Lesson 37: Functions, Domain & Range

By the end of this lesson you will be able to:

- Determine if mapping, ordered pairs, and graphs are functions
- Determine domain and range of functions

Functions

A function can be written in the form of f(x) (recall linear programming). Remember, that f(x) = y. This means that the equation is written in terms of variable x.

An equation is considered a function if you plug in a value for x and get ONLY ONE answer (y) in return.

Examples of a Function

- $f(x) = x^2$
- $f(x) = |x|$
- $f(x) = x^2 - 4$

Lesson 37: Function, Domain & Range

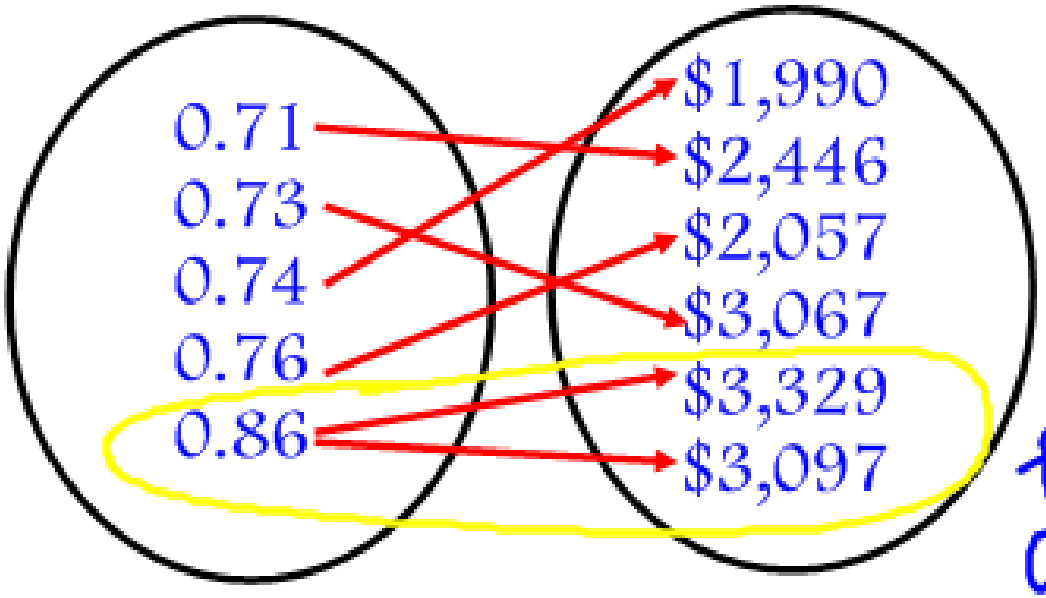
Determine whether a Mapping (bubbles) is a function.

(x's)

Karats for Daimonds

(y's)

Price



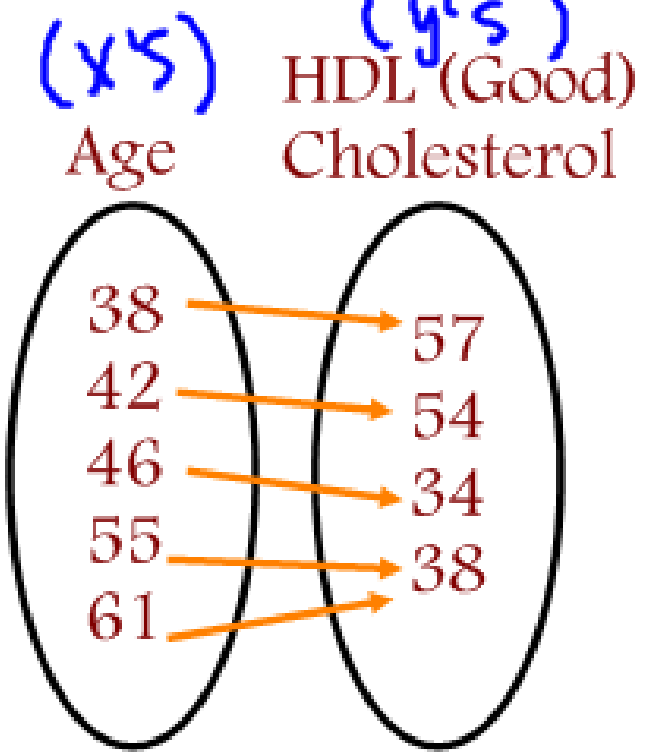
two answers (y's)

Function or not?

No, not a function

Determine whether a Mapping is a function.

