Topic - 1.1: Functions and Domain/Range - Day 1

Basics of Functions and Their Graphs

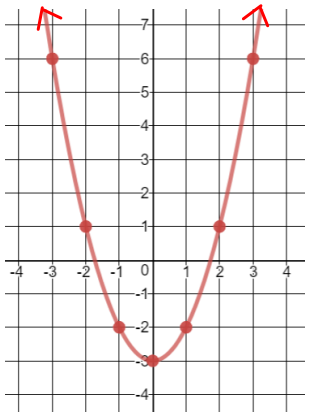
Relation: a set of ordered pairs. (*inputs*, *outputs*) (*x*, *y*)

Domain: the set of all first components (*inputs or x-values*) of the ordered pairs in a relation.

Range: the set of all second components (*outputs or y-values*) of the ordered pairs in a relation.

Ex.1 Given $y = x^2 - 3$, find the domain and range.

x	y
-3	6
-2	1
-1	-2
0	-3
1	-2
2	1
3	6



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

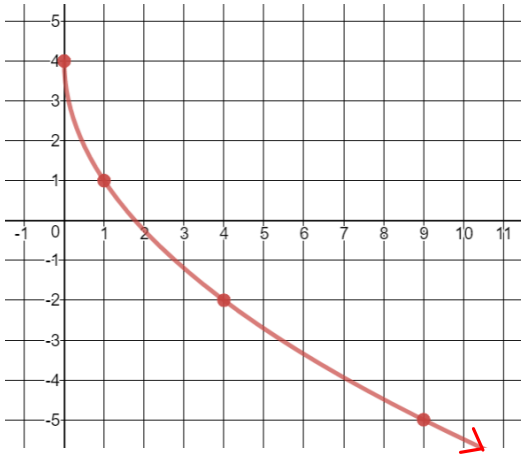
R: $[-3, \infty)$

Ex.2 Given $y = -3\sqrt{x} + 4$, find the domain and range.

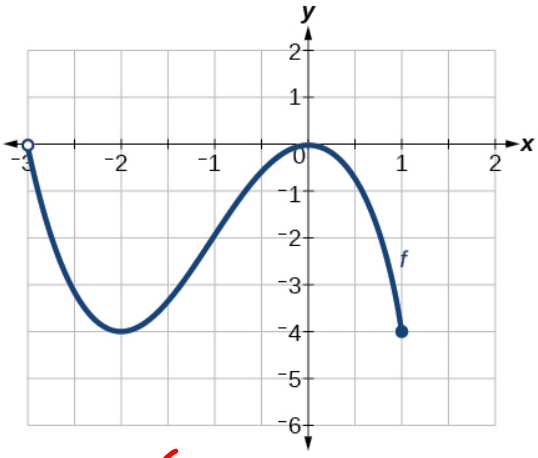
x	y
-1	undefined
0	4
1	1
4	-2
9	-5
16	-8
25	-11

D: $[0, \infty)$

R: $(-\infty, 4]$

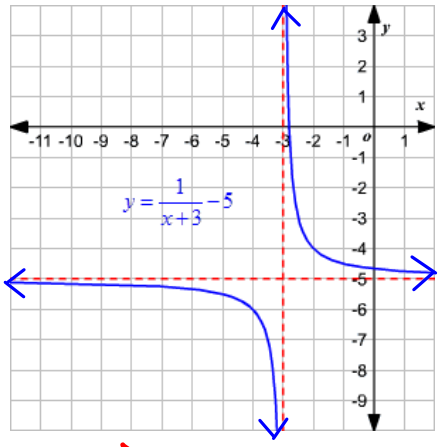


Ex.3 Given the graphs, find the domain and range.



D: $(-3, 1]$

R: $[-4, 0]$



D: $(-\infty, -3) \cup (-3, \infty)$

R: $(-\infty, -5) \cup (-5, \infty)$

What is a Function?

Function: a relation in which each element in the domain corresponds to exactly one element in the range (*no repeated domain values*).

