Sec. 2-1 Relations and Functions

Vocabulary

- relation: a set of input and output values.

Represented by:

Ordered Pairs (input, output)

(x, y)
$(-3, 4)$
$(3, -1)$
$(4, -1)$
$(4, 3)$

Mapping Diagram

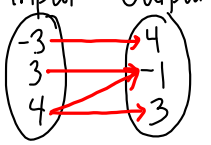
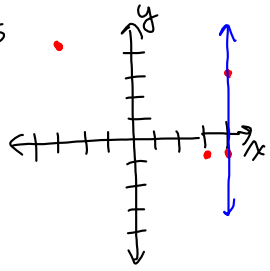


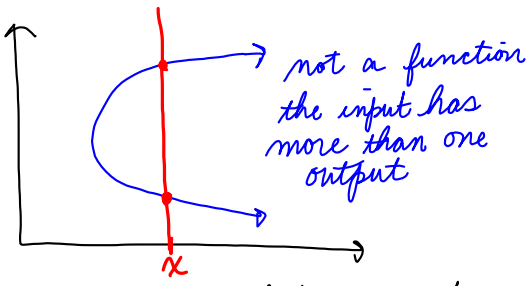
Table of Values

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

Graph



- domain: set of inputs (x-coordinates)
- range: set of outputs (y-coordinates)
- * function: each input has exactly one output
- vertical line test: if a vertical line passes through more than one point on the graph of a relation, then the relation is NOT a function



- function rule: an equation that represents an output value in terms of an input value.

$y = 3x + 2$; $x = 7$

output ← y ; x → input

- function notation:

$f(x) = 3x + 2$

"f of x"

$f(7) = 3(7) + 2$

$f(7) = 23$

input ← $(7, 23)$ → output

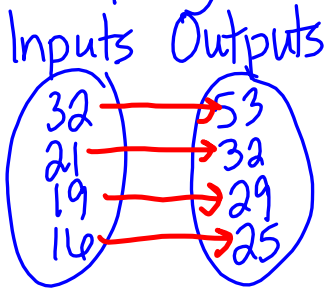
- independent variable: x, represents the input of the function
- dependent variable: $f(x)$, represents the outputs
  - called the dependent variable because its value depends on the independent variable

Problem 1: In 2000, the 4 most populous states (in millions), were CA (32), TX (21), NY (19), and FL (16). The numbers of U.S. Representatives were CA (53), TX (32), NY (29), and FL (25). Represent these data in four different ways?

Ordered Pairs

(32, 53)
(21, 32)
(19, 29)
(16, 25)

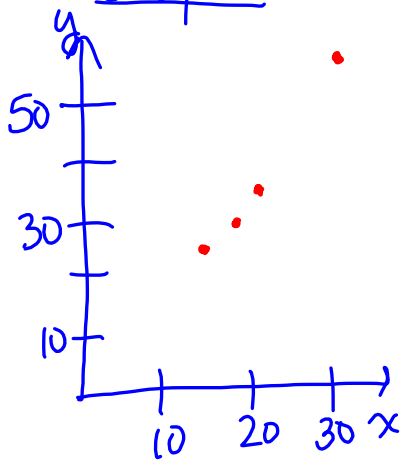
Mapping



Table

x	y
32	53
21	32
19	29
16	25

Graph



Problem 2: What are the domain and range from Problem 1?

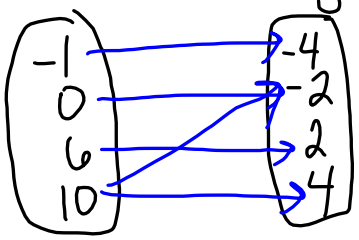
D: {32, 21, 19, 16}

R: {53, 32, 29, 25}

{ } braces

Problem 3: Is the relation a function?

a. Domain Range



The input 10 has 2 outputs.

NOT a function

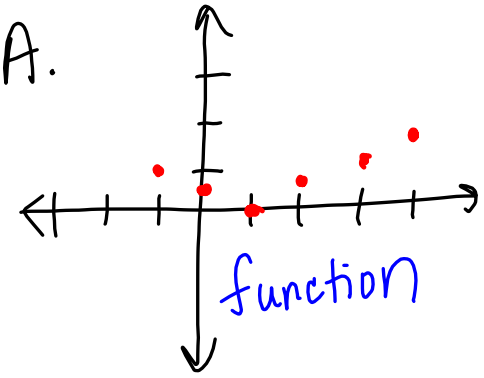
b. {(0,0), (2,4), (-2,4), (3,9), (-3,9)}

each input has only one output

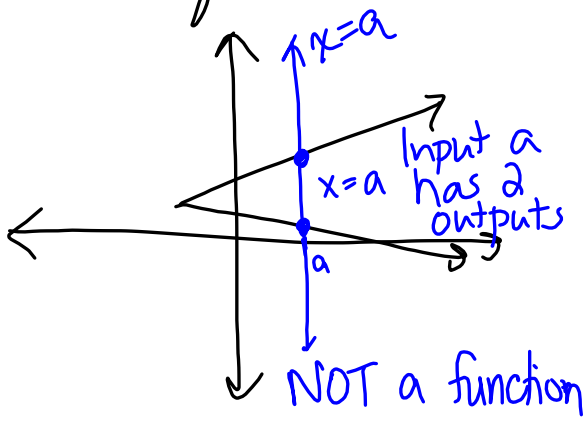
function

Problem 4: Use the vertical-line test. Which graph(s) represent functions?

A.



B.



Problem 5: For $f(x) = -3x + 2$, what is the output for the input -4, 0, and 0.2?

$f(-4) = -3(-4) + 2 = 12 + 2 = 14$

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

$f(0.2) = -3(0.2) + 2 = -0.6 + 2 = 1.4$

Problem 6: A pizza costs $14. The flat delivery fee is $1.50. What function rule models the total cost of the number of pizzas delivered? Evaluate for 5 pizzas

a = number of pizzas

$f(a) = 14a + 1.50$

$f(5) = 14(5) + 1.50$

$f(5) = 70 + 1.50$

$f(5) = 71.50$ $71.50