(x's) (y's)

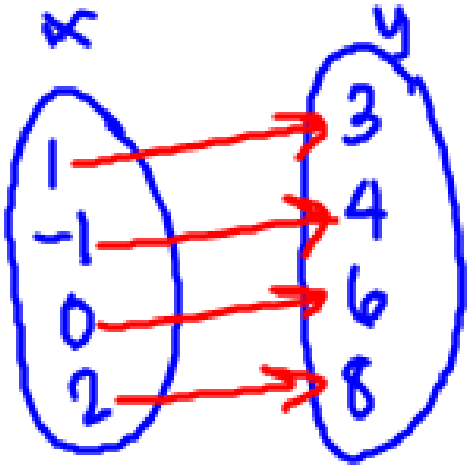


Function or not?

yes

Function

Function or not?

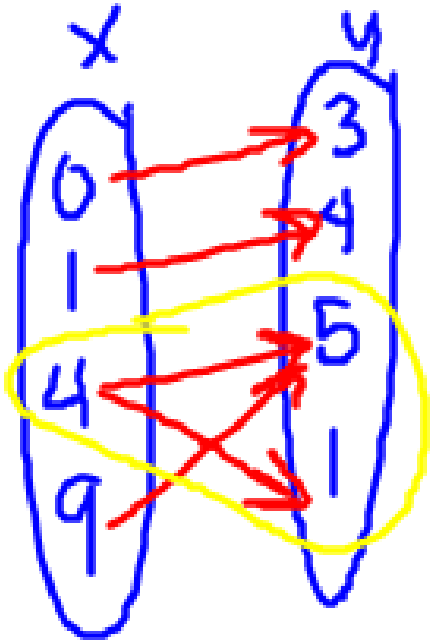


a.) {(1,3), (-1,4), (0,6), (2, 8)}

yes

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

yes



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

not a function

Function or not?

a.)

x	y
-1	7
0	4
1	-1
2	2

yes

b.)

x	y
5	-2
2	-1
1	0
2	1
5	2

no

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.

Lesson 37: Function, Domain & Range

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 x (input) results in ONLY one y (output).

* no y^2
* no $\pm$ ex: $y = \pm 3x$

Examples:

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

yes

b.) $y = \pm 3x$

no, there is $\pm$

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

yes

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

no, there is a y^2

$\sqrt{y^2} = \pm\sqrt{9-x}$

$y = \pm\sqrt{9-x}$

$\uparrow$

x

Examples:

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

Yes

b.) $y = \pm 3x$

No

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

Yes

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

No

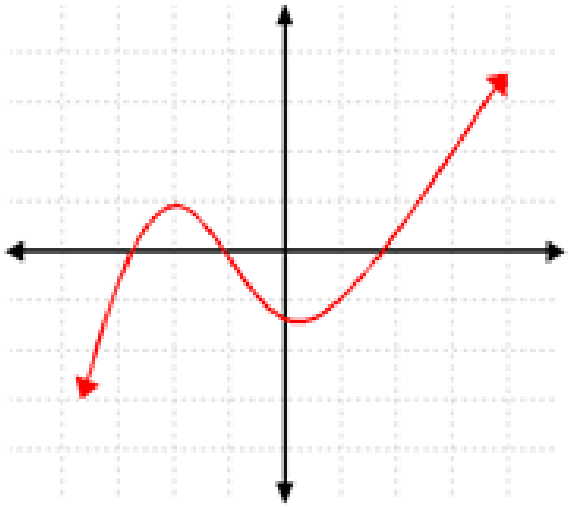
Determine if a graph is a function.

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

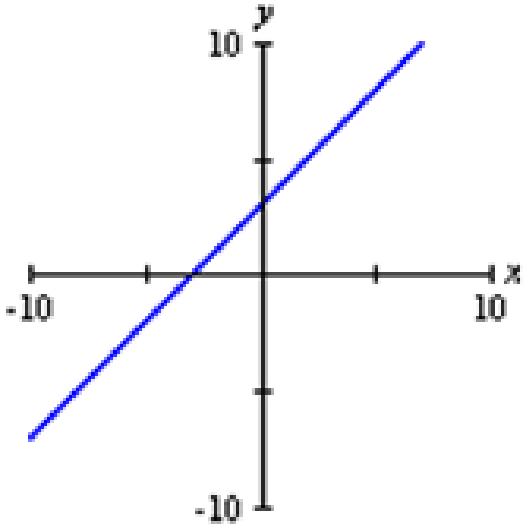
The Vertical Line Test states:

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.

