Algebra 2

Ch. 2 Handout 2.1

Relations and Functions

A **relation** ~is a set of pairs of input and output values
~you may write a relation as a set of ordered pairs

The **domain** of a relation is the set of all inputs, x-coordinates, of the ordered pair.

The **range** of a relation is the set of all output, y-coordinates, of the ordered pair.

Pull

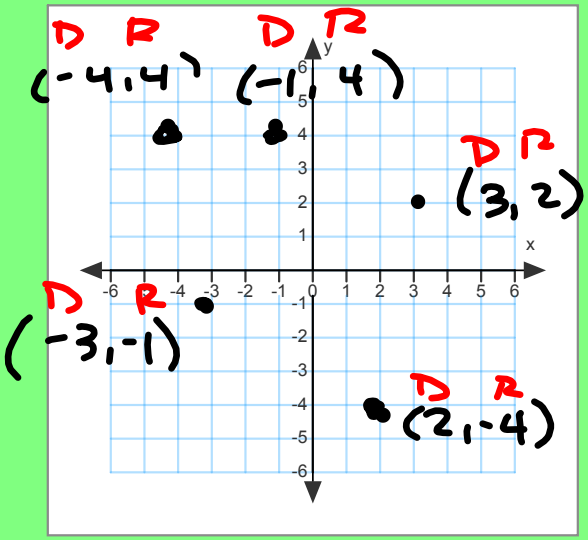
Pull

Pull

1. Write the ordered pairs for the relation. Find the domain and range.

The domain is $\{-4, -3, -1, 2, 3\}$

The range is $\{-4, -1, 2, 4\}$



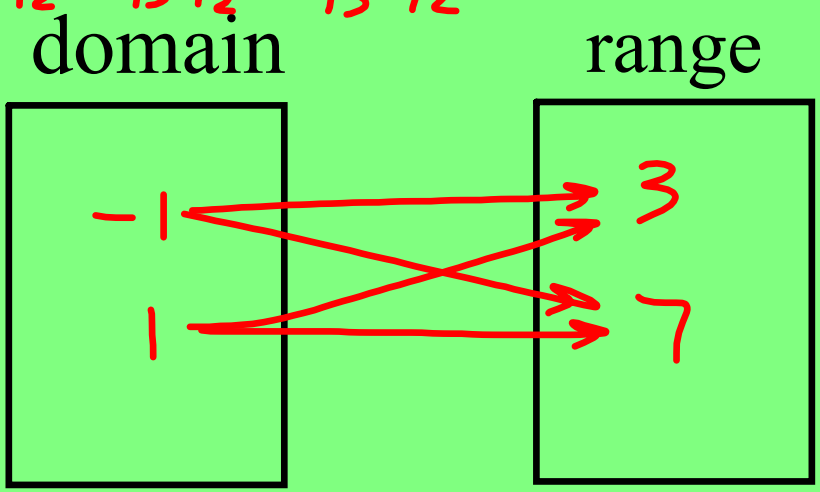
Another way to show a relation is to use a mapping diagram.

Mapping diagram links elements of the domain with corresponding elements of the range

Pull

2. Make a mapping diagram for the relation
{(-1, 7), (1, 3), (1,7), (-1, 3)}

D R D R D R D R



FUNCTION

1. Is a special kind of relation Pull
2. is a relation in which each element of the domain is paired with exactly one element in the range. Pull
3. domain values cannot repeat Pull
4. Use vertical-line test to determine whether the relation is a function Pull
5. F(x) -- "f of x' -- "a function f of x" (f(x) does not mean f times x) Pull

Real Life Examples of a function:

Height example:

The "pairing" of names and height is a relation.

