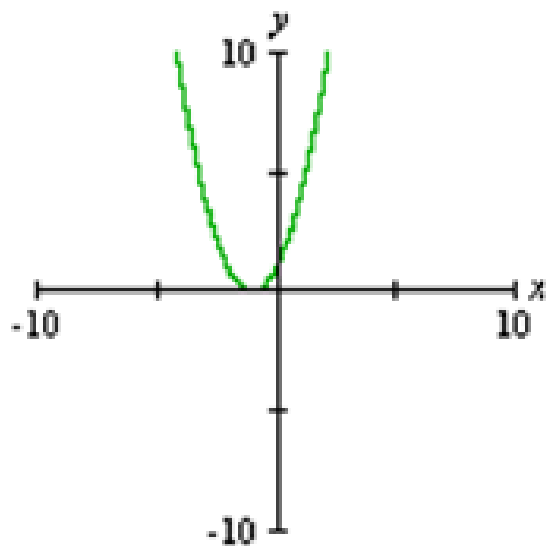


Lesson 2.3: Graphs, Relations, and Functions

Function or not?

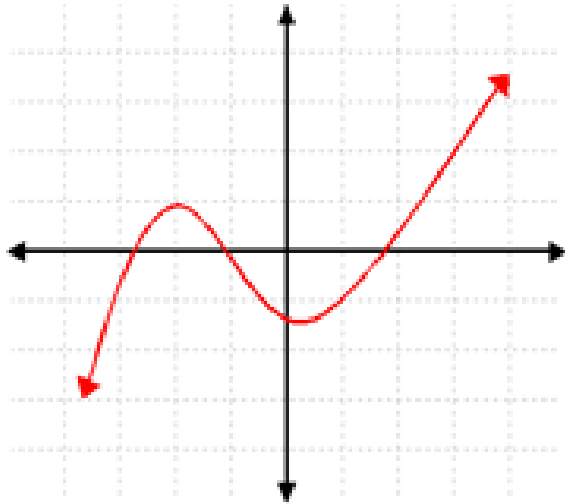


Function or not?

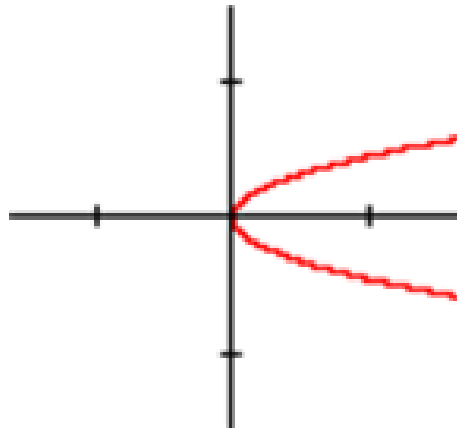


Lesson 2.3: Graphs, Relations, and Functions

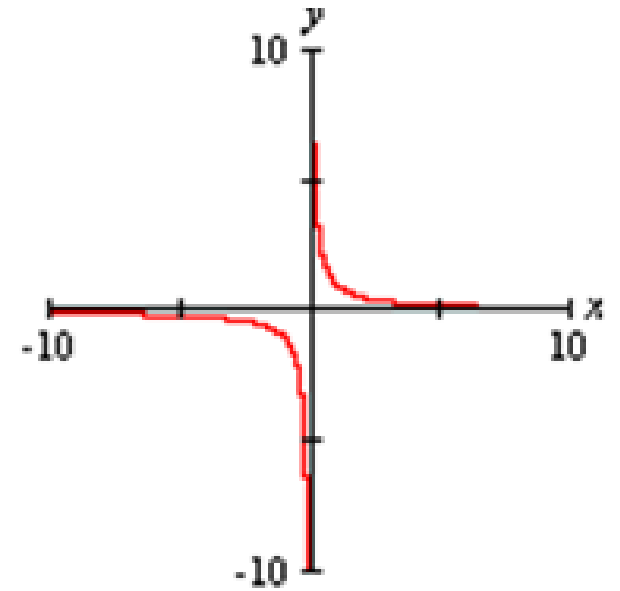
Function or not?