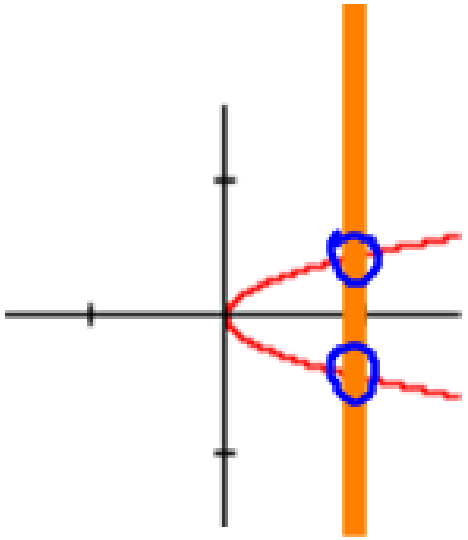
Function or not?



yes

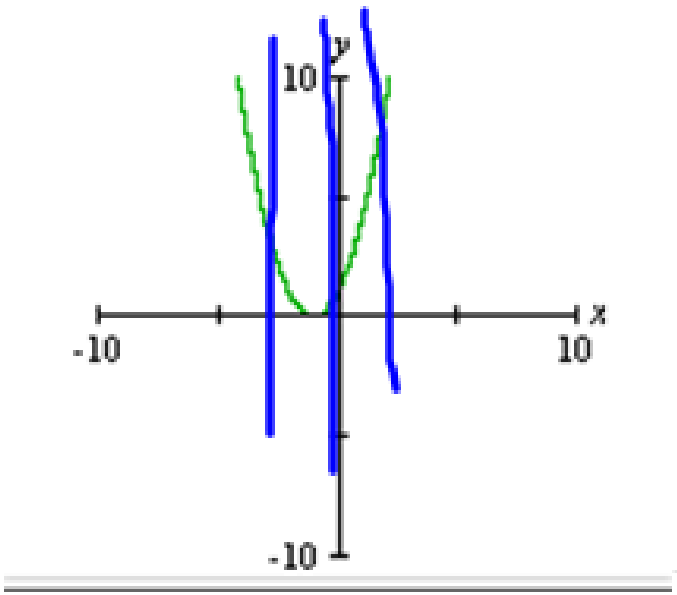


yes

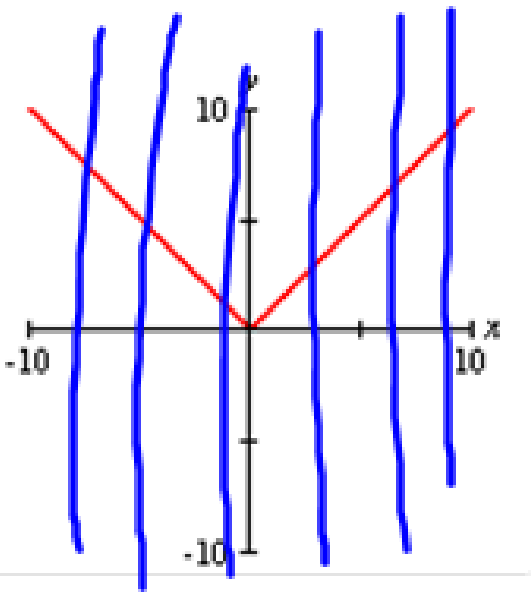


no

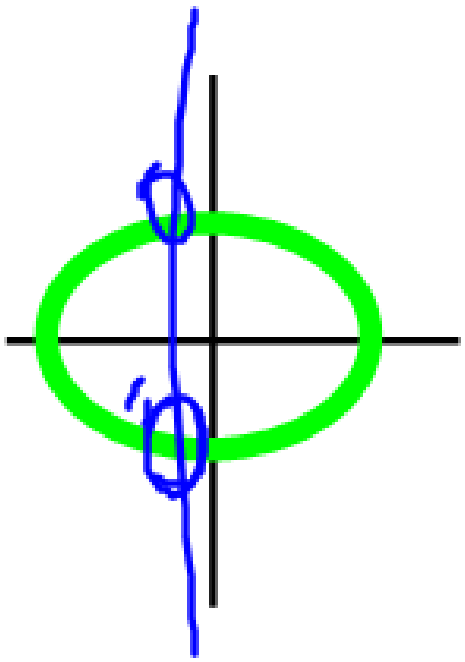
Function or not?



yes



yes



no

Domain and Range

Domain: All acceptable x-values for the function.

left/right

Range: All acceptable y-values for the function.