Pairs of names and heights are "ordered" in the function

(person, height) ⟵ a function -- one to one

(height, person) ⟵ not a function -- many to one

3. For the function $f(x) = 2x^2 + 3x$ find the range (y-values) given the Domain (x-values) = {-3, -1, 0, 2}

D = {-3, -1, 0, 2}

R = {9, -1, 0, 14}

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

$f(-3) = 2(-3)^2 + 3(-3) = 2(9) + -9 = 18 + -9 = 9$

$f(-1) = 2(-1)^2 + 3(-1) = 2(1) + -3 = 2 + -3 = -1$

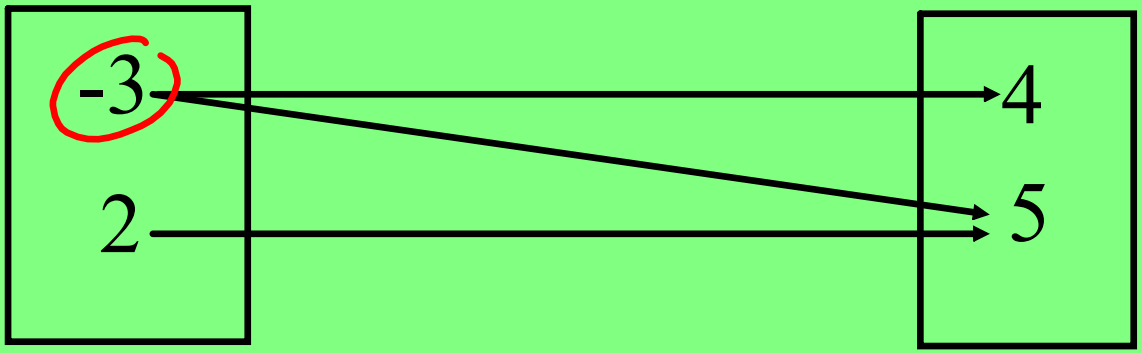
$f(0) = 2(0)^2 + 3(0) = 0$

$f(2) = 2(2)^2 + 3(2) = 2(4) + 6 = 8 + 6 = 14$

4. Determine whether the relation is a function.

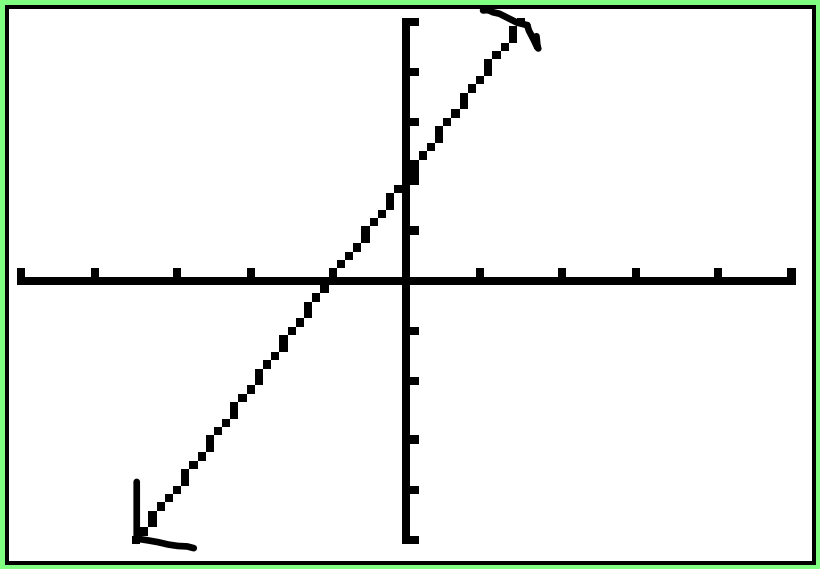
Repeating

domain (-3, 4) (-3, 5) (2, 5) range



Not a function because domain values repeat.

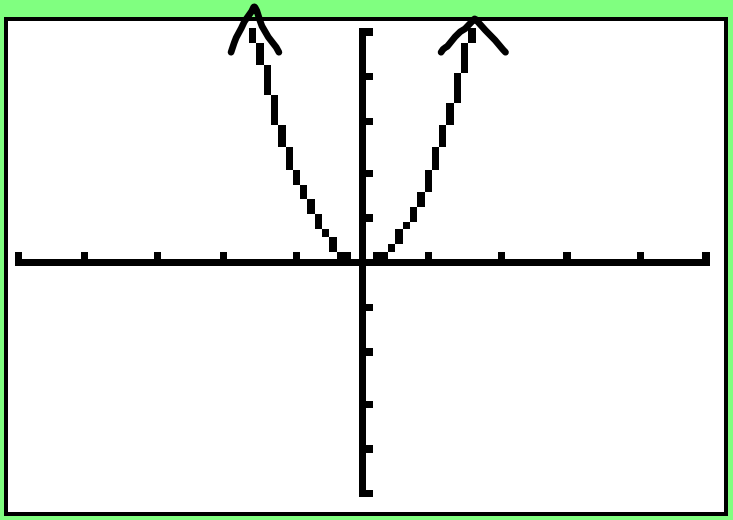
6. Find the domain and range the graph:



