2.1 - Basics of Functions and their Graphs - Part 2

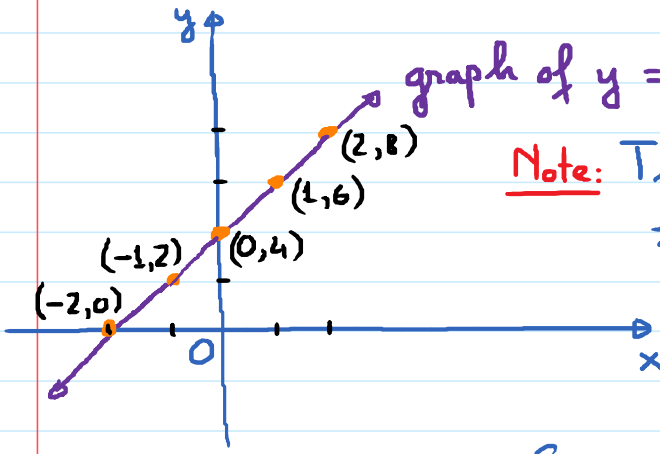
Wednesday, September 11, 2019 12:49 PM

Objective 1: Graphs of Functions

Definition: The graph of a function is the graph of its ordered pairs.

E.g. $f(x) = 2x + 4$

x	$y = f(x) = 2x+4$	Ordered pair (x, y)
-2	0	$(-2, 0)$
-1	2	$(-1, 2)$
0	4	$(0, 4)$
1	6	$(1, 6)$
2	8	$(2, 8)$



graph of $y = 2x + 4$.

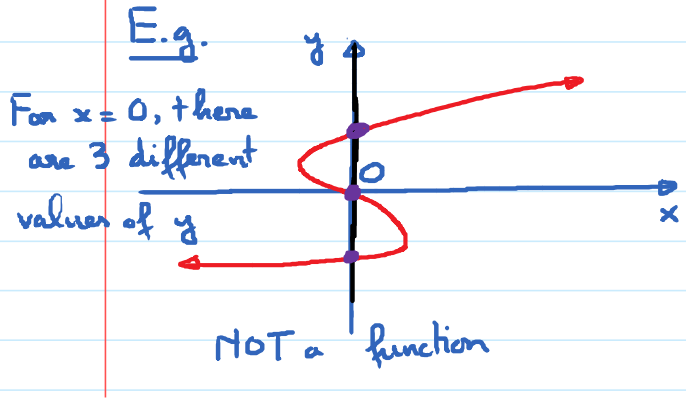
Note: This function has the form $f(x) = mx + b$.

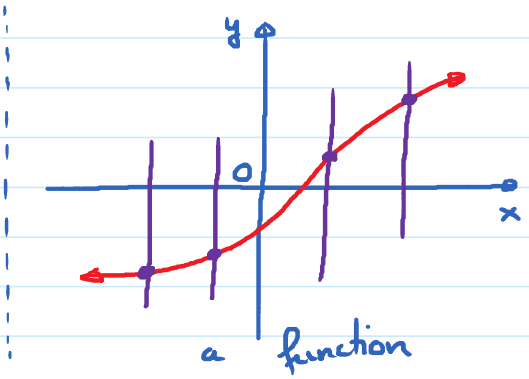
We know that the graph of such functions is a straight line.

So, we really just need 2 points to sketch the graph.

Objective 2: Use the vertical line test

E.g.

