

**Math 1310**  
**Section 3.2: Functions and Graphs**

You can answer many questions given a graph.

**Definition:** The graph of a function  $f(x)$  is the set of points  $(x, y)$  whose  $x$  coordinates are in the domain of  $f$  and whose  $y$  coordinates are given by  $y = f(x)$ .

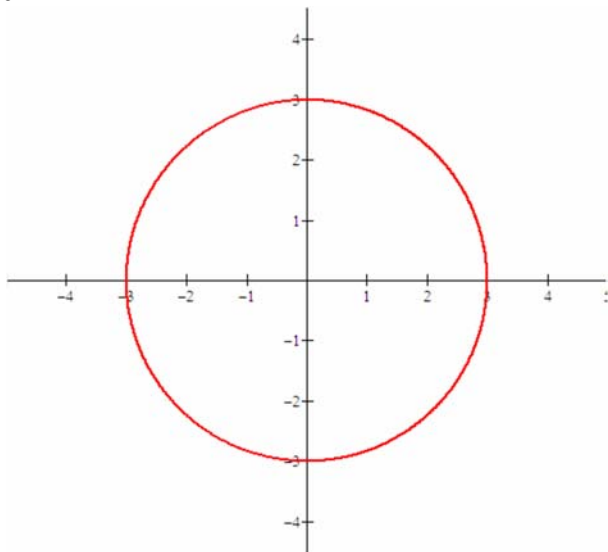
First, does the graph represent a function? To answer this, you will need to use the **vertical line test (VLT)**.

**The Vertical Line Test:**

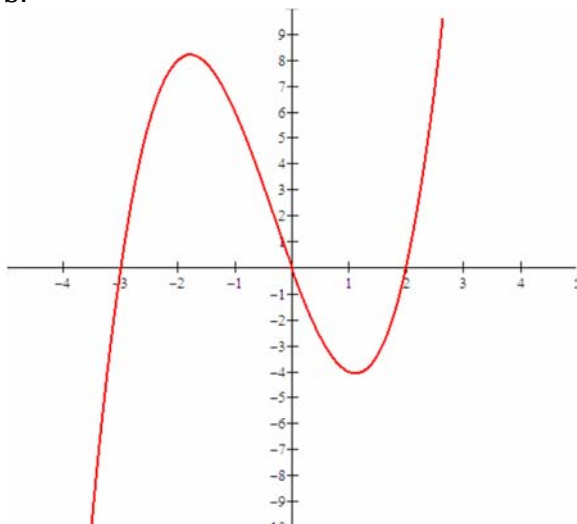
If you can draw a vertical line that crosses the graph more than once, it is NOT the graph of a function.

**Example 1:** Determine if the graph represents a function:

a.



b.



Definition: An **equation defines  $y$  as a function of  $x$**  if when one value for  $x$  is substituted in the equation, **exactly one value for  $y$  is returned.**

**Example 2:** Does the following equation define  $y$  as a function of  $x$ ?

$$y - x^2 = 4$$

1. Solve for  $y$ .
2. For each value  $x$ , do we get exactly one value for  $y$  back?

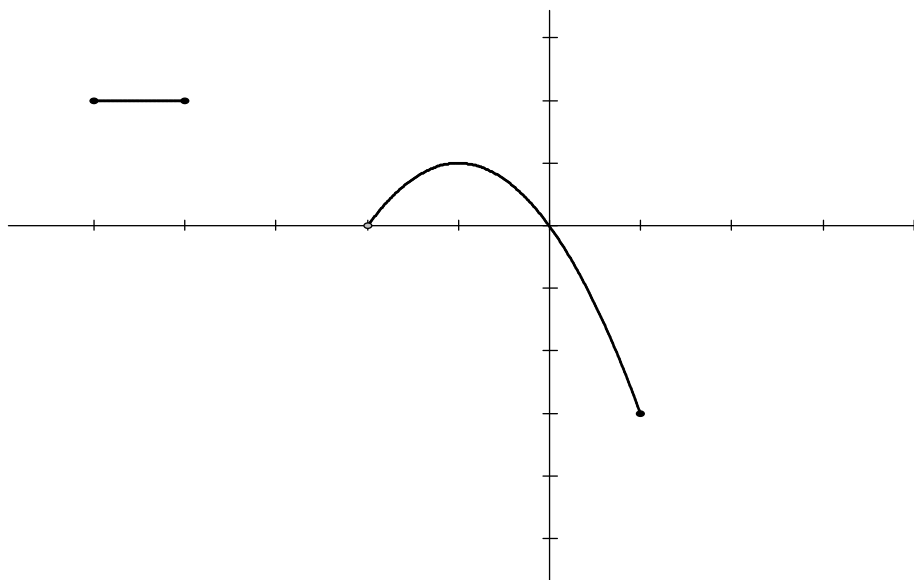
b.  $x^2 + y^2 = 9$

1. Solve for  $y$ .
2. For each value  $x$ , do we get exactly one value for  $y$  back?

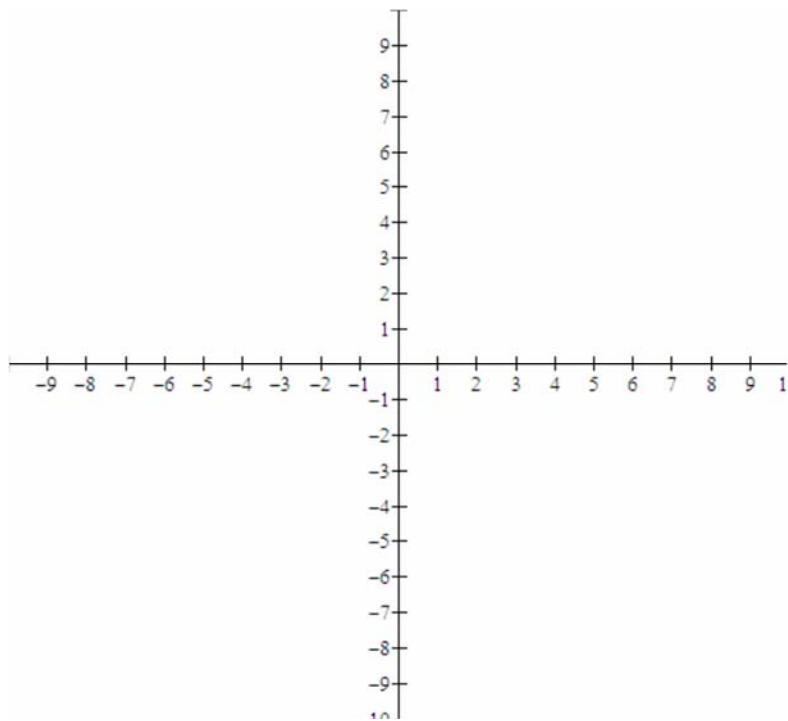
**Example 3:** Find the domain and range of the function whose graph is shown.

Domain: \_\_\_\_\_

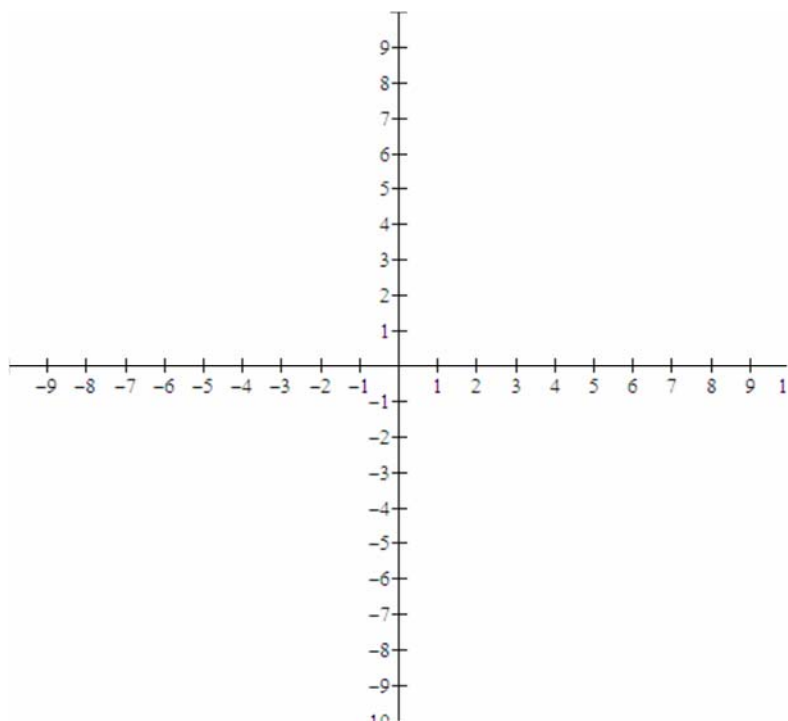
Range: \_\_\_\_\_



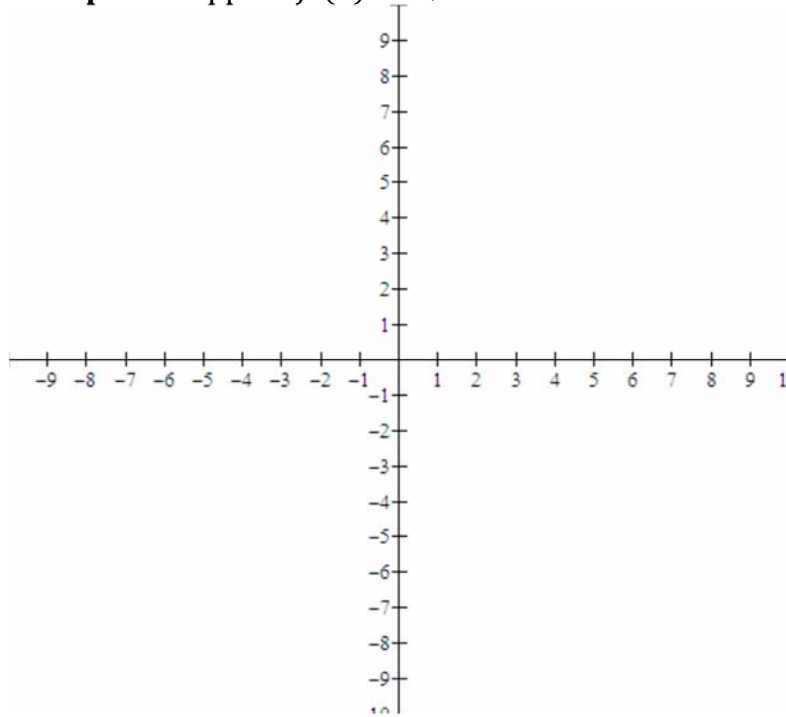
**Example 4:** Suppose  $f(x) = 2x - 5$ . State the domain of the function and graph it.



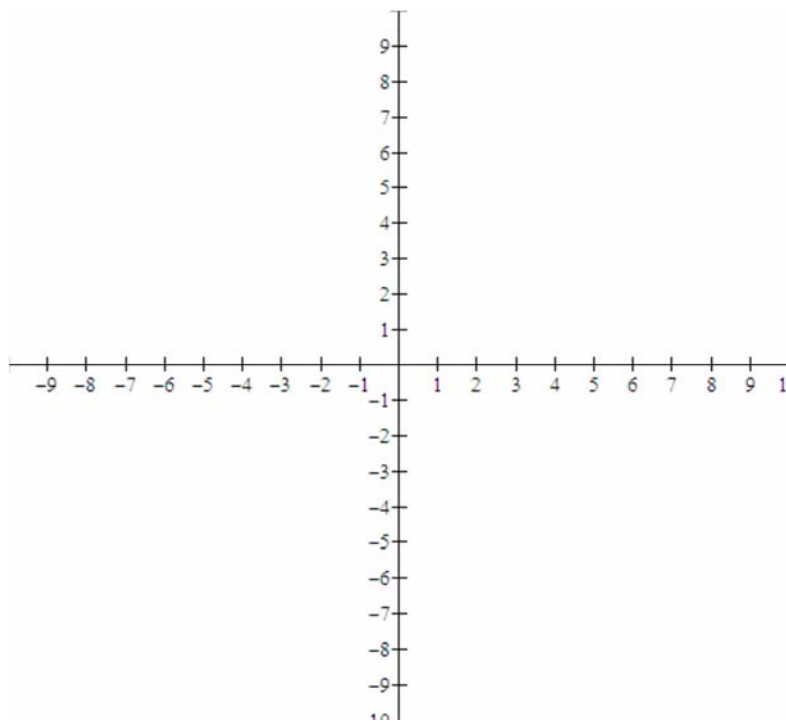
**Example 5:** Suppose  $f(x) = 4x - 1, -1 < x \leq 2$ . Graph the function.



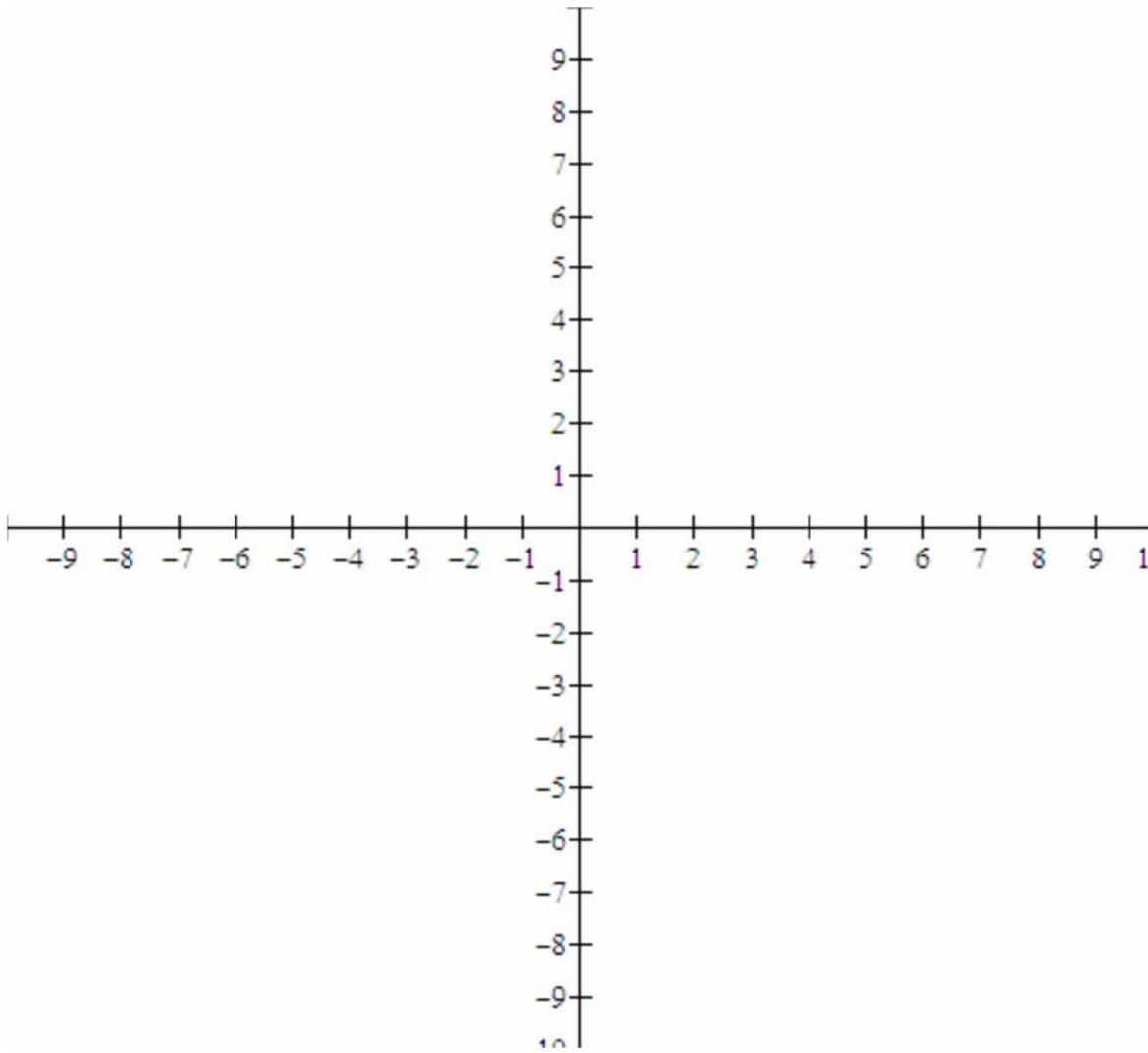
**Example 6:** Suppose  $f(x) = \sqrt{x - 1}$ . State the domain of the function and graph it.



**Example 7:** Suppose  $g(x) = |x + 2| + 1$ . State the domain of the function and graph it.

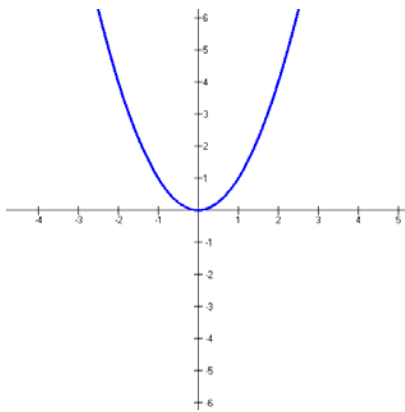


**Example 8:** Let  $P(x) = \begin{cases} -3, & x < 2 \\ x^2, & x > 2 \\ 2, & x = 2 \end{cases}$  State the domain of the function and graph it.

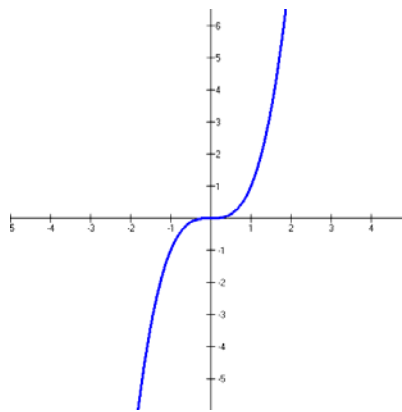


You'll also need to be able to graph functions. For now, you can do so by plotting points. But...  
**YOU MUST KNOW THESE FUNCTIONS AND GRAPHS**

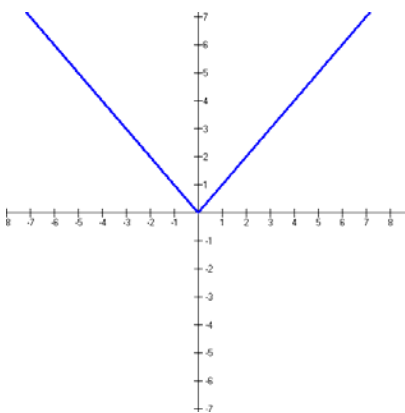
$$f(x) = x^2$$



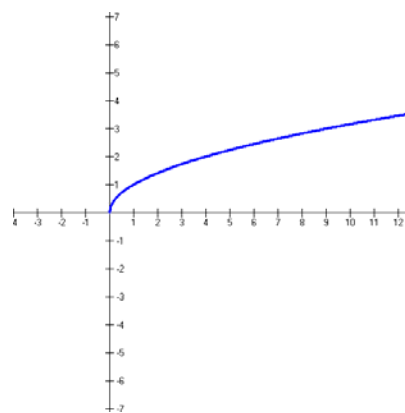
$$f(x) = x^3$$



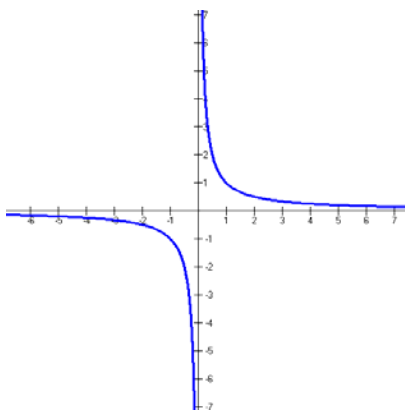
$$f(x) = |x|$$



$$f(x) = \sqrt{x}$$



$$f(x) = \frac{1}{x}$$



$$f(x) = \sqrt[3]{x}$$