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

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

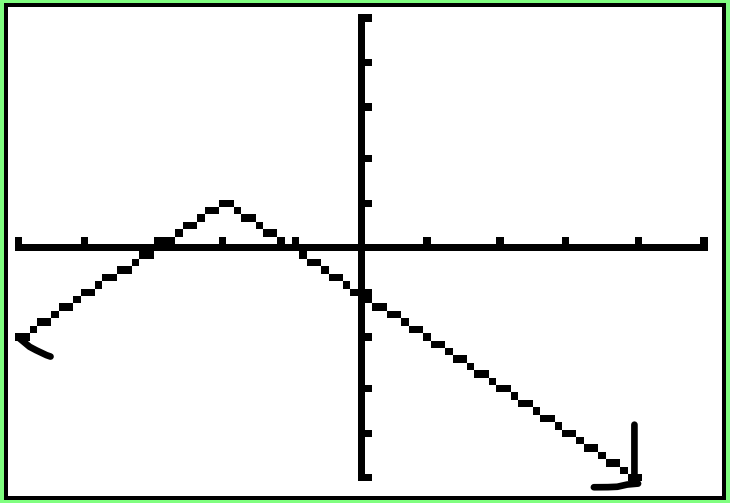
7. Find the domain and range of the function:



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

range: $[0, \infty)$

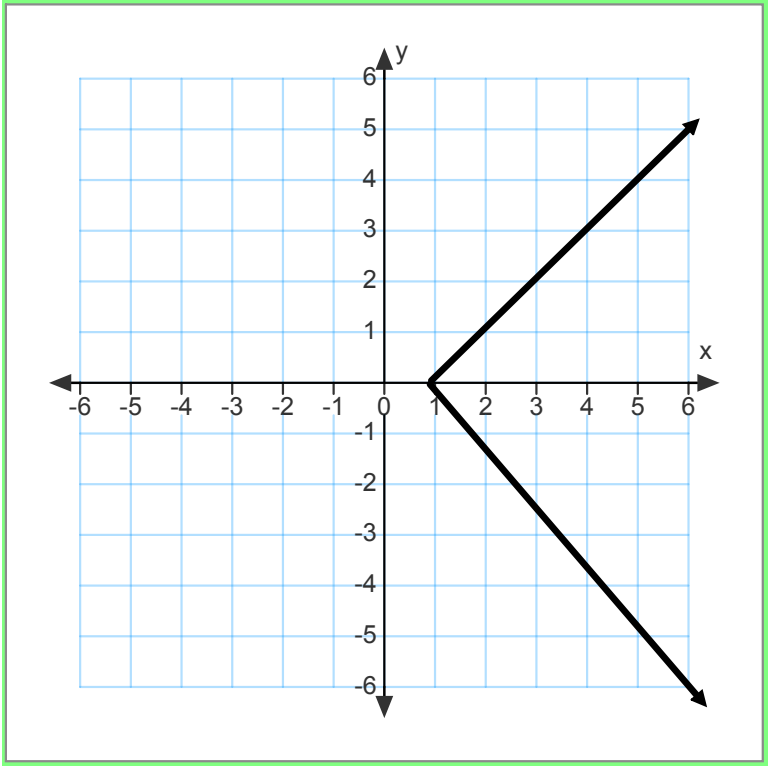
8. Find the domain and range of the graph:



