ESSENTIAL BM I: I CAN EVALUATE, GRAPH, AND WRITE PIECEWISE FUNCTIONS

Math 2 textbook, pages 301 – 304. START: Just below "For You To Do"

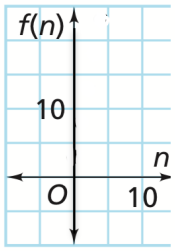
Previously, you looked at a number of functions that were defined recursively. Consider $f(n)$ below, for the whole number values of n.

$$f(n) = \begin{cases} 3 & n = 0 \\ f(n-1) + 5 & n > 0 \end{cases}$$

Use the function, $f(n)$ to complete the table

n	$f(n)$
0	
1	
2	
3	
4	

Graph the function, $f(n)$



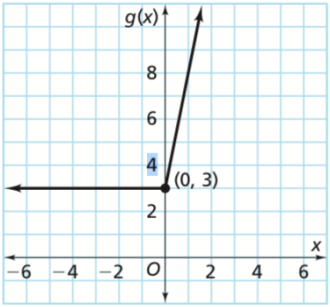
The graph of any function with a recursive definition will simply be a set of discrete points. In this case, since the natural domain of the function is $\mathbb{Z}^+$, the x-coordinate of each point will be a whole number. ($\mathbb{Z}^+$---> this symbol means the set of positive integers)

Compare the definitions of the functions below.

$$f(n) = \begin{cases} 3 & \text{if } n = 0 \\ f(n-1) + 5 & \text{if } n > 0 \end{cases} \qquad g(x) = \begin{cases} 3 & \text{if } x < 0 \\ 5x + 3 & \text{if } x \geq 0 \end{cases}$$

The definition of g is not recursive. The function g is called a _____ .
It is defined in _____ . The domain of g is the union of each _____ in the definition, which is this case is _____ .

Here is the graph of g.

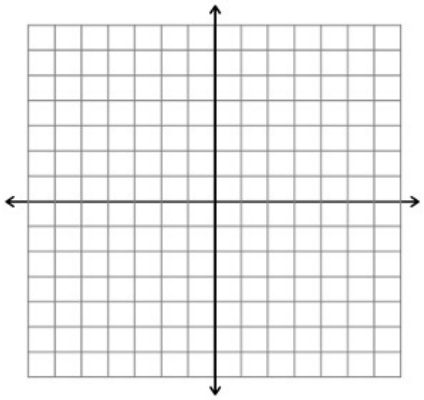


EXAMPLE 2

From bottom of page 302

Problem Sketch the graph of the function k shown below.

$$k(x) = \begin{cases} 2 - x & \text{if } x \le 1 \\ \frac{1}{2}x - 1 & \text{if } 1 < x \le 4 \\ -3x + 11 & \text{if } x > 4 \end{cases}$$



Strategy: It is helpful to make a table for each "piece" using its domain.

x	$k(x)$
-2	
-1	
0	
1	

This point is shown as a CLOSED circle because it is INCLUDED in the domain

x	$k(x)$
1	
2	
3	
4	

This point is shown as an OPEN circle because it is NOT INCLUDED in the domain

Choose one: OPEN circle CLOSED circle

x	$k(x)$
4	
5	
6	

Choose one: OPEN circle CLOSED circle

For Discussion

From page 303

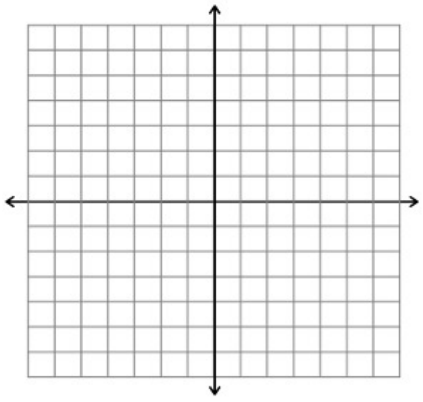
3. What are the domain and range of k?

For You to Do

From top of page 304

4. Sketch a graph of each of the following functions. Indicate whether the function is one-to-one.

a. $f(x) = \begin{cases} 3 & \text{if } x \le -1 \\ -2 & \text{if } x > -1 \end{cases}$



b. $g(x) = \begin{cases} 2x - 4 & \text{if } x < 0 \\ 2x + 4 & \text{if } x \ge 0 \end{cases}$