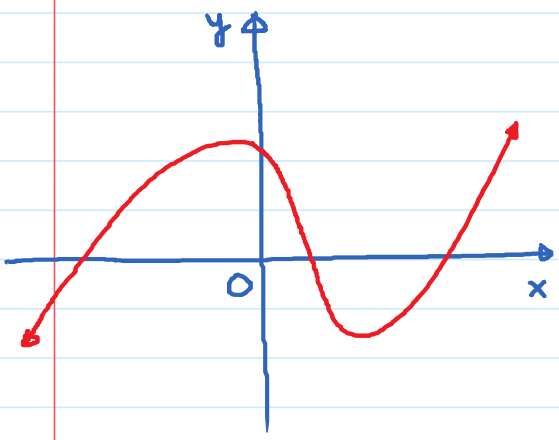




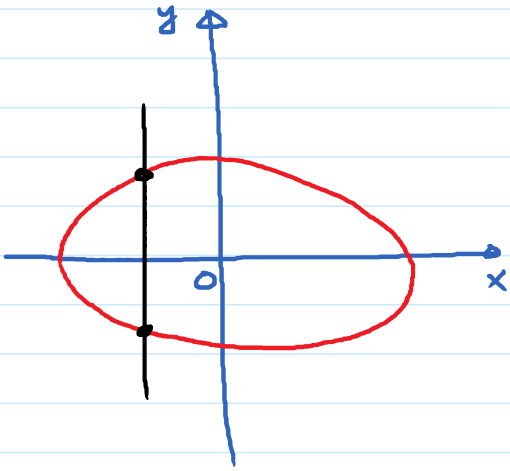
The vertical line test:

> If any vertical line intersects a graph in more than one point, then the graph does not define y as a function of x

E.g. Is the given graph the graph of a function?



This is a graph of a function

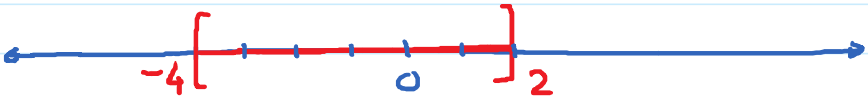


This is NOT the graph of a function.

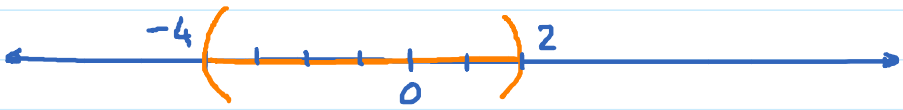
Objective 3: Identify Domain and Range of a function from its graph.

Recall: Interval Notation.

What is the difference between $[-4, 2]$ and $(-4, 2)$?



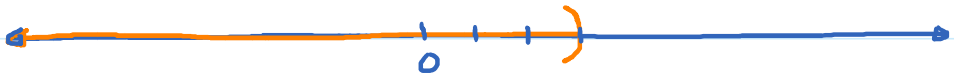
$[-4, 2]$: all the numbers in between -4 and 2 and include -4 and 2



$(-4,2)$: all numbers in between -4 and 2 excluding -4 and 2

E.g.

Interval notation: $[-2, \infty)$



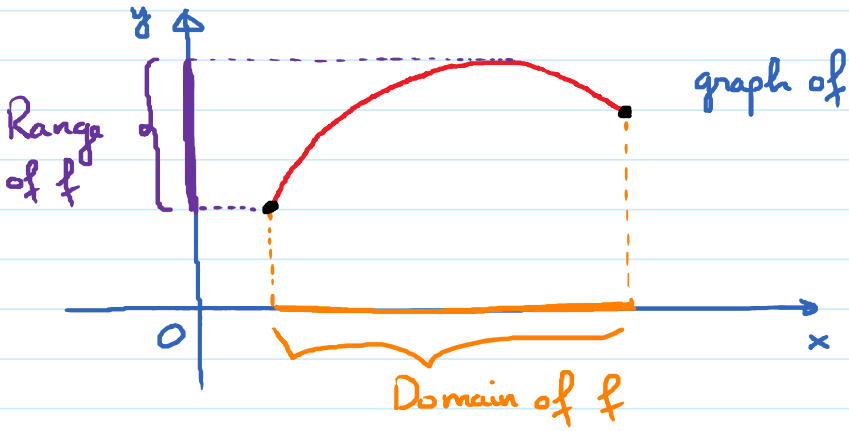
Interval notation: $(-\infty, 3)$

* Set builder notation:

Set builder notation

$$\underbrace{[-4,2]}_{\text{interval notation}} = \{x \mid -4 \le x \le 2\}$$

* Domain and Range of a function from its graph.