Ex4. Given the relation, is it a **function?**

a. { (1,-5), (2,-1), (3,4), (-2,-1) }

Yes, a function

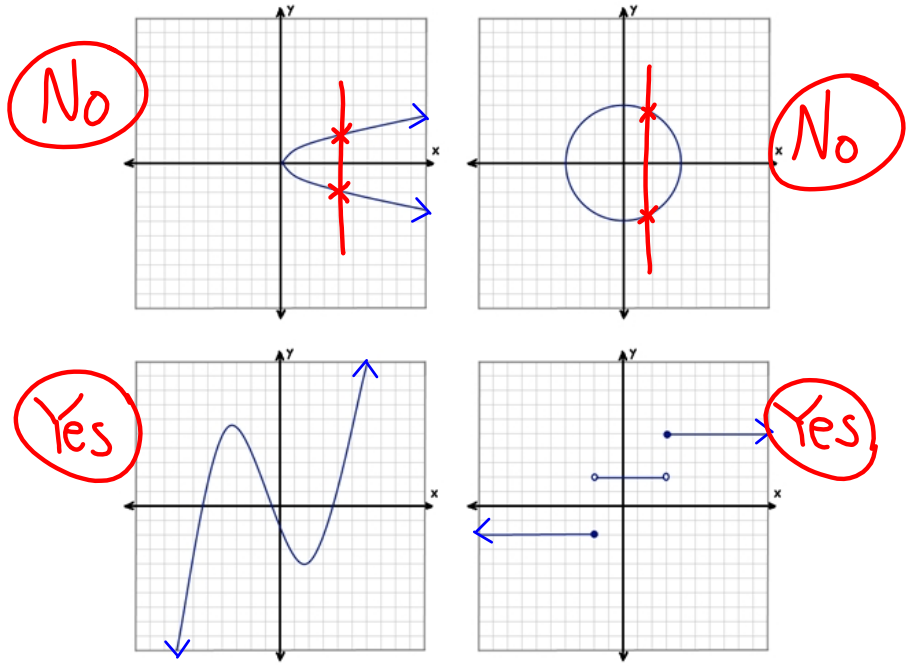
b. { (3,0), (4,1), (7,2), (4,-1) }

Not a function

Vertical Line Test

If any vertical line intercects a graph in more than one point, then the graph does not define a function.

Ex5. Identify graphs in which *y* is a function of *x*.



Function Notation

x is an input ***f(x)*** is an output (*y*)

How you say: "f of x"

Ex5. Given this function, $f(x) = x^2 + 3x + 5$, find the following, simplify.....

a.) $f(-6)$ input

$(-6)^2+3(-6)+5$

$36-18+5$

23 output

b.) $f(x+4)$

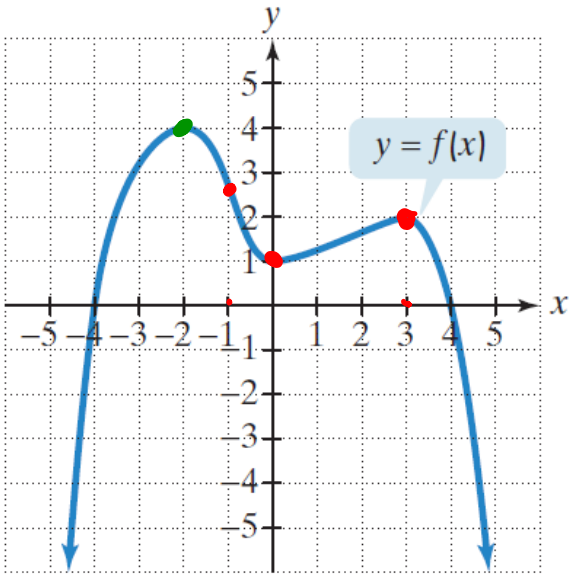
$(x+4)^2+3(x+4)+5$

$x^2+8x+16+3x+12+5$

$x^2+11x+33$

Obtaining Info. from a Graph

Ex6.



a.) $f(3)$ = 2

b.) $f(-1)$ ≈ 2.5

c.) $f(0)$ = 1

d.) For what value of x is $f(x) = 4$

x = -2

*e.) Find the domain and range.

D: $(-\infty, \infty)$ R: $(-\infty, 4]$