

## What's Going On?

 Checking In

H.W. Logs

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 Minds on

Wrapping Up Parent Functions

 Action!

Domain and Range

 Consolidation

Function Creation

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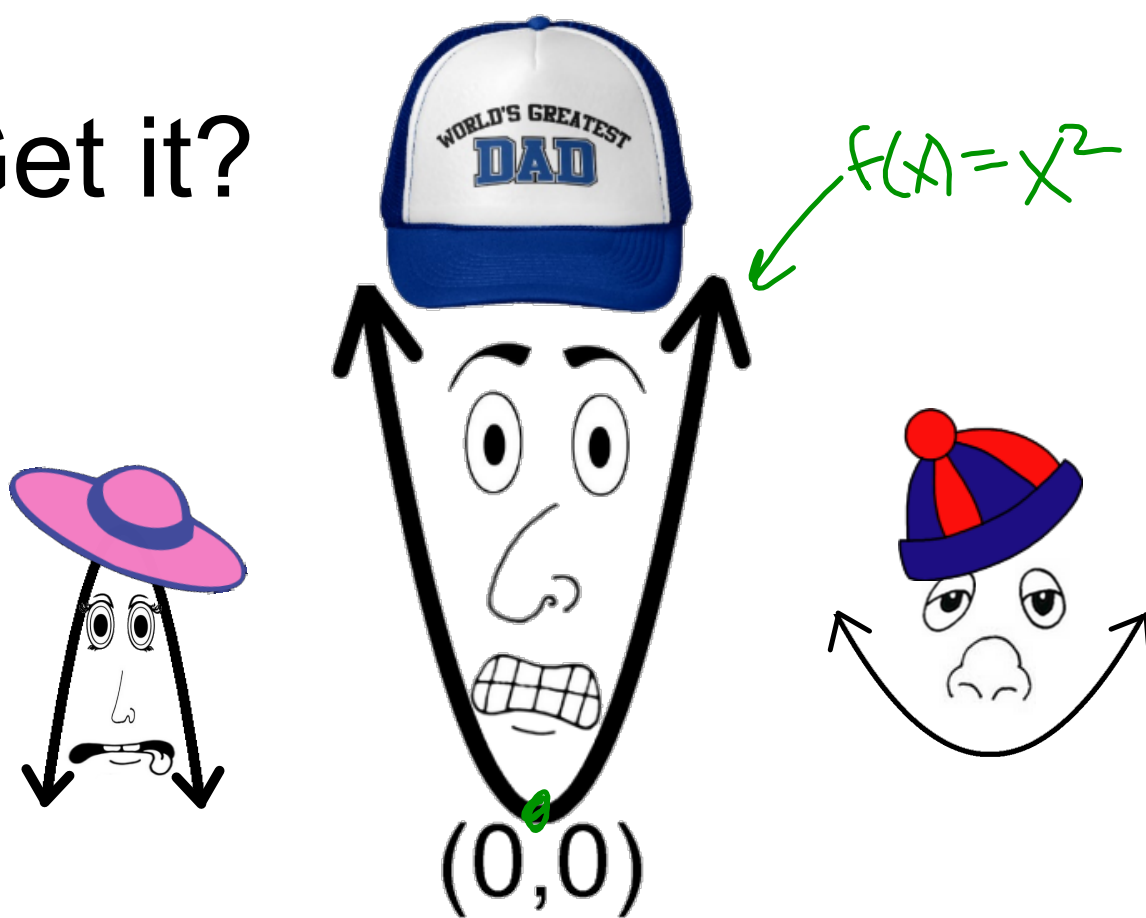
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Learning Goal - I will be able to determine the domain and range of functions from their equations and graphs.

What's happening at  
**gilbertmath.com?**

Get it?





# Parent Functions

We have 5.

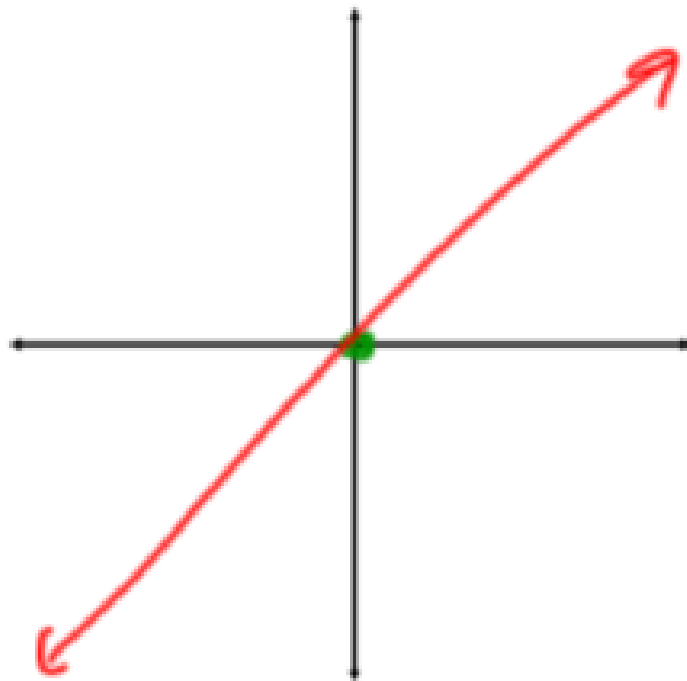
You need to know them inside and out!