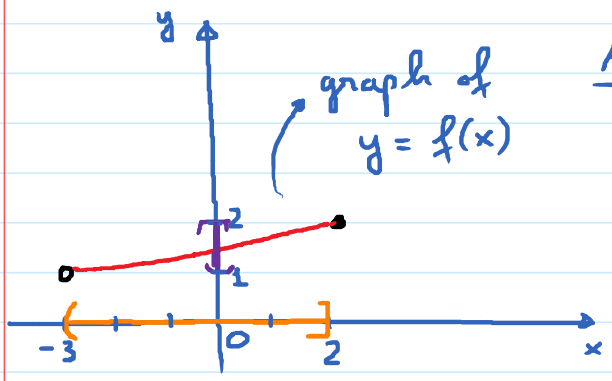


Domain: set of inputs (found on the x-axis from the x-coordinate of the leftmost point of the graph to the x-coordinate of the rightmost point of the graph)

Range: set of outputs (found on y-axis from the y-coordinate of the lowest point on the graph to the y-coordinate of the highest point on the graph)

E.g. Find domain and range of the function.

Write the answer in interval notation and set builder notation.



Answer: (interval notation)

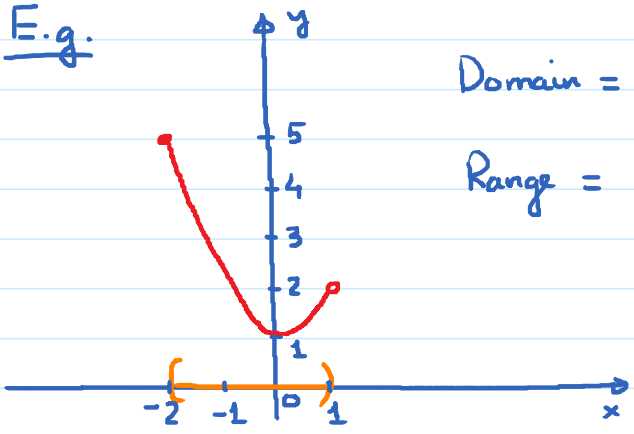
Domain $= (-3, 2]$

$= \{x \mid -3 < x \leq 2\}$ (set builder notation)

Range $= (1, 2] = \{y \mid 1 < y \leq 2\}$

(interval notation) (set builder notation)

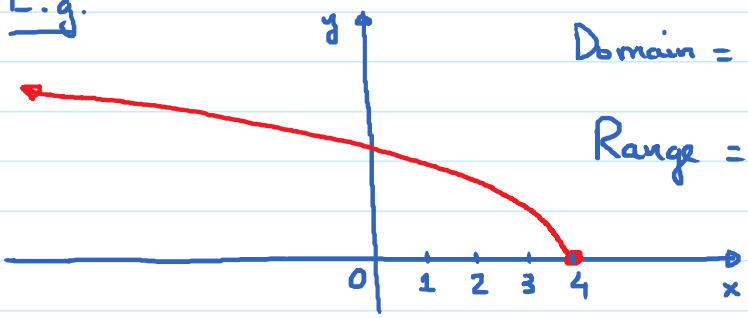
E.g.



Domain $= [-2, 1)$

Range $= [1, 5]$

E.g.