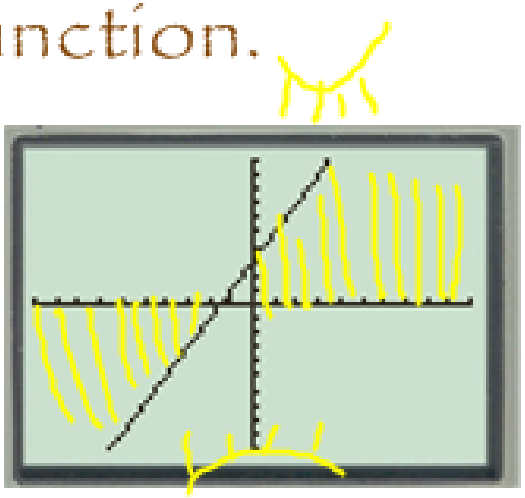
up/down

Domain and Range - graph on the Calculator

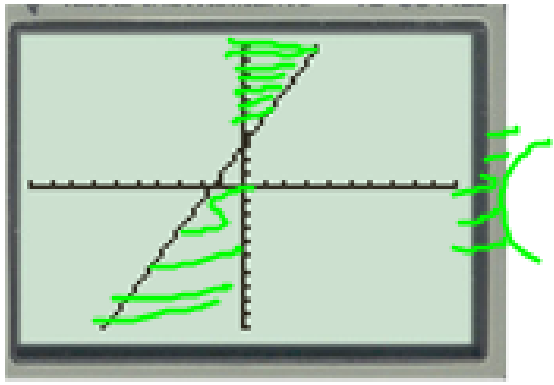
Find the domain and range for the function.

$$y = 2x + 3$$

Domain: $\mathbb{R}$



Range: $\mathbb{R}$



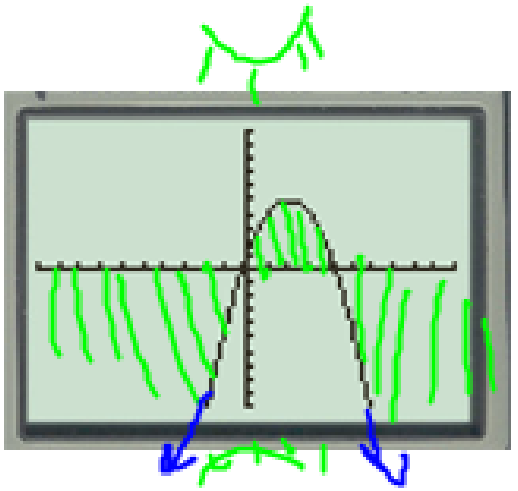
Domain and Range - graph on the Calculator

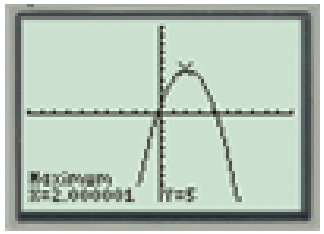
Find the domain and range for the function.

$$y = -x^2 + 4x + 1$$

D: $\mathbb{R}$

R: $y \leq 5$





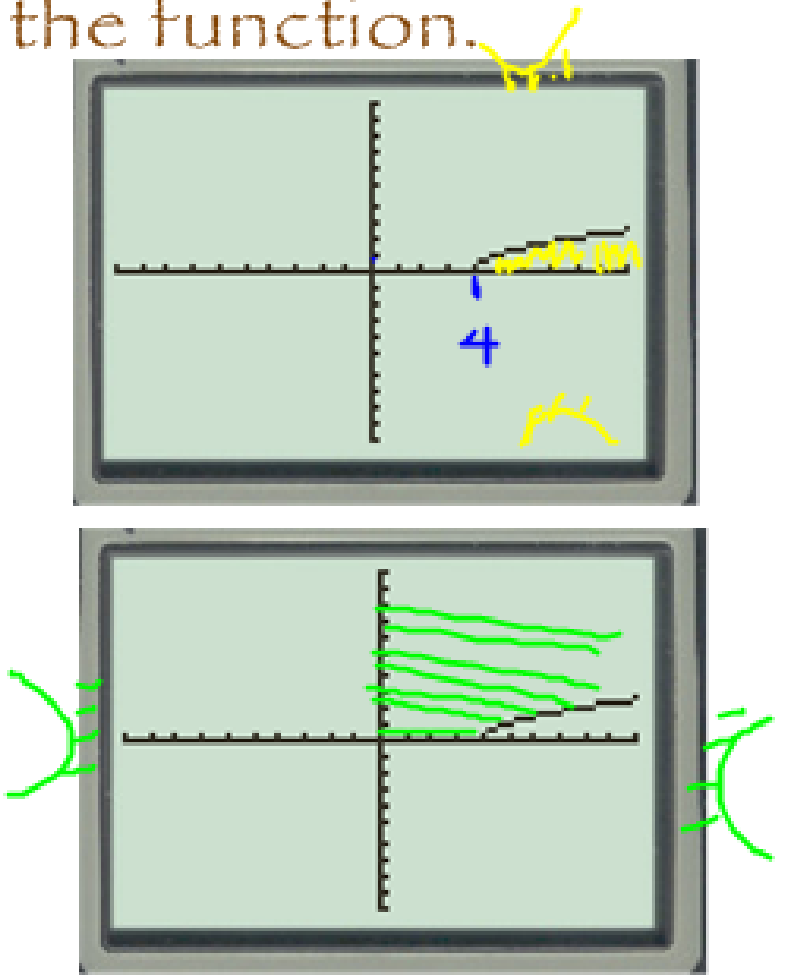
Domain and Range - graph on the Calculator