# Linear Function

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$$f(x) = x$$

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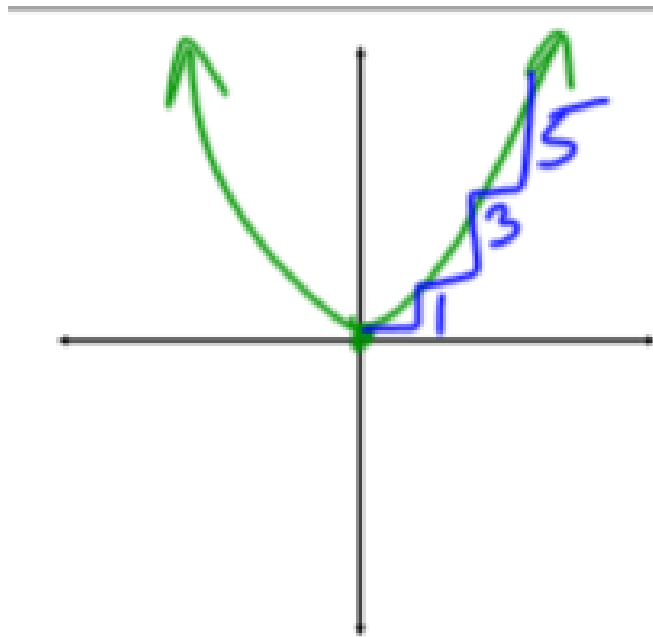


- it's a line!
- goes through the origin
- slope of 1 (m)
- y-intercept of 0 (b)
- x-intercept of 0
- $y=mx+b$  form is  $y = 1x + 0$

## Quadratic Function

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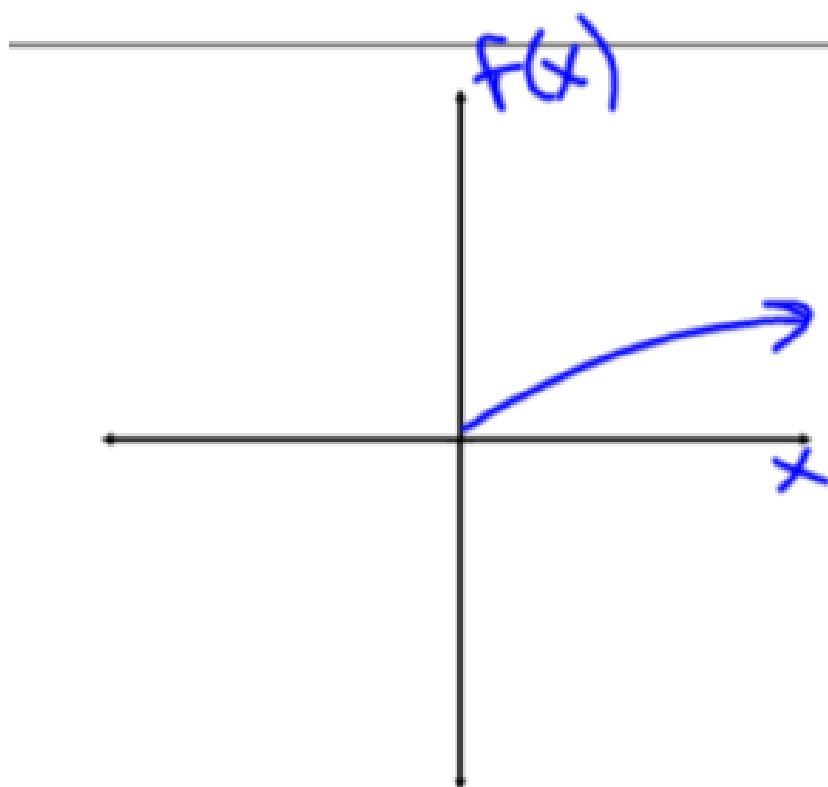
$$f(x) = x^2$$



