

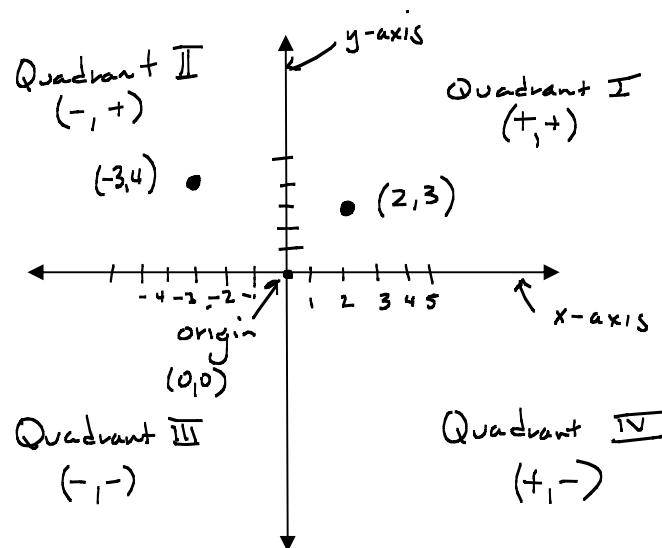
Section 1.2

Graphs of Functions

Objectives

- Draw graphs of functions.
- Determine the domain and range of a function given its graph.
- Use the vertical line test to determine whether a given graph is the graph of a function.
- Determine x- and y- intercepts given the graph of a function.

The Cartesian coordinate system (or rectangular coordinate system)



Satisfying the Function Definition

Example: Does the following set of points define a function?

$$\{(-4, -1), (1, -1), (2, 0), (3, -1)\}$$

Example: Does the following set of points define a function?

$$\{(-4, 1), (-4, -1), (-2, 0), (7, -1)\}$$

Graphing a Function

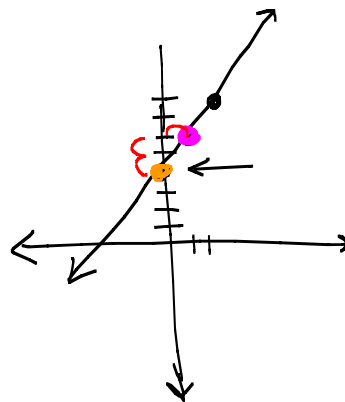
Example: Graph $f(x) = 2x + 4$

x	$f(x) \leftarrow y$	
0	4	$(0, 4)$
1	6	$(1, 6)$
2	8	$(2, 8)$

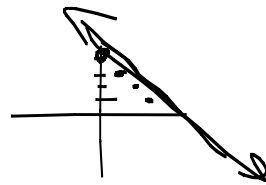
$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{2}{1}$$

$$y = mx + b$$

↑ slope ↖ y-int.

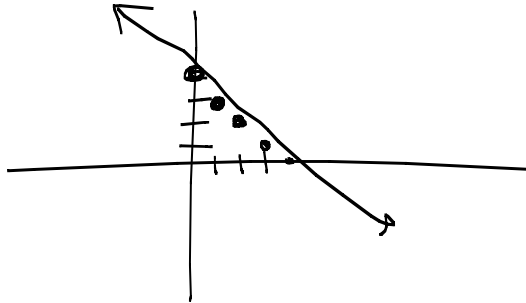


$$m = -1 = -\frac{1}{1}$$



Example: Graph $f(x) = -x + 4$

x	f(x)
0	4
1	3
2	2
3	1



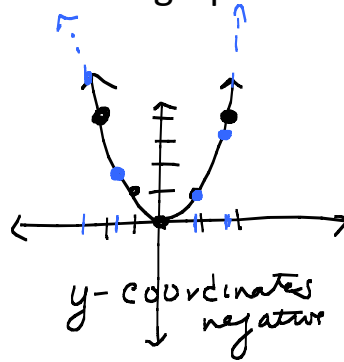
Finding the Domain and Range from a Graph

Example: Graph $f(x) = x^2$. Use the graph to find the domain and range of f .

x	f(x)
0	0
1	1
2	4
-1	1
-2	4

↑

(0,0)
(1,1)
(2,4)



parabola

domain: All real numbers
 $(-\infty, \infty)$

range: $[0, \infty)$

Example: Graph $f(x) = -2x^2$. Use the graph to find the domain and range of f .