Find the domain and range for the function.

$$y = \sqrt{x - 4}$$

D: $x \geq 4$

R: $y \geq 0$

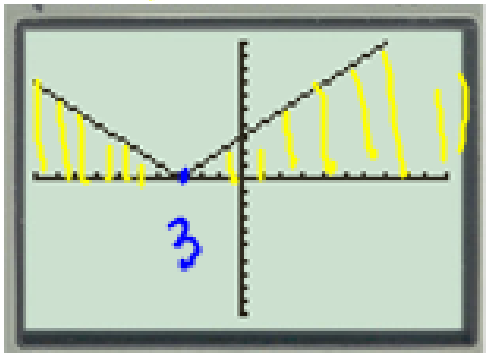


Domain and Range - graph on the Calculator

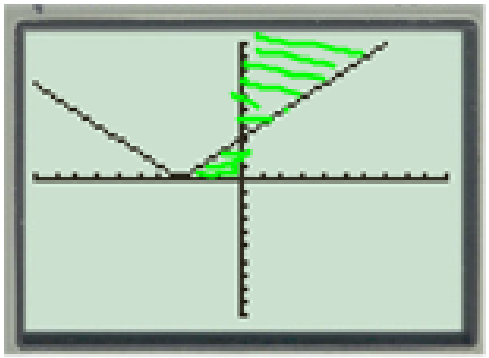
Find the domain and range for the function.

$$y = |x + 3|$$

D: ℝ



R: $y \geq 0$



Domain and Range

Find the domain and range. Is it a function?

$\{(3,4), (2,3), (1,2), (4,2)\}$

D: $\{3, 2, 1, 4\}$

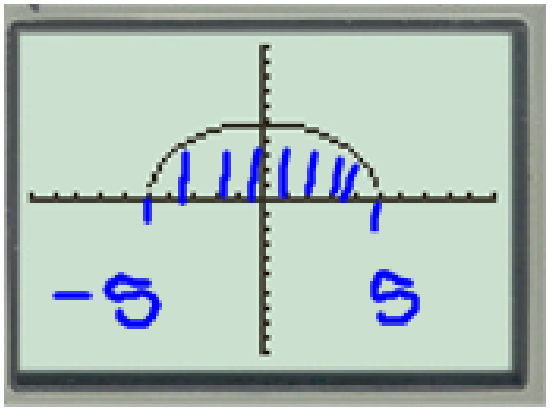
R: $\{4, 3, 2\}$

yes, function

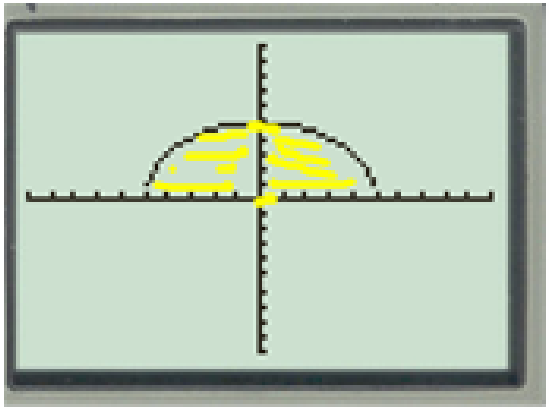
find D & R on calc

$y = \sqrt{25 - x^2}$

D: $-5 \le x \le 5$



R: $0 \le y \le 5$



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Can you?

Homework:

Assignment 37