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

range: $(-\infty, 1]$

9. Find the domain and range of the graph:



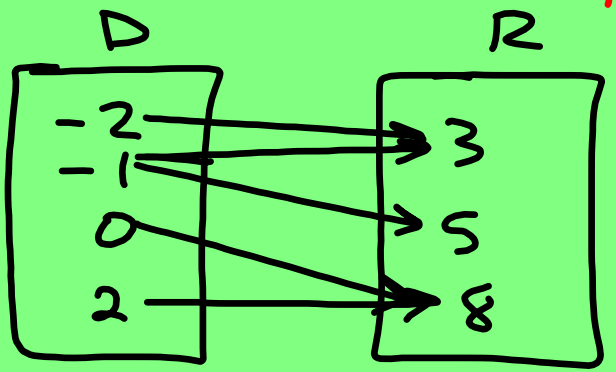
domain: $[1, \infty)$

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

10. Make a mapping diagram for each relation.

a) {(2, 8), (-1, 5), (0, 8), (-1, 3), (-2, 3)}

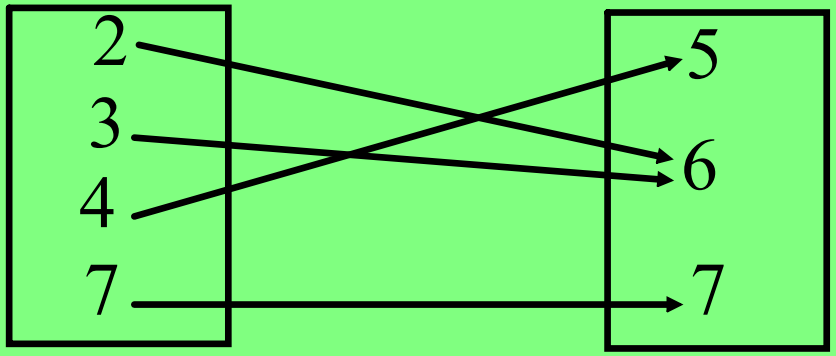
Repeating



Not a function

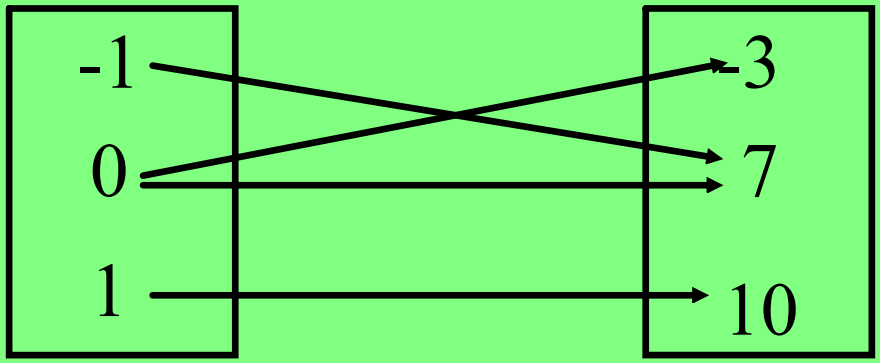
11. Determine whether each relation is a function.

