Lesson 1.6: Piecewise Functions

$$f(x) = \begin{cases} -x^2 & x \leq -3 \\ |x-2| & -3 < x < 1 \\ \sqrt{x-1} & x \geq 1 \end{cases}$$

functions

Domain (or where to graph)

For the following function, $f(x) = \begin{cases} -x^2 & x \le -3 \quad 1 \\ |x-2| & -3 < x < 1 \quad 2 \\ \sqrt{x-1} & x \ge 1 \quad 3 \end{cases}$, find the following values:

a) $f(-4)$

$-4 \cancel{\ge} 1$

$\cancel{-3 < -4 < 1}$

$-4 \le -3$ ✓

$-(-4)^2 = -(16) = \boxed{-16}$

b) $f(1)$

$\cancel{1 \le -3}$

$\cancel{-3 < 1 < 1}$

$1 \ge 1$

$\sqrt{1-1} = \boxed{0}$

c) $f(0)$

$-3 < 0 < 1$ ✓

$|0-2| = |-2| = \boxed{2}$

Graph: $f(x) = \begin{cases} -x - 1 & x \le -1 \\ 3x + 2 & x > -1 \end{cases}$

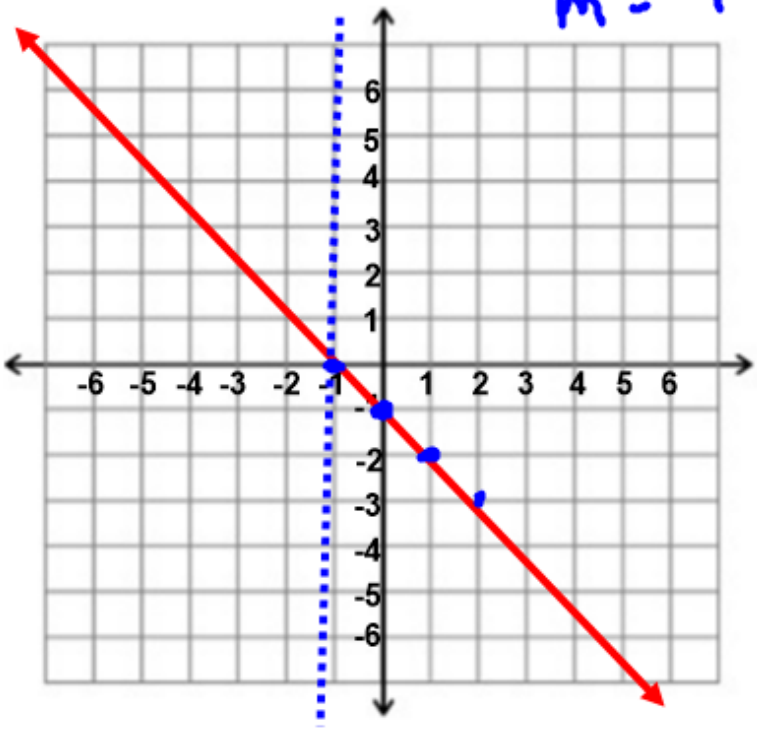
$y = mx + b$

slope

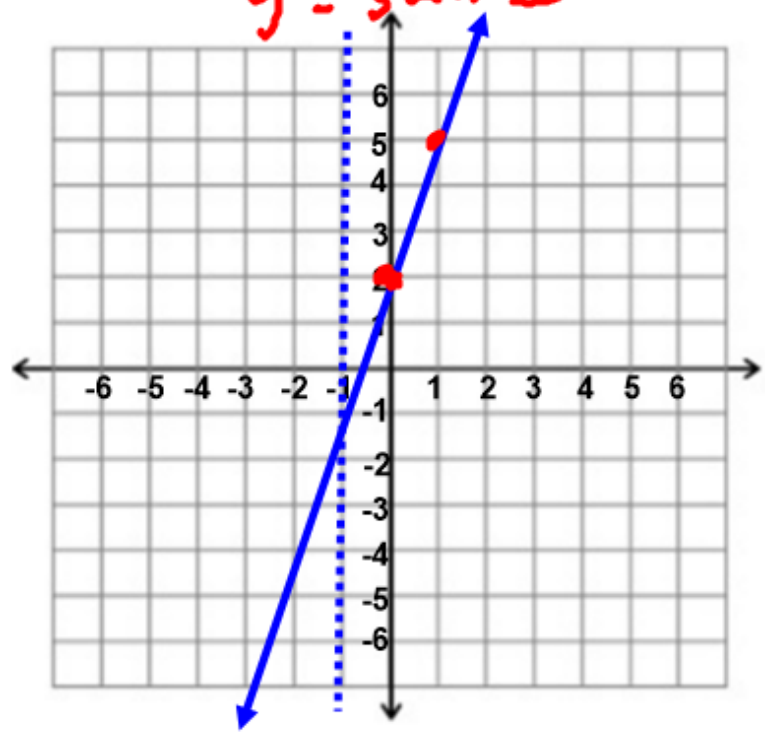
y-int.