Yes



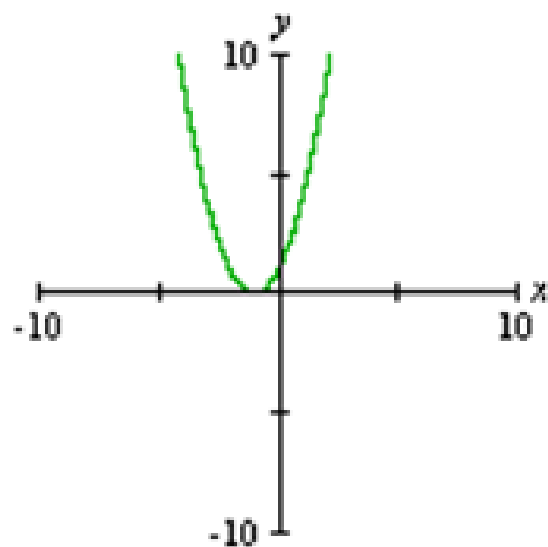
No



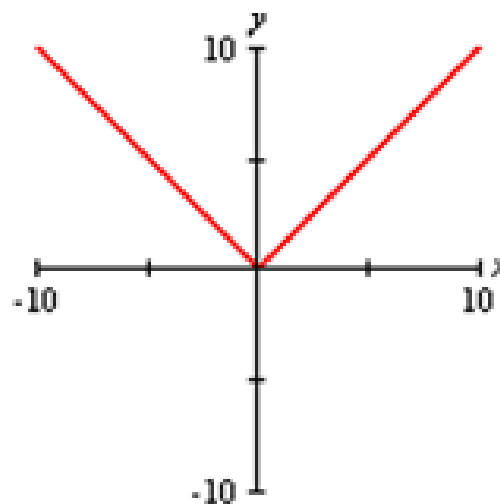
Yes

Lesson 2.3: Graphs, Relations, and Functions

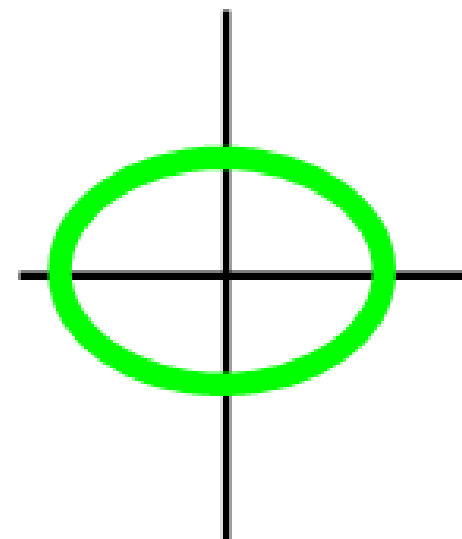
Function or not?



Yes



Yes



No

Lesson 2.3: Graphs, Relations, and Functions

We often denote functions as f , F , g , G , etc.

If f is a function, then for each number x in its domain, there is a corresponding value in the range - denoted as $f(x)$. We call $f(x)$ "the value of f at the number x ".

For example:

We can rewrite $y = 3x + 2$ as $f(x) = 3x + 2$

Lesson 2.3: Graphs, Relations, and Functions

For a function $y = f(x)$:

x is called the independent variable.

y is called the dependent variable.

y is called the dependent variable because its value depends on the value for x .

Lesson 2.3: Graphs, Relations, and Functions

Find the value for the function:

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

a.) $f(3)$

b.) $f(-2)$

Lesson 2.3: Graphs, Relations, and Functions

Find the value for the function:

$$f(x) = 4x + 7$$

a.) $f(x + 3)$

b.) $f(x) + f(3)$

Summary

1. For each x in the domain there corresponds exactly one y in the range.
2. f is a symbol that we use to denote the function. It represents the equation that we use to get from an x in the domain to $f(x)$ in the range.
3. If $y = f(x)$, then x is called the independent variable, and y is called the dependent variable or the value of f at x .

Lesson 2.3: Graphs, Relations, and Functions

Find the value for the function:

$$f(x) = 4x + 7$$

a.) $f(x + 3)$

b.) $f(x) + f(3)$

By the end of the lesson, you should be able to:

- ~ Tell if a RELATION is a function.
 - *Remember that a relation is a
 - ~ Mapping
 - ~ Set of Coordinate Pairs
 - ~ Equation
 - ~ Graph
- ~ Find the value of a function
- ~ Graph a function

Can you?

Homework:

Pg. 165: 1, 2, 9, 11, 15-35 odds,
39, 43, 47, 51, 53, 67
(19 prob)