x	f(x)
0	0
1	-2
2	-8
-1	-2
-2	-8

(0,0)
(1,-2)
(2,-8)

$$f(0) = -2(0)^2 = 0$$

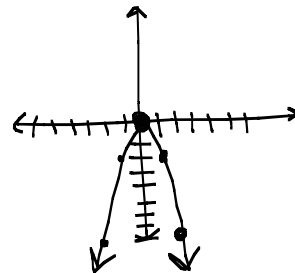
$$f(1) = -2(1)^2 = -2$$

$$f(2) = -2(2)^2 = -8$$

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

$$f(-2) = -2(-2)^2 = -8$$

domain: $(-\infty, \infty)$
range: $(-\infty, 0]$



Example: Graph $f(x) = \sqrt{x+2}$. Use the graph to find the domain and range of f .

x	$f(x)$
-2	0 ←
-1	1
2	2
14	4
-	-

$$f(-2) = \sqrt{-2+2} = \sqrt{0} = 0$$

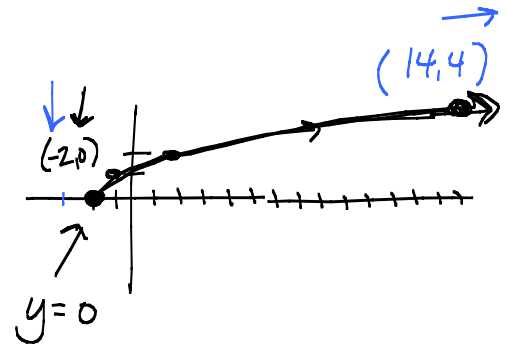
$$f(-1) = \sqrt{-1+2} = \sqrt{1} = 1$$

$$f(2) = \sqrt{2+2} = \sqrt{4} = 2$$

$$f(14) = \sqrt{14+2} = \sqrt{16} = 4$$

$$\text{Domain: } [-2, \infty)$$

$$\text{Range: } [0, \infty)$$



Example: Graph $f(x) = \sqrt{-2x}$. Use the graph to find the domain and range of f .

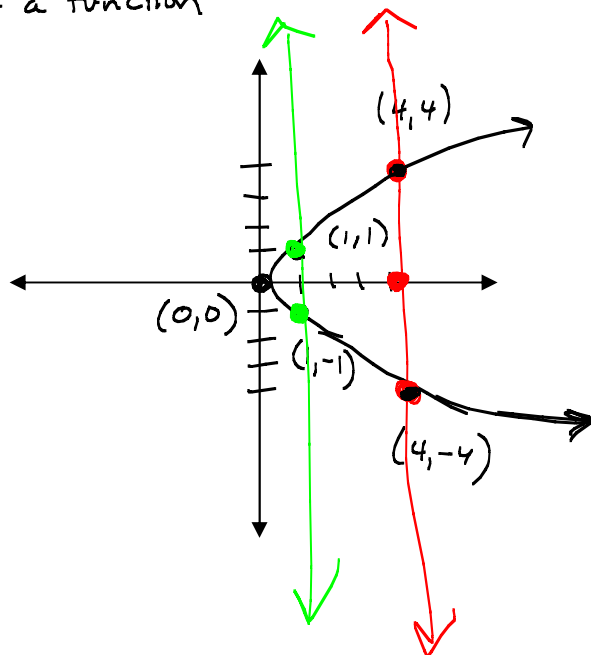
Example: Graph $f(x) = |x|$. Use the graph to find the domain and range of f .

Example: Graph $f(x) = |x| + 3$. Use the graph to find the domain and range of f .

Example: Graph $f(x) = 3$. Use the graph to find the domain and range of f .