$y = -x - 1$

$m = -1$



$y = 3x + 2$

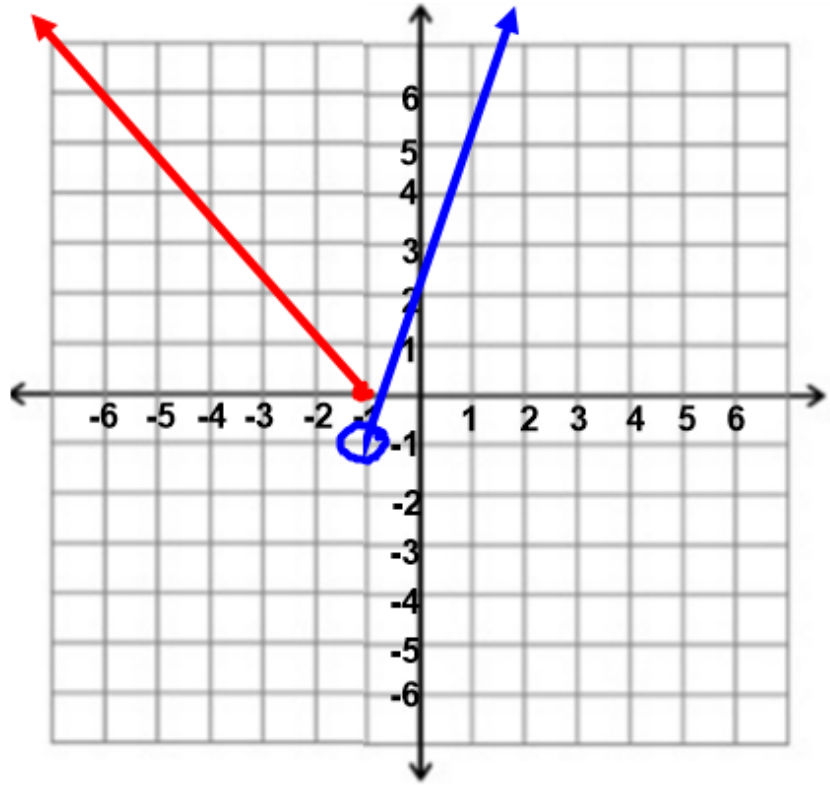


x	y
0	2
1	5

$$f(x) = \begin{cases} -x - 1 & x \leq -1 \\ 3x + 2 & x > -1 \end{cases}$$

$\leq, \geq \rightarrow$ closed dot

$<, > \rightarrow$ open

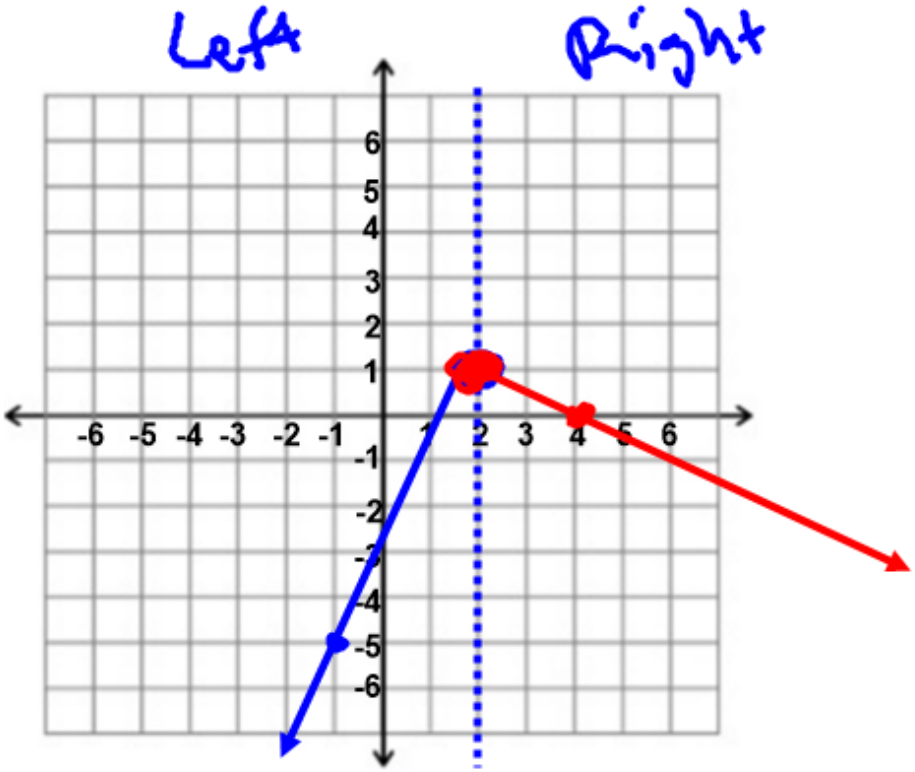


$$f(x) = \begin{cases} 2x - 3 & \boxed{x < 2} \\ -\frac{1}{2}x + 2 & x \geq 2 \end{cases}$$

