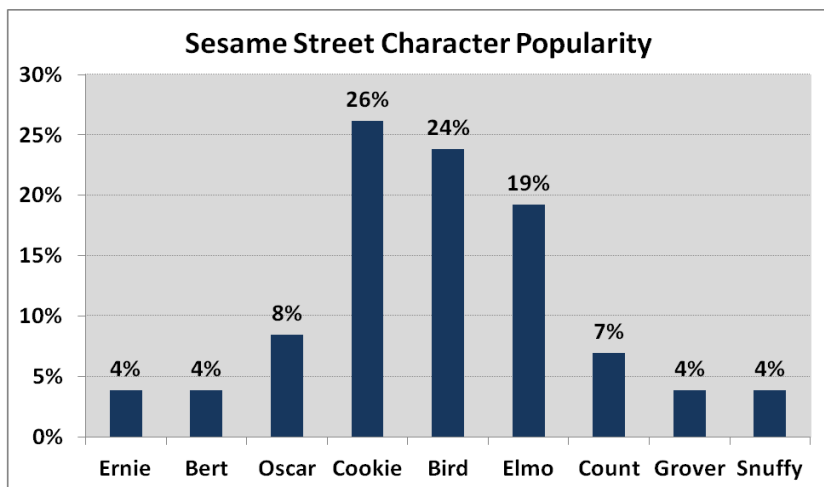


## Section 1.2 (Basics of Functions and Their Graphs)

Within ordered pairs (any set of ordered pairs is also called a relation), the first components are called the **domain** (usually the x-coordinate) and the second components are called the **range** (the y-coordinate) of the relation.



Here, the correspondence between the character and their popularity is  $\{(Ernie,4), (Bert,4), (Oscar,8), (Cookie,26), (Bird,24), (Elmo,19), (Count,7), (Grover,4), (Snuffy,4)\}$

The domain (1<sup>st</sup> values) is

The range (2<sup>nd</sup> values) is

A **function** is a relation in which each element in the domain corresponds to exactly 1 element of the range

Example: Determine if the following are functions

Domain	Range			
Ernie Bert Oscar Cookie Bird Elmo Count Grover Snuffy	4% 7% 8% 19% 24% 26%			
			$\{(1,2), (3,4), (3,5), (4,6)\}$	$\{(1,5), (2,5), (3,5)\}$
		Domain:		
		Range:		

Functions are usually given in terms of equations rather than as sets of ordered pairs. For  $y$  to be a function of  $x$ , each value for  $x$  should correspond to only 1 value for  $y$ .

Example: Determine whether each equation defines  $y$  as a function of  $x$  ( $x$  is the **independent variable** and can be assigned any value in the domain;  $y$  is the **dependent variable** because its value depends on  $x$ )

$$y = 3 - x^2$$

$$y = \sqrt{x+20}$$

$$x^2 + y^2 = 16$$

Functions are often listed as “ $f$  of  $x$ ”, “ $g$  of  $x$ ”, etc. and written as  $f(x)$ ,  $g(x)$ ,  $h(x)$ , etc. and represent the value of the given function evaluated at the number  $x$ .

Example: Consider the function  $y = \text{“}f \text{ of } x\text{”} = f(x) = 2x^2 - x$ . Evaluate  $f(2)$ ,  $f(x+1)$  and  $f(-x)$ .

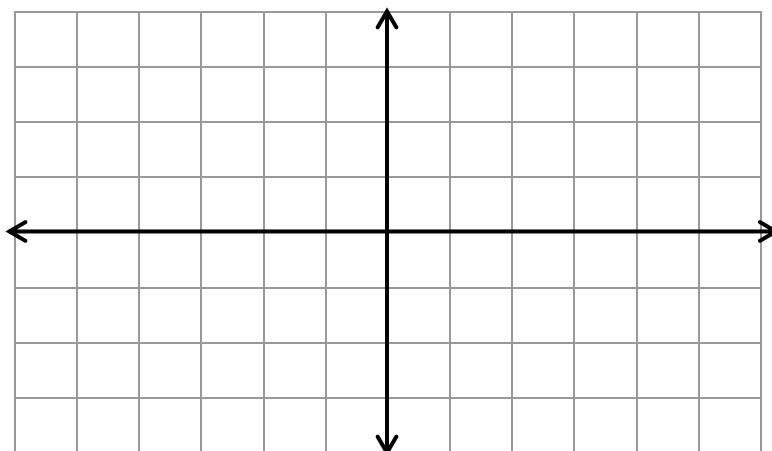
$$f(2) = 2(2)^2 - 2 = 6,$$

$$f(x+1) =$$

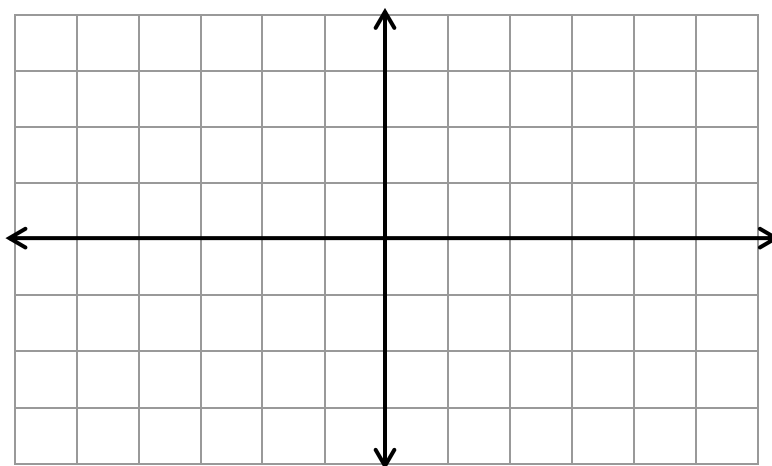
$$f(-x) =$$

The graph of a function is a graph of the ordered pairs that solve the function.

Example: Graph  $f(x) = 2x + 1$ ,  $g(x) = 2x$  and describe how they are related

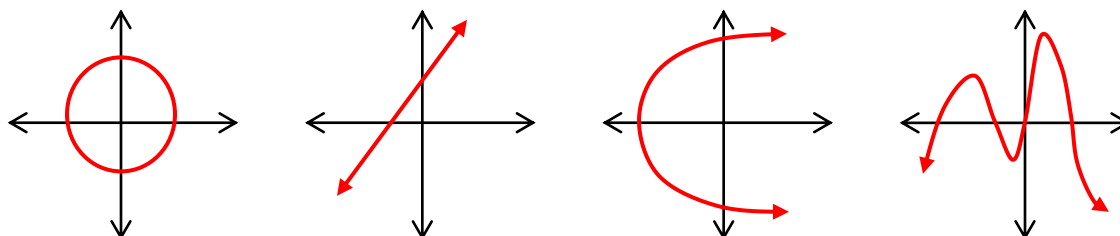


Example: Graph  $g(x) = |x|$  and  $h(x) = |x| - 3$  using  $x = -3, -1, 0,$  and  $2$  then describe how they are related



The **vertical line test** can be used to determine if a graph denotes  $y$  as a function of  $x$ . If any vertical line intersects the graph in more than 1 point, the graph does not define  $y$  as a function of  $x$ .

Example: Determine if the following graphs have  $y$  as a function of  $x$



Example: Find  $h(-2)$  in the above example and find the value of  $x$  for which  $h(x) = -3$

Example: Online HW Examples (domain, range, etc.)