a) Domain Range



yes, a function

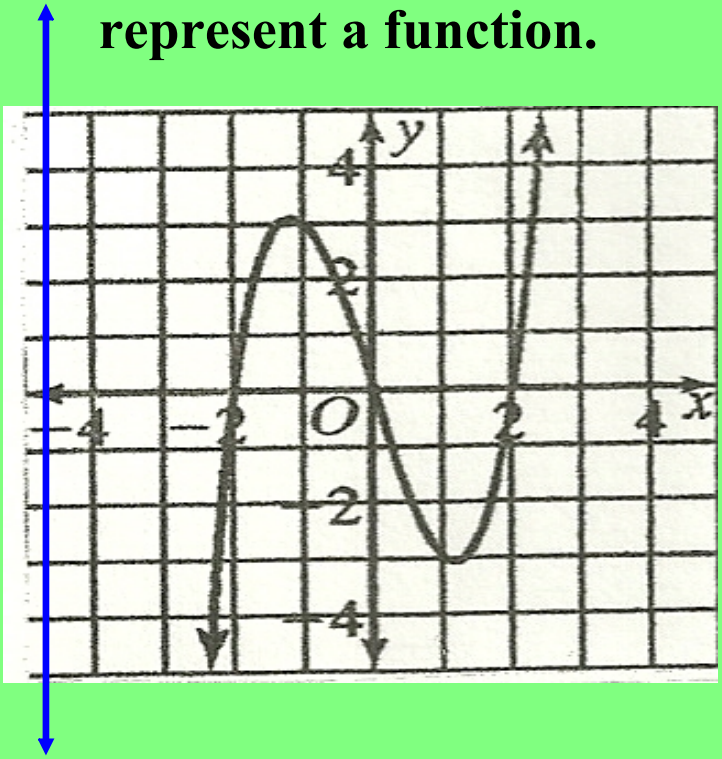
b) Domain Range



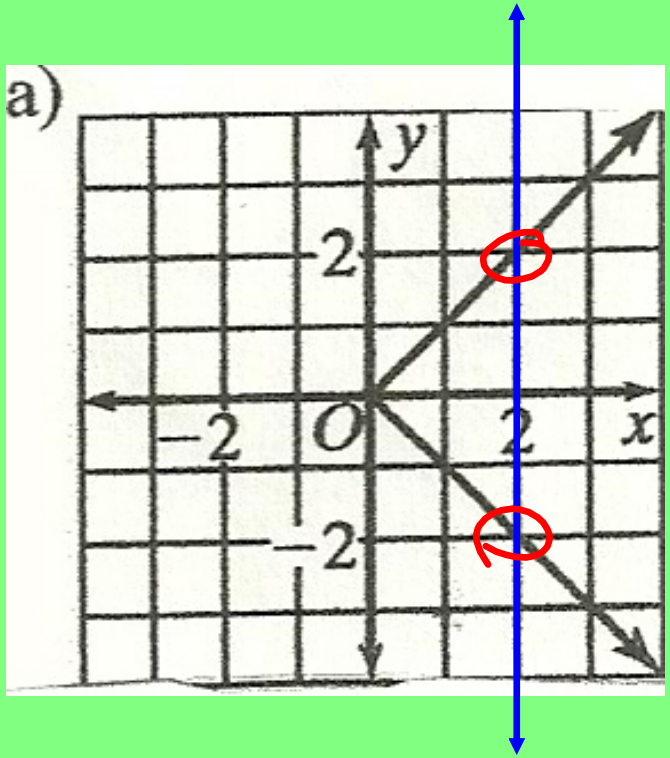
Not a function because 0 repeats

Use the vertical-line test to determine whether the graph represents a function.

If you move an edge of a ruler from left to right across the graph, keeping the edge vertical as you do so, you see that the edge of the ruler never intersects the graph in more than one point in any position. Therefore, the graph does represent a function.



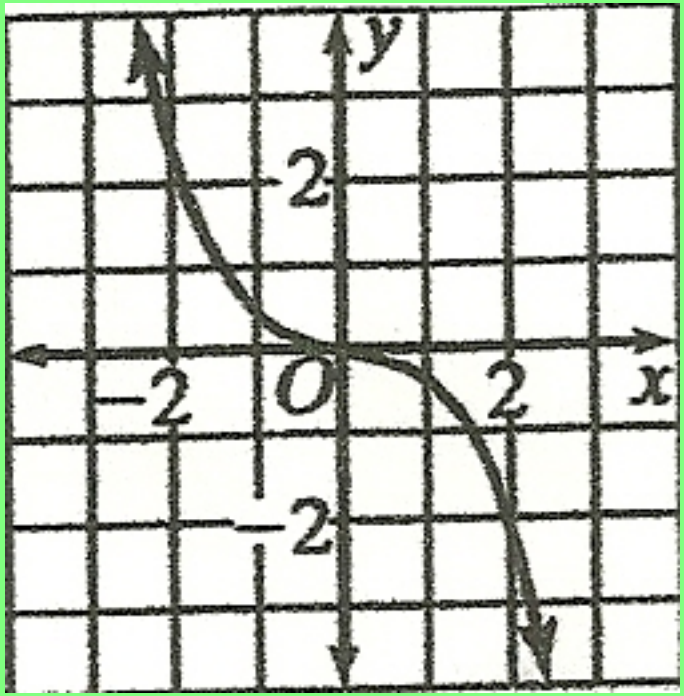
13a. Use the vertical-line test to determine whether each graph represents a function.