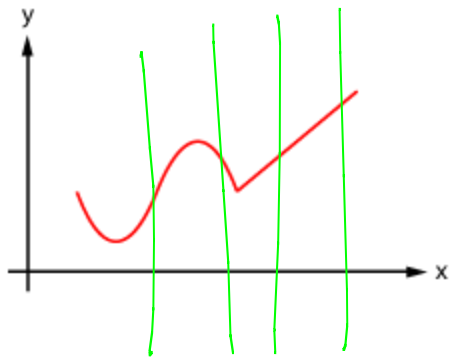
Vertical Line Test for Functions

Not a function

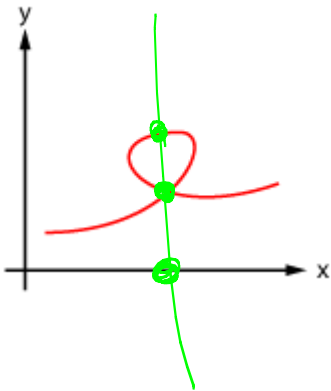


x	f(x)
0	0
1	1
4	1
	4
	-4

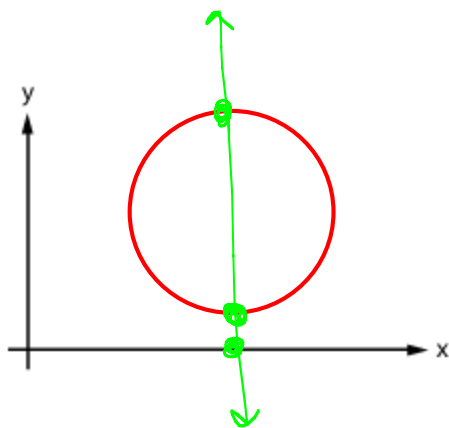
Example: Which of the graphs are graphs of functions?



✓



no



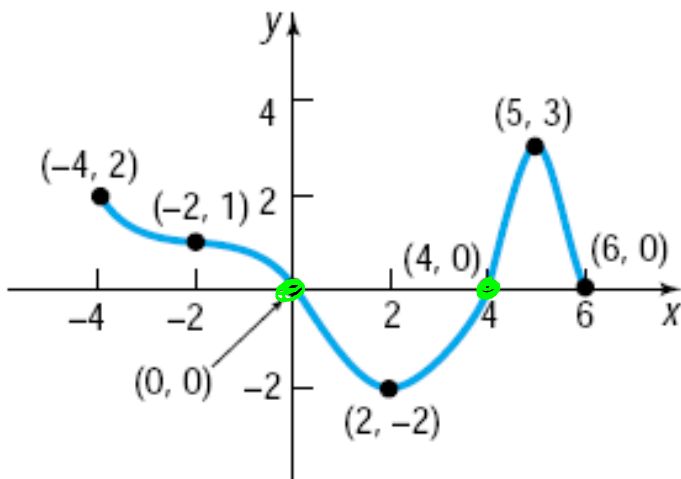
no

Intercepts and Zeros of Functions

x-intercept: A point at which the graph of a function crosses the x-axis.

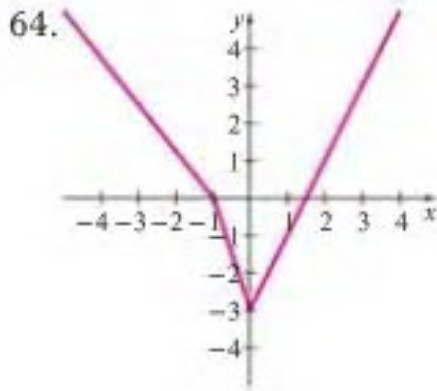
y-intercept: the point at which the graph of a function crosses the y-axis.

zeros—Values of x satisfying $f(x) = 0$.



- Find $f(5)$, $f(-2)$ and $f(6)$.
- For what numbers x is $f(x) = 0$?
- What is the domain of f ?

d. What are the x- and y-intercepts?



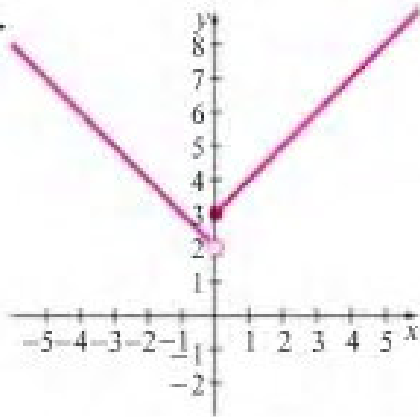
a. Find $f(-1)$, $f(0)$ and $f(2)$.

b. What are the zeros?

c. What is the domain of f ? What is the range of f ?

d. What are the x- and y-intercepts?

68.



- Find $f(-1)$, $f(0)$ and $f(2)$.
- What are the zeros?
- What is the domain of f ? What is the range of f ?
- What are the x - and y -intercepts?

Homework: Section 1.2: 7 – 11 (odd), 17- 45 (every other odd), 47 – 67 (odd)