

Section 1.1 - Characteristics of a Function

Learning Goal:

By the end of today I will be able to recognize the difference between a FUNCTION and a RELATION.

By the end of today, I will be able to recognize a function using the vertical line test.

By the end of today, I will have a better understanding of functional notation and set notation.

Sep 9-9:43 PM

FUNCTIONS
TERMINOLOGY

Relation
→ a relationship between two variables

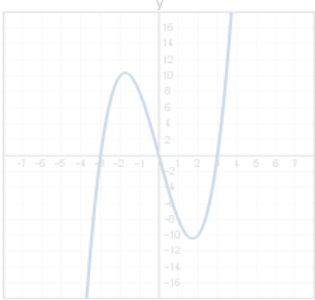
Function
→ a relation for which each element in the domain is assigned only one element in the range

Domain
→ set of all x coordinates
→ horizontal axis
→ independent variable

Range
→ set of all y coordinates
→ vertical axis
→ dependent variable

Set Notation
→ a way of writing a set of items or numbers within curly brackets { }

Mapping Diagram
→ a drawing with arrows to show the relationship between each value of x and the corresponding values of y

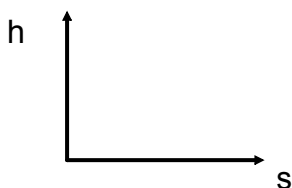


Jul 4-3:42 PM

Which of the following fit the definition of a Function?

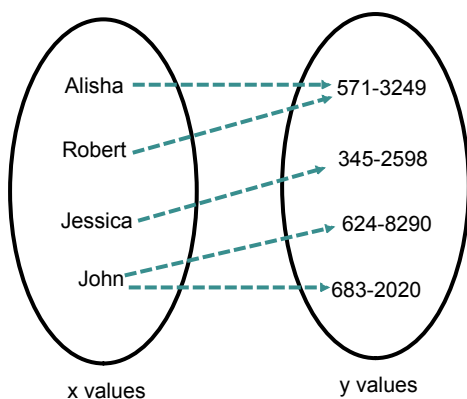
Remember...to be a function an x-value cannot have two y-values

Example 1 The height of a football after the time kicked



The ball will never be at two heights at one time, therefore it IS a function.

Example 2



It's okay that Alisha and Robert share a phone number but NOT a function because John has two phone numbers.

Jul 5-12:42 AM

Which of the following fit the definition of a Function?

Remember...to be a function an x-value cannot have two y-values

Example 3

a)

x	y
-1	3
2	-3
1	-1
-2	0
3	1

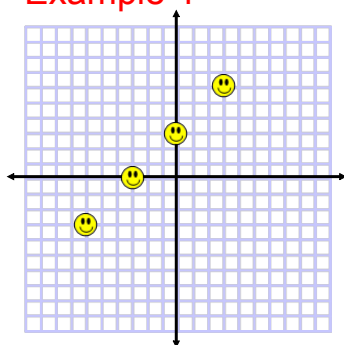
YES a Function
no repeated x-values

b)

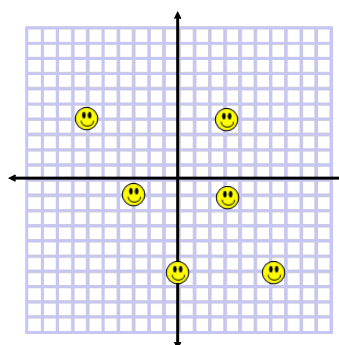
x	y
3	3
2	-1
4	1
3	-2
1	2

NOT a Function
x=3 has two y-values

Example 4



YES a Function
no repeated x-values



NOT a Function
x=7 has four y-values

Jul 5-12:52 AM

Using reasoning to decide whether a relation is a function...

b)

x	y
-1	-3
0	1
1	5
2	9

Solution

$$\text{Domain} = \{-1, 0, 1, 2\}$$

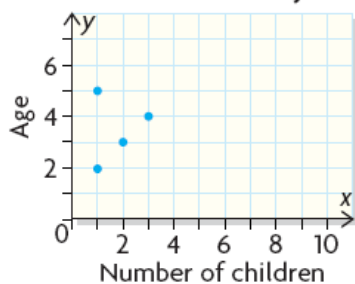
$$\text{Range} = \{-3, 1, 5, 9\}$$

This relation is a function.

