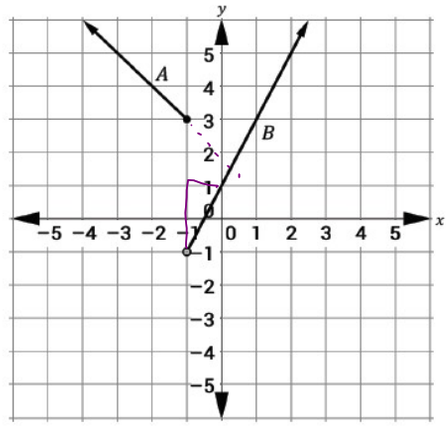
Section 3 – Topic 4
Graphing and Writing
Piecewise–Defined Functions – Part 2

A piecewise-defined function can also be written from a graph.

The graph of a piecewise-defined function is given below. In order to write the function represented by this graph, we must examine each piece separately.



How many "pieces" will form the piecewise function? 2

Both A and B are linear functions. This means that both equations can be written in the form $mx+b$.

At which x –value does piece A begin? Where does it end?

$(-\infty, -1]$

What does the closed circle tell us about the domain restriction for piece A?

included

At which x –value does piece B begin? Where does it end?

$(-1, \infty)$

What does the open circle tell us about the domain restriction for piece B?

not included

Write the piecewise-defined function represented by the graph.

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

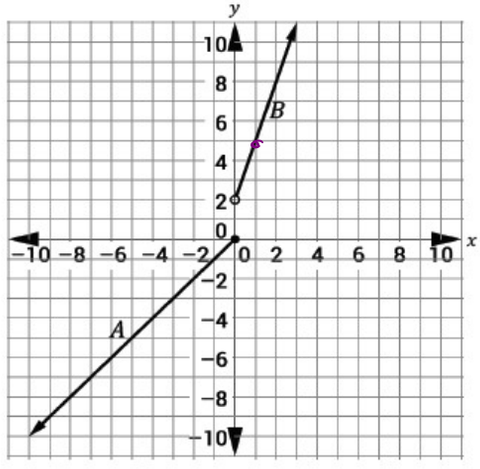
What is the domain of the function? What is the range?

Domain $(-\infty, \infty)$

Range $(-1, \infty)$

Try it!

1. The graph of a piecewise function is given below.



$\cup$ = union
- gap or break in graph

a. Write a piecewise function that represents the graph.

$$f(x)\begin{cases} x & x \le 0 \\ 3x+2 & x > 0 \end{cases}$$

b. What is the domain of the function? What is the range?

D: $(-\infty, \infty)$
R: $(-\infty, 0] \cup (2, \infty)$

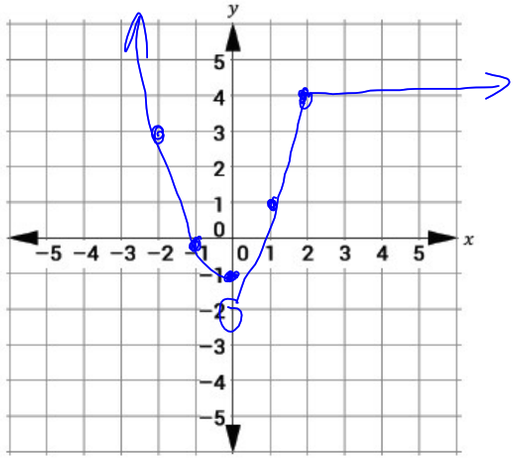
c. How do you know that the graph represents a function?

- every x-value has exactly one y-value

BEAT THE TEST!

1. Graph the following piecewise-defined function:

$$f(x) = \begin{cases} x^2 - 1, & x \le 0 \\ 3x - 2, & 0 < x \le 2 \\ 4, & x > 2 \end{cases}$$



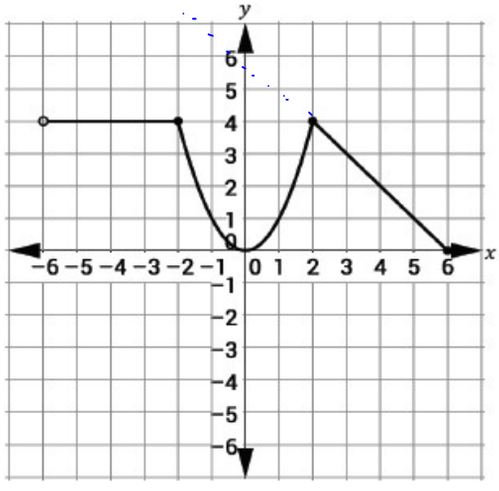
$x^2 - 1$

x	y	
0	−1	closed
−1	0	
−2	3	

$3x - 2$

x	y	
0	−2	open
1	1	
2	4	closed

2. The following graph represents a piecewise function.



Part A: Write a piecewise function that represents the graph.

$$f(x) \begin{cases} 4 & -6 \le x \le -2 \\ x^2 & -2 \le x \le 2 \\ -x+6 & 2 \le x \le 6 \end{cases}$$

Part B: Which of the following statements are true about the graph? Check all that apply.

- ☐ $f(x) = x^2$, where $-2 \leq x \leq 2$.
- ☐ The quadratic graph has a maximum at $(0, 4)$.
- ☐ The graph has an undefined slope when $-6 < x \leq -2$.
- ☐ The graph is decreasing when the domain is $(-2, 0) \cup (2, 6)$.
- ☐ The range of this piecewise function is $0 \leq y \leq 4$.
- ☐ The domain of this piecewise function is $-6 \leq x \leq 6$.