- it's a parabola
- opens up
- vertex at (0, 0)
- step pattern is 1, 3, 5, 7, ...
- x and y-intercepts are both 0
- in vertex form  $y = a(x-h)^2 + k$   
 $a = 1, h = 0, k = 0$
- the curve has not been stretched or compressed
- has a minimum but no maximum

# Square Root Function

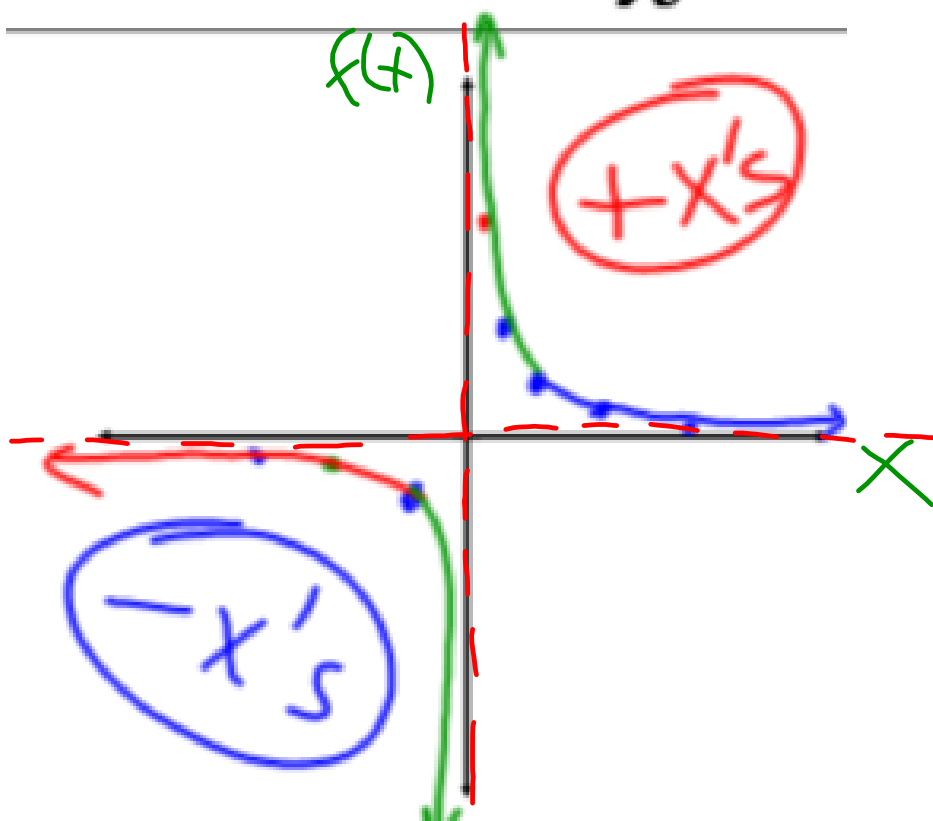
$$f(x) = \sqrt{x}$$



- y is always positive
- when  $x = 1$ ,  $y = 1$
- when  $0 < x < 1$ ,  $x < f(x)$
- when  $x > 1$ ,  $x > f(x)$
- increasing from left to right
- growth slows down

# Reciprocal Function

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



- two asymptotes (the x-axis and the y-axis)
  - $x = 0$  and  $y = 0$
- When x is POSITIVE
  - as  $|x|$  increases,  $f(x)$  decreases (approaches zero)
  - as  $|x|$  decreases,  $f(x)$  increases (approaches infinity)
- When x is NEGATIVE
  - as  $|x|$  increases,  $f(x)$  decreases (approaches zero)
  - as  $|x|$  decreases,  $f(x)$  increases (approaches negative infinity)

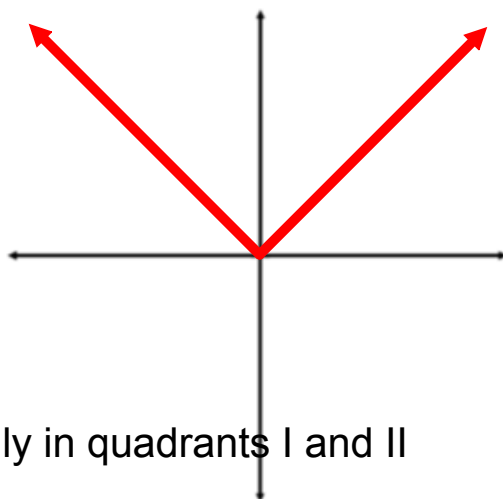


### ABSOLUTE VALUE FUNCTION

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