

1.2 - Functions & Graphs

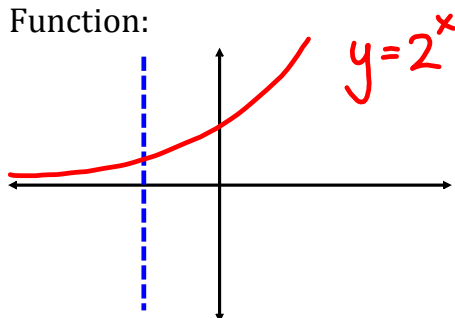
A **function** is a relation in which each input has exactly one output.

The **domain** of a function is the set of all input values (x) for which the function is defined.

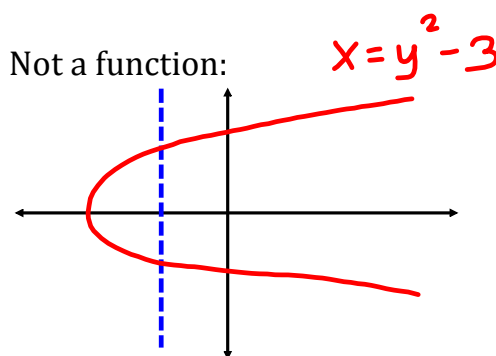
The **range** of a function is the output of the domain.

**Vertical Line Test** A vertical line drawn through the graph of a function can intersect it at most once.

Function:



Not a function:



$\{(1,2), (3,4), (5,6), (7,1)\}$

Is it a function? *yes*

What is the domain?  $\{1, 3, 5, 7\}$

*"roster method"*

What is the range?  $\{1, 2, 4, 6\}$

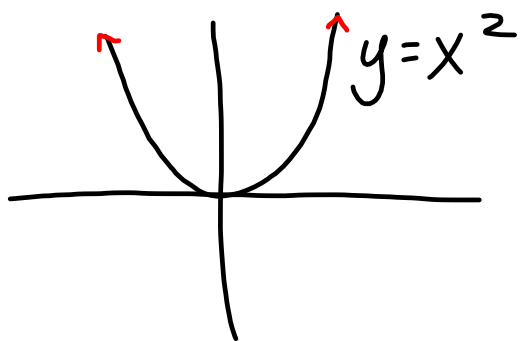
$\{(1,2), (2,2), (3,2), (4,2)\}$

Function? *yes*

Domain?  $\{1, 2, 3, 4\}$

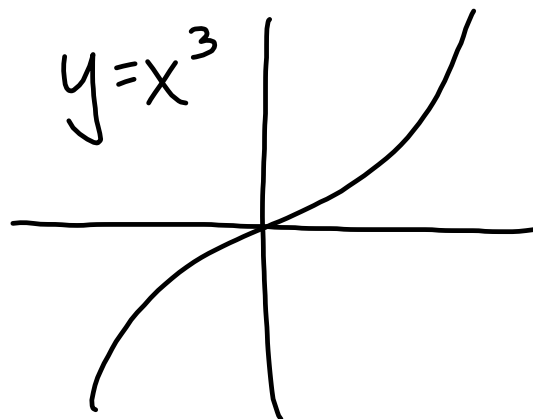
Range?  $\{2\}$

$\{(1,1), (1,2)\}$   
*not a function*



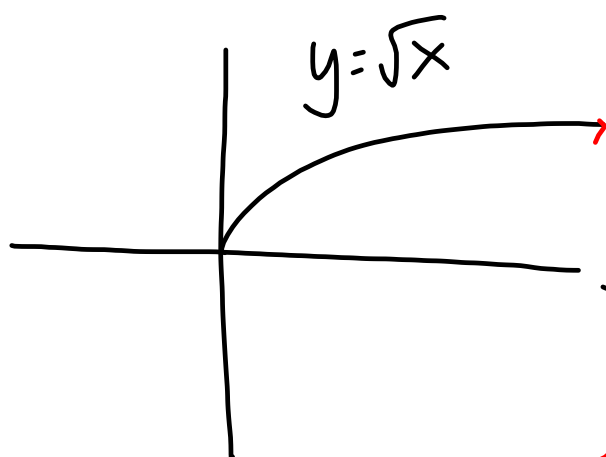
domain:  
 $(-\infty, \infty)$

range:  
 $[0, \infty)$



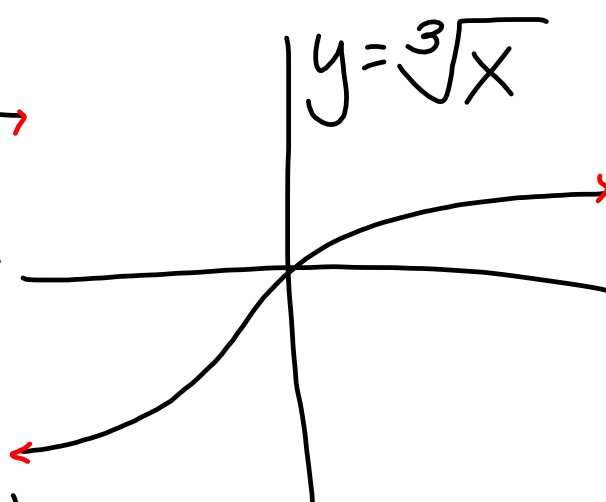
domain:  
 $(-\infty, \infty)$

range:  
 $(-\infty, \infty)$



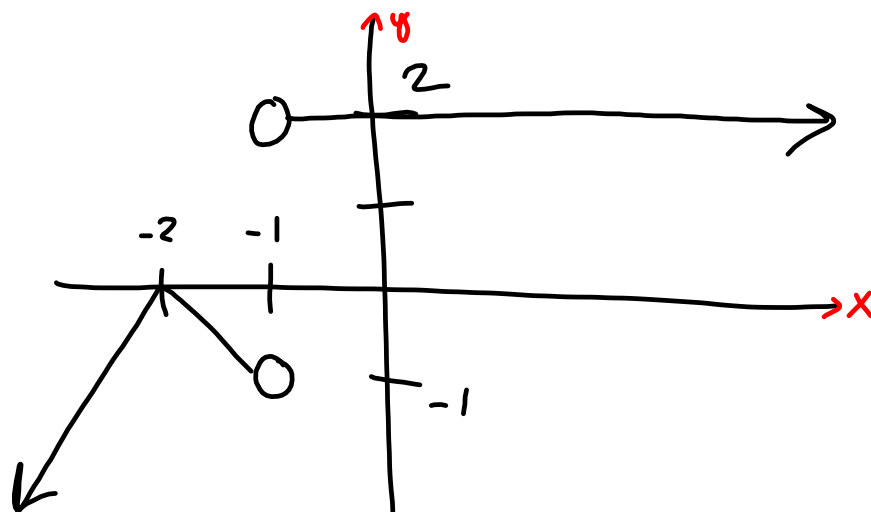
domain:  
 $[0, \infty)$

range:  
 $[0, \infty)$



domain:  
 $(-\infty, \infty)$

range:  
 $(-\infty, \infty)$



Domain: <sup>interval notation</sup>  $(-\infty, -1) \cup (-1, \infty)$  = <sup>set-builder notation</sup>  $\{x \mid x \neq -1\}$

Range:  $(-\infty, 0] \cup \{2\} = \{x \mid x \leq 0 \text{ or } x = 2\}$

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

$$\{x \mid x \geq 0\}$$

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

$$\{x \mid x \neq 0\}$$

$$f(x) = \sqrt{5-x}$$

$$5-x \geq 0 \quad -x \geq -5$$

$$5 \geq x$$

$$x \leq 5$$

$$x \leq 5$$

$$\{x \mid x \leq 5\} = (-\infty, 5]$$

domain

$$f(x) = \frac{27x+2}{5x-3}$$

$$5x-3 \neq 0$$

$$5x \neq 3$$

$$\{x \mid x \neq \frac{3}{5}\} = (-\infty, \frac{3}{5}) \cup (\frac{3}{5}, \infty)$$

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

$$\{x \mid x > 0\}$$

---

$$f(x) = \frac{7}{\sqrt{x-6}}$$

$$x-6 > 0$$

$$\{x \mid x > 6\} = (6, \infty)$$

$$f(x) = \frac{\sqrt{x+2}}{x-5}$$

$$\{x \mid x+2 \geq 0\} \quad \cap \quad \{x \mid x-5 \neq 0\}$$
$$x \geq -2 \quad \text{and} \quad x \neq 5$$

Homework #1 (due Friday, 08/15):

- 1.2: #15-29odd (determining if a relation is a function; determining function values)  
#40,41,42,45,48 (determining domain of a function)  
#59-70all (determining if a graph is a function; domain & range from graph)
- 1.4: #35-47odd; 53-63odd (determining equations of lines; parallel v. perpendicular)
- 1.5: #1-16all (determining characteristics of functions from graphs)  
#47-61odd (determining function values of & graphing piecewise functions)  
#69-74all (finding domain, range & equation given graph of a piecewise function)