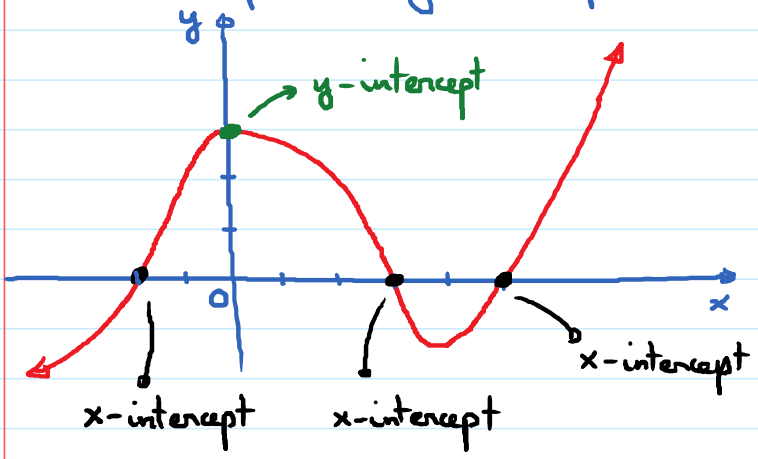


Domain = $(-\infty, 4]$

Range = $[0, \infty)$

Objective 4: Find x-intercept(s) and y-intercept and other information from graphs

* x-intercept and y-intercept.



x-intercept : is a point at which the graph crosses the x-axis.

y-intercept : is a point at which the graph crosses the y-axis.

x-intercepts : $(-2,0)$; $(3,0)$; $(5,0)$

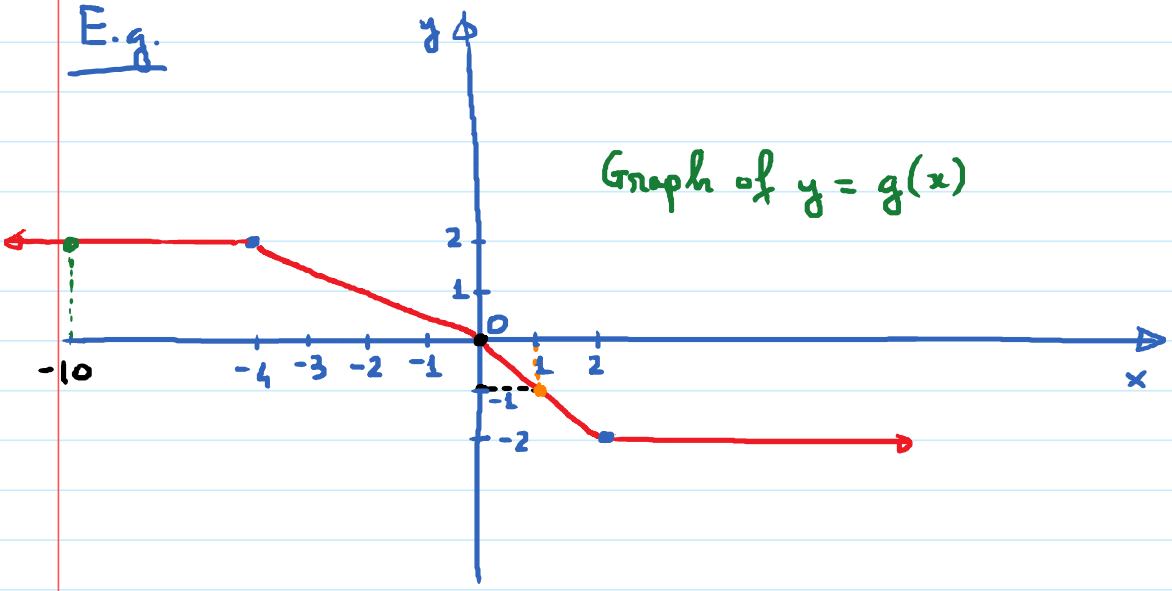
Note: y-coordinate of an x-intercept $= 0$

Hence, the x-coordinate of an x-intercept is often called a **zero** of a function.

y-intercept : (0, 3)

Note: x-coordinate of the y-intercept = 0

E.g.



(a) $g(-4) = 2$ (go to $x = -4$; go to the point on graph, find y of point)

(b) $g(2) = -2$

(c) $g(-10) = 2$

(d) $g(10) = -2$

(e) x-intercept : (0, 0) ; y-intercept : (0, 0)

(f) For what value(s) of x is $g(x) = -1$?

Answer: $\boxed{x = 1}$