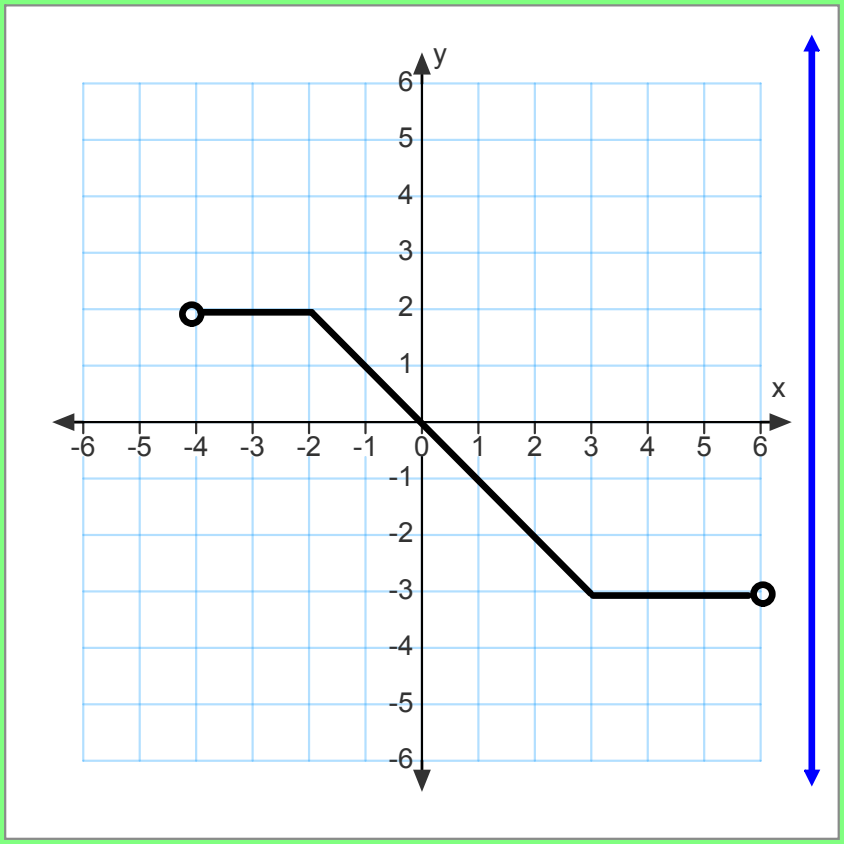
Not a function

13b. Use the vertical-line test to determine whether each graph represents a function.

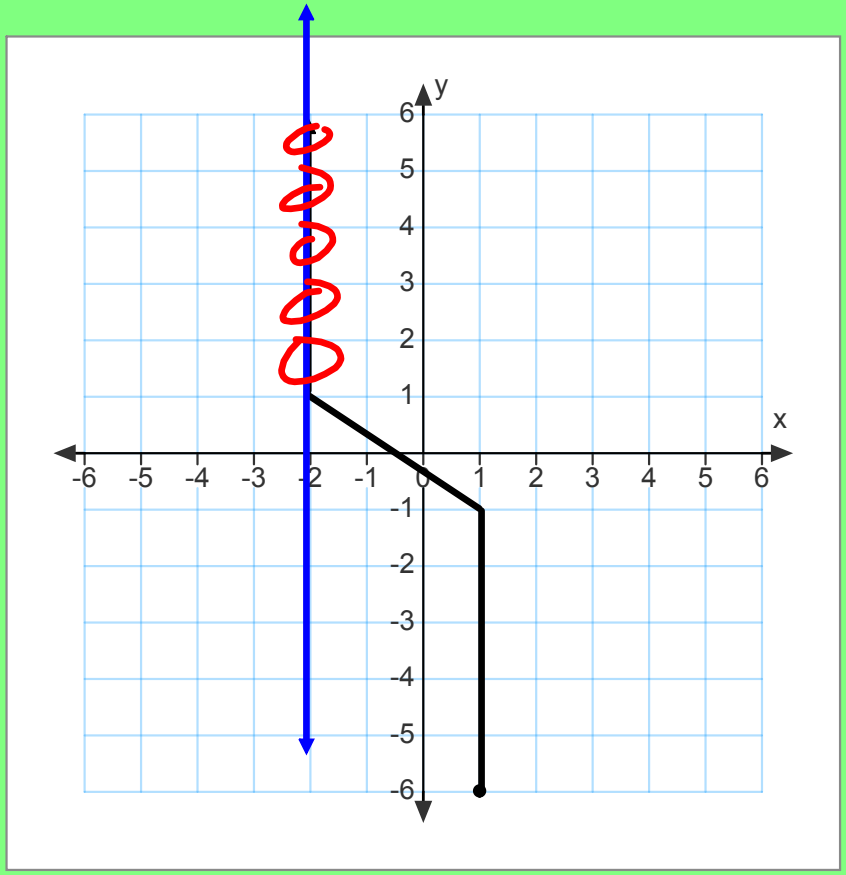
b)