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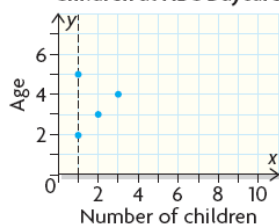
Using reasoning to decide whether a relation is a function...

c) Children at ABC Daycare



Solution

c) Children at ABC Daycare



$$\text{Domain} = \{1, 2, 3\}$$

$$\text{Range} = \{2, 3, 4, 5\}$$

This relation is not a function.

Jul 5-12:06 AM

DETERMINING IF A RELATION IS A FUNCTION ...USING THE VLT

vertical-line test

a test to determine whether the graph of a relation is a function. The relation is not a function if at least one vertical line drawn through the graph of the relation passes through two or more points

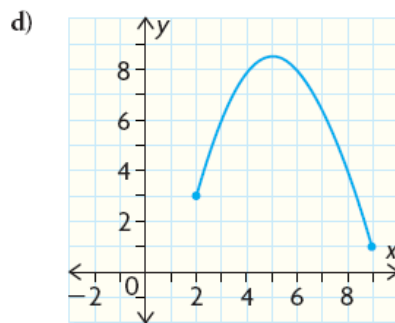
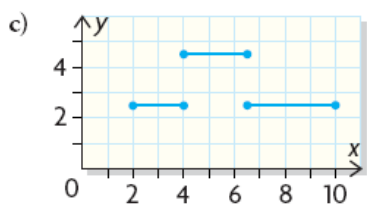
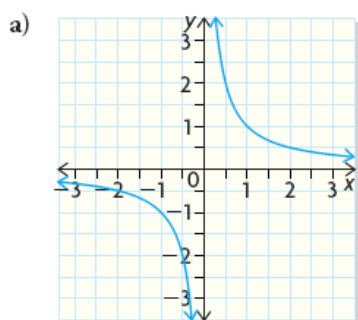


Feb 10-2:09 PM

Connecting functions with graphs

Which of the following graphs are functions?

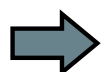
Vertical
Line Test



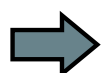
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DOMAIN AND RANGE

PROPER SET NOTATION



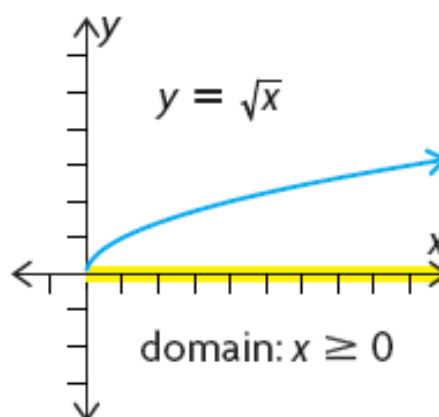
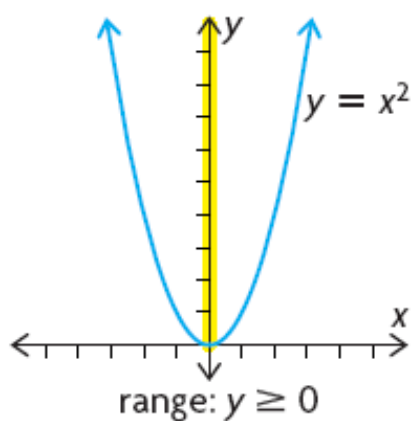
Domain can represent a specific set or the "set of all real numbers" $\{x \in \mathbb{R}\}$



Range can represent a specific set or the "set of all real numbers" $\{y \in \mathbb{R}\}$

