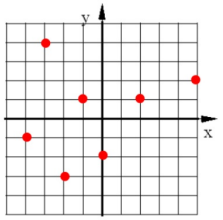
Some Relations are called Functions.

Every x value is paired with one and only one y value.

For every input there is only one output



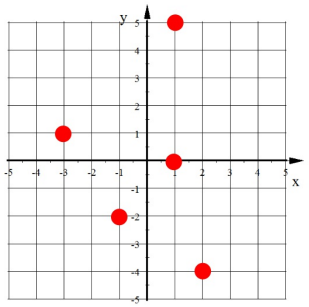
x	y
-4	-1
-2	-3
-1	1
0	-2
-2	1
5	2

Is this relation a function?

YES

each x-value produces only one y-value.

Is this relation a function?



x	y
-3	1
-1	-2
1	0
2	-4
1	5

NOT A FUNCTION

when x=1 two different y-values occur.
One input leads to two outputs.

Real-Life Functions and Non-Functions

You look up a word in the dictionary to get a definition:

Input (domain): A word
Output (range): Definition

Is a Dictionary a Function?

NO

A word (one input) might have more than one definition (more than one output)

A policman looks up a license plate number to find who it is registered to:

Input (domain): License plate number
Output (range): Who the car is registered to

Does this relationship represent a Function?

Yes

Each license plate number (one input) is registered to only one person (one output)

The IRS looks up a Social Security Number to find out who the tax return if for:

Input (domain): Social Security Number
Output (range): Taxpayers Name

Does this relationship represent a Function?

Yes

One Social Security Number should give only one name in return.

You look up a friend's name in your address book to find a number you can call them at:

Input (domain): Friend's name
Output (range): Phone number

Does this relationship represent a Function?

NO

One name can lead to more than one phone number.

Which of the following is correct?

1. Every Relation is a Function
2. Every Function is a Relation 

Is this relation a function?

(6,7) (-4,3) (1, -5) (6,2)

NO

When x=6 two different y-values result.
For one input there is two outputs.

Is this relation a function?

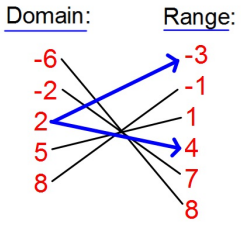
(4,0) (2,1) (-8,1) (9,5)

no x-value repeats so every input has only one output.

Yes, this represents a function

Using a Mapping Diagram to tell if a relation is a function.

(5,1), (-2, 7), (2, -3), (8, -1), (2, 4), (-6, 8)



If any domain value has more than one line coming from it then the relation is NOT a function

This would indicate that the same input (x) produces more than one output (y)

Is the following relation a function?

(-4, 7), (3, -9), (-8, 2), (5, 7), (2, 4)

Yes

No x-value repeats.

Is the following relation a function?

x	y
8	4
1	−9
−3	2
5	4

No x-value repeats.

Yes

Is the following relation a function?

x	y
−9	1
4	0
−2	−7
4	8

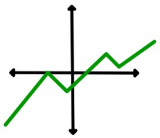
NO

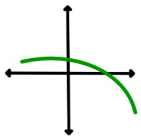
When x is 4 two different y-values are possible.

In other words, for one input there are two outputs.

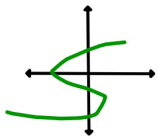
How can you tell if a graph represents a function?

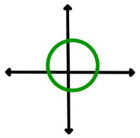
Is a Function



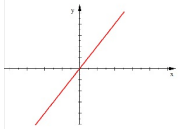


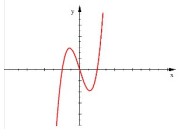
Is NOT a Function

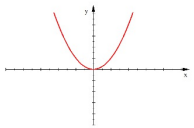




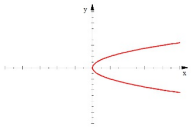
Is a Function

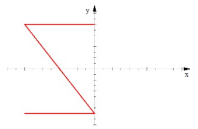




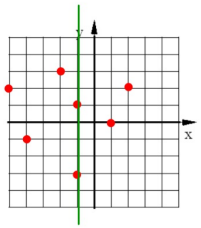


Is NOT a Function

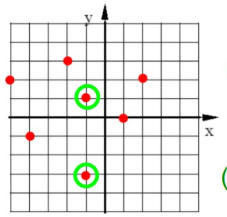




Vertical Line Test: If any vertical line can touch the graph more than once the relation is not a function.



Is this graph a function?



(-1,1)

(-1,-3)

When two points line up vertically they have the same x-coordinate.

8. Is each of these relations a function?

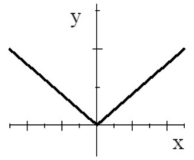
a)

X	Y
-2	4
3	1
7	-6
4	1

Yes

No x-values repeat

b)



Yes

No vertical line touches the graph more than once.

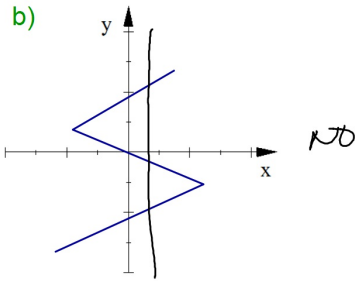
Is each of these a function?

a)

X	Y
-7	4
-2	-3
11	1
-7	6
8	-5

NO

b)



NO

How do you say $f(x)$?

" f of x"

f is the function name

X is the Independent variable (the input)

f(x) doesn't mean f times x

What is another way to write $f(x) = 7x - 8$?

$y = 7x - 8$

f(x) = is just another way to write y =

If $f(x) = -2x + 3$ what does $f(5)$ mean?

evaluate the function f when x=5.

Find $f(5)$.

$f(5) = -2(5) + 3$

$= -10 + 3$

$f(5) = -7$

Use this function: g(k) = 4k - 3

Find g(9)

$g(9) = 4(9) - 3$

$36 - 3$

$g(9) = 33$

Find g(-7)

$g(-7) = 4(-7) - 3$

$-28 - 3$

$g(-7) = -31$

Use this function: $w(b) = -2b^2 + 5$

Find w(3)

$-2(3)^2 + 5$

$-18 + 5$

-13

$w(3) = -13$

Find w(-5)

$-2(-5)^2 + 5$

$-50 + 5$

-45

$w(-5) = -45$

Use this function: $m(y) = y^2 - 3y + 1$

Find m(-2)

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

$= 4 + 6 + 1$

$m(-2) = 11$

Find m(4)

$= 4^2 - 3(4) + 1$

$= 16 - 12 + 1$

$4 + 1$

$m(4) = 5$

13. If $f(x) = x^2 + 3x$

find the range for this given domain: $Domain : \{-4, 0, 2\}$

Find each of the following:

f(-4) = $(-4)^2 + 3(-4) = 4$

$16 - 12$

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

f(2) = $(2)^2 + 3(2) = 10$

$4 + 6$

Range: $\{0, 4, 10\}$

Given the functions: $g(x) = -10x - 1$

and $k(r) = -2r^2 + 5$

3. Find x if g(x) = 29

$29 = -10x - 1$

$+1 \quad +1$

$\frac{30}{-10} = \frac{-10x}{-10}$

$x = -3$

You can now finish Hwk #19
Sec 5-2
pages 244-245
problems 2, 4, 24, 28-30, 32, 38-41, 44