Yes, a function



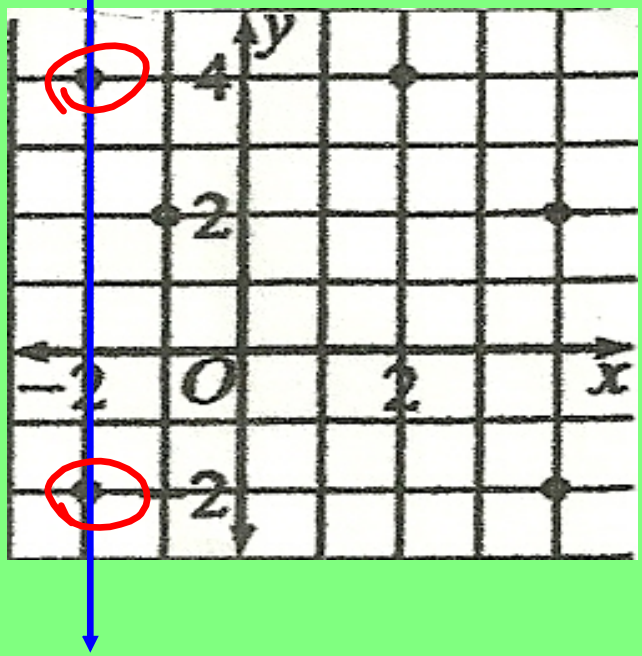
Yes, a function



Not a function

13c. Use the vertical-line test to determine whether each graph represents a function.

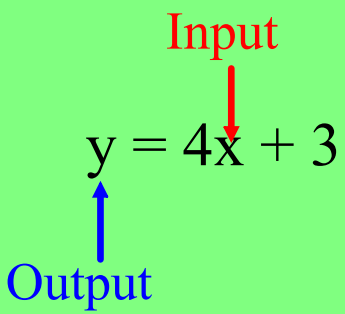
c)

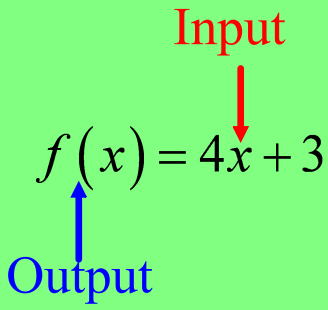


Not a function

Functional Notation

The equation y = 4x +3 describes y as a function of x. By giving this function the name "f", you can use f(x).





The symbol f(x) is read as the "value of f at x" or simple "f of x".

Note: f(x) is just another name for y.

14. Find $f(2)$ for each function.

a) $f(x) = -x^2 + 1$

$f(2) = -(2)^2 + 1$

$= -4 + 1$

$f(2) = -3$

b) $f(x) = |3x|$

$f(2) = |3(2)|$

$= |6|$

$f(2) = 6$

c) $f(x) = \dfrac{9}{1-x}$

$f(2) = \dfrac{9}{1-2} = \dfrac{9}{-1}$

$f(2) = -9$

15. Find $f(-3)$, $f(0)$, and $f(5)$ for each function.

a) $f(x) = 3x - 5$

$f(-3) = 3(-3) - 5 = -9 - 5 = -14$

$f(0) = 3(0) - 5 = 0 - 5 = -5$

$f(5) = 3(5) - 5 = 15 - 5 = 10$

$f(-3) = -14$

$f(0) = -5$

$f(5) = 10$

$$f(x) = 2x + 3$$

find $3f(x - 1)$ $= 3(2(x-1) + 3)$

$= 3(2x - 2 + 3)$

$= 3(x + 1)$

$3f(x-1) = 3x+3$

15. Find $f(-3)$, $f(0)$, and $f(5)$ for each function.

b) $f(y) = -\frac{1}{5}y$

$f(-3) = -\frac{1}{5}(-3) = \frac{3}{5}$

$f(0) = -\frac{1}{5}(0) = 0$

$f(5) = -\frac{1}{5}(5) = -1$

$f(-3) = \frac{3}{5}$

$f(0) = 0$

$f(5) = -1$

Assignment:

Day 1: 2.1 Pgs 59-61 1-11 all, 32-35 all, 40-42 all, 66-75 all

Day2: 2.1 Pgs 59-61 12-30 all, 36-39 all, 43-47all, 50-57all, 62-64 all