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Examples

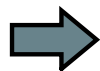


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Domain can represent a specific set or the "set of all real numbers LESS than zero"

$$\{x < 0\}$$



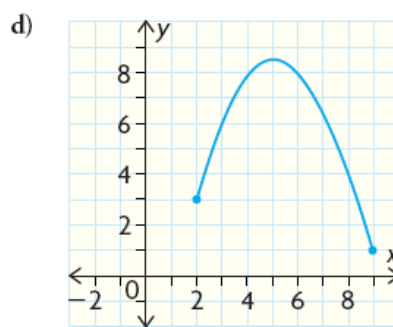
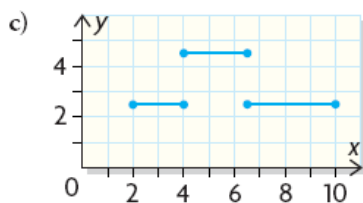
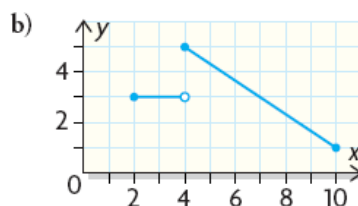
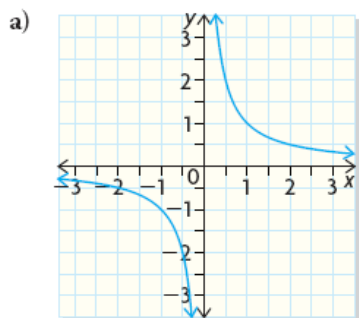
Range can represent a specific set or the "set of all real numbers greater than or equal to 5"

"except or condition" $\{y \geq 5\}$

$\{x \in \mathbf{R} \mid x \neq 0\}$ is the mathematical notation for saying "the set of x such that x can be any real number except 0."

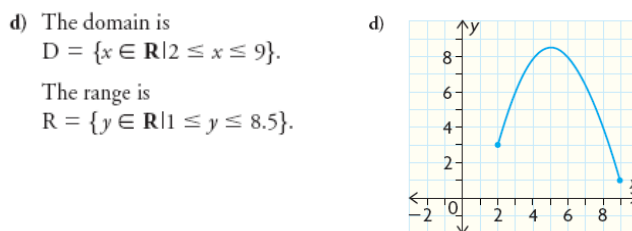
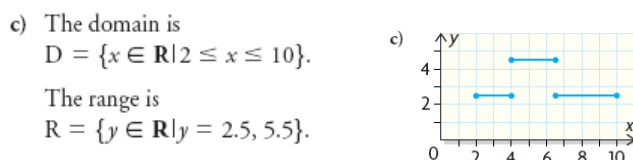
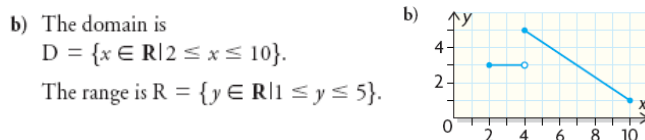
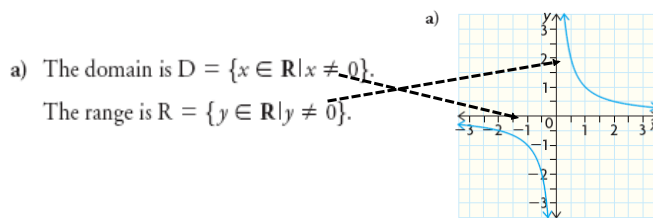
Sep 9-10:28 PM

Write the domain and range for the following graphs; use sentences, Set notation, or both.



Feb 10-2:15 PM

DOMAIN AND RANGE FOR THE PREVIOUS GRAPHS



Jul 6-12:46 AM



$f(x)$ is function notation, it replaces the "y" that is called xy-notation

eg. $f(x) = 3x - 1$ is the same as $y = 3x - 1$

Example

For $y = 3x - 1$, determine the value of "y" when "x = 2".

Or

$$g(x) = 3x + 1$$

$$g(2) = 3(2) + 1$$

Sep 9-10:23 PM

Evaluate the following:

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

$$f(3) =$$

$$f(-2) =$$

$$g(x) = 2x^3 + 3x^2 + x$$

$$g(2) =$$

Sep 9-10:50 PM

Practicing

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2, 4, 6, 7



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