Left

Right

< less than



$2x-3$

x	y
2	1
-1	-5

open

$-\frac{1}{2}x+2$

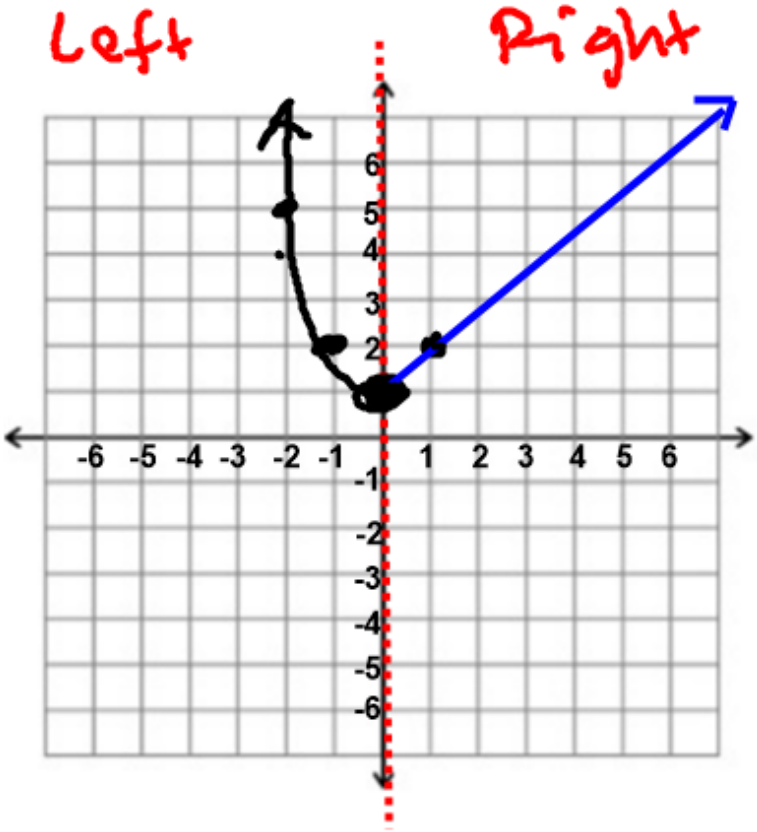
x	y
2	1
4	0

closed

$$f(x) = \begin{cases} x^2 + 1 & x \le 0 \\ x + 1 & x > 0 \end{cases}$$

Left

Right



$1x + 1$

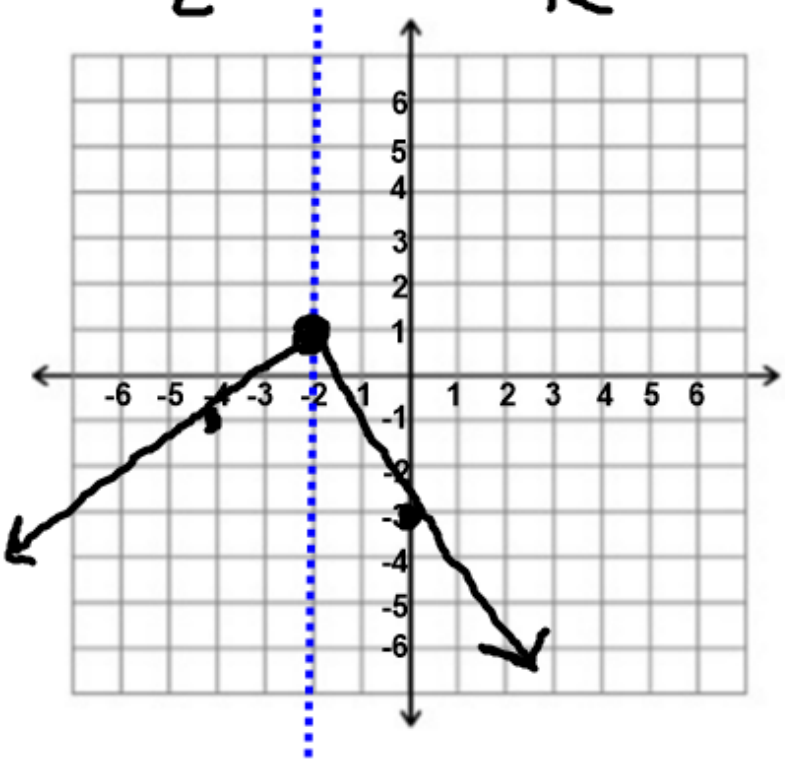
x	y
0	1
1	2

open

(4) $f(x) = \begin{cases} x+3 & x < -2 \\ -2x-3 & x \geq -2 \end{cases}$

L

R



$x+3$

x	y
-2	1
-4	-1

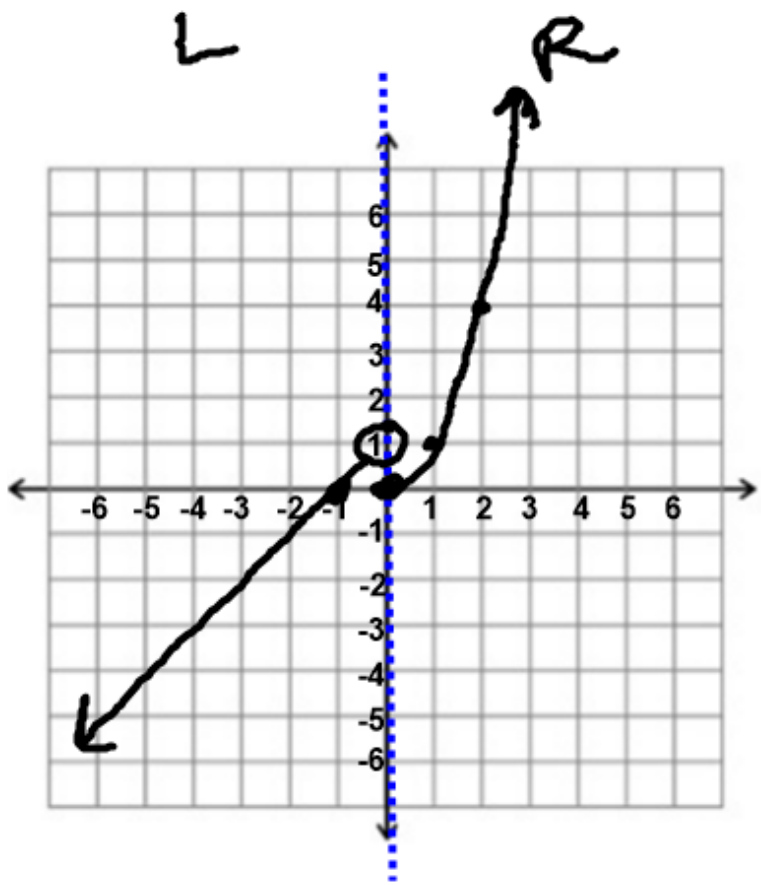
open

$-2x-3$

x	y
-2	1
0	-3

closed

7) $f(x) = \begin{cases} x+1 & x < 0 \\ x^2 & x \geq 0 \end{cases}$



$x+1$

x	y
0	1
-1	0

open

x^2

x	y
0	0
1	1
2	4
3	9

closed

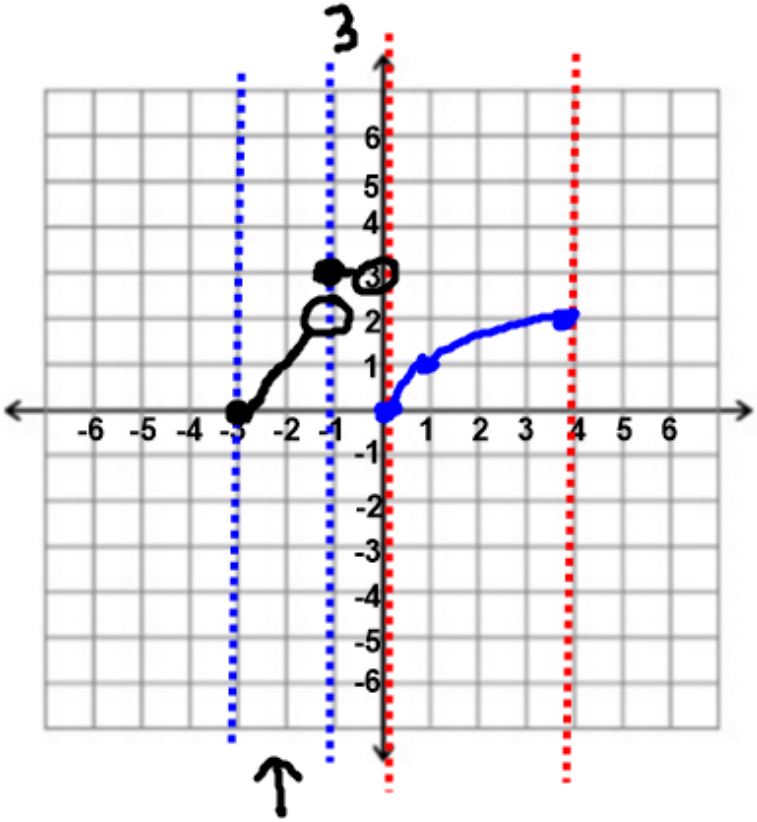
(12)

$$f(x) = \begin{cases} x+3 \\ \sqrt{x} \end{cases}$$

$-3 \le x < -1$

$-1 \le x < 0$

$0 \le x \le 4$



$x+3$

x	y	
-1	2	open
-3	0	closed

$\sqrt{x}$

x	y	
0	0	close
4	2	closed