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)

1.6: #23,29,31; 45, 49, 51; 63, 71,75; 81, 83 (algebra of functions)

1.7: #9,11,21,23; 39-47odd (symmetry tests)
#59-69odd; 77-83 odd; 93-101odd; 115-121odd (graphing with transformations)

2.4: #1,2; 15-22all; 23-27odd (parabolas)

2.4: #3-13 odd

1.2 - Functions & Graphs

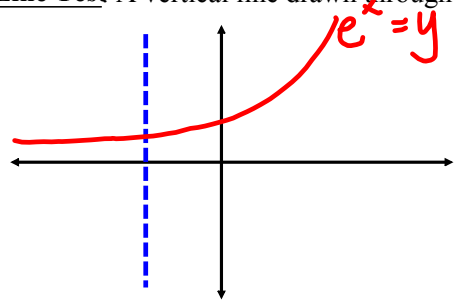
A **function** is a relation in which each input has exactly one output.

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

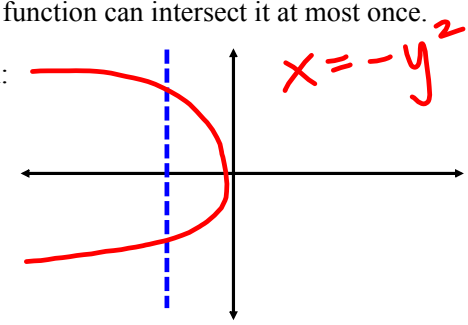
The **range** of a function is the output of the domain.

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? $\{1,3,5,7\}$

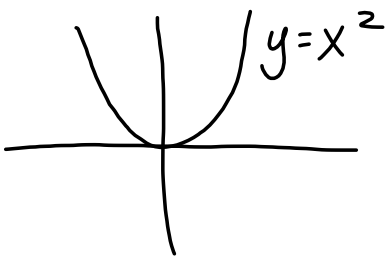
What is the range? $\{1,2,4,6\}$

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

Function? yes

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

Range? $\{2\}$



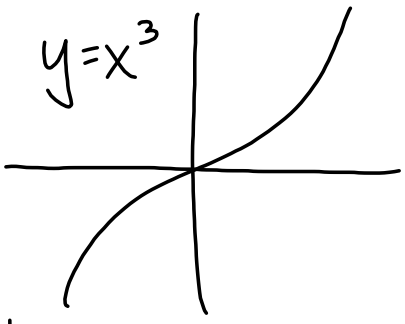
domain: $\mathbb{R}$

$(-\infty,\infty)$

$\{x \mid x \in \mathbb{R}\}$

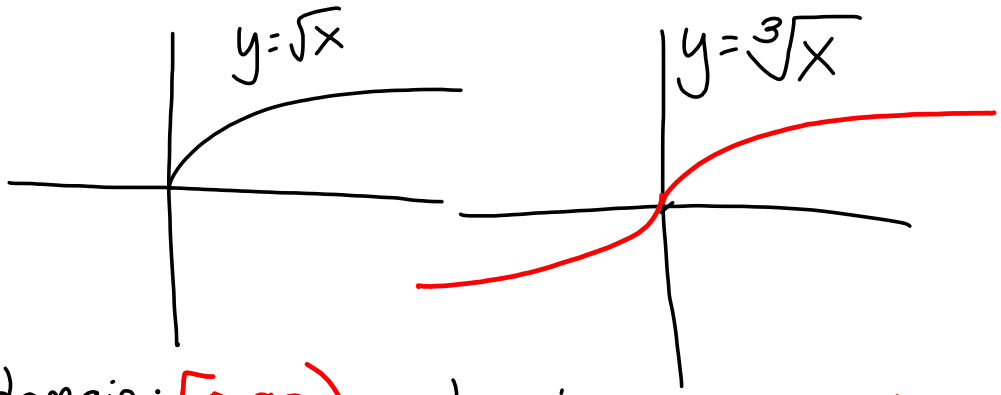
range: $[0,\infty)$

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



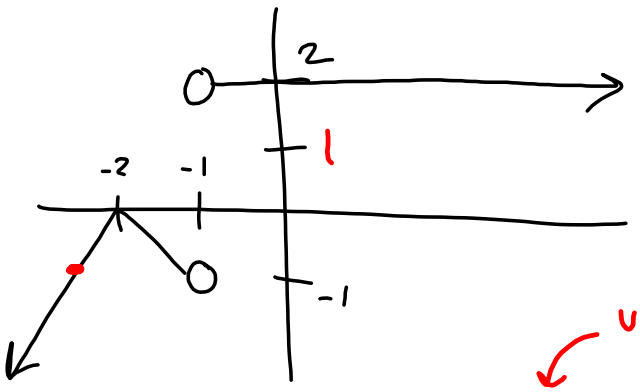
domain: $(-\infty,\infty)$

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



domain: $[0,\infty)$ domain: $(-\infty,\infty)$

range: $[0,\infty)$ range: $(-\infty,\infty)$



union

domain: $(-\infty,-1) \cup (-1,\infty)$

range: $(-\infty,0] \cup \{2\}$

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

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

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

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

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

domain:

$\{x \mid 5-x \geq 0\}$

$= \{x \mid 5 \geq x\} = \{x \mid -x \geq -5\}$

$= \boxed{\{x \mid x \leq 5\}}$ set-builder notation

$= (-\infty, 5]$ interval notation

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

domain:

$\{x \mid 5x-3 \neq 0\}$

$= \{x \mid x \neq 3/5\}$

$= (-\infty, 3/5) \cup (3/5, \infty)$

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

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

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

domain: $\{x \mid x-6 > 0\} = \{x \mid x > 6\}$

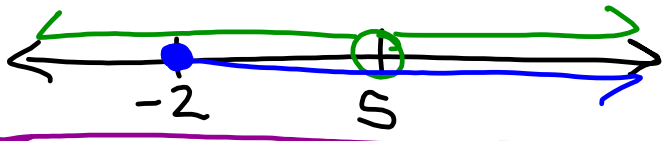
$= (6, \infty)$

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

$x-5\neq 0$ and $x+2\geq 0$

$\{x|x\neq 5\}$ $\cap$ $\{x|x\geq -2\}$

$\cap$ ← intersection



$[-2,5)\cup(5,\infty)$

$\{x|-2\leq x<5 \text{ or } x>5\}$

Find the function value

$f(x)=2x^2-5$

$f(3)=2(3)^2-5=13$

$f(x)=-x^3-x^2$

$f(-2)=-(-2)^3-(-2)^2=-(-8)-(4)=8-4=\boxed{4}$

$f(x) = 5x^2 - 4x$

$f(x+h) = 5(x+h)^2 - 4(x+h)$

$= 5(x^2+2xh+h^2) - 4x - 4h$

$= 5x^2+10xh+5h^2-4x-4h$

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

$f(x-7) = \frac{\sqrt{x-7-3}}{x-7+5} = \frac{\sqrt{x-10}}{x-2}$

$x-2 \neq 0$ and $x-10 \geq 0$

$x \neq 2$ $x \geq 10$

domain of $f(x-7)$: $[10, \infty) = \{x \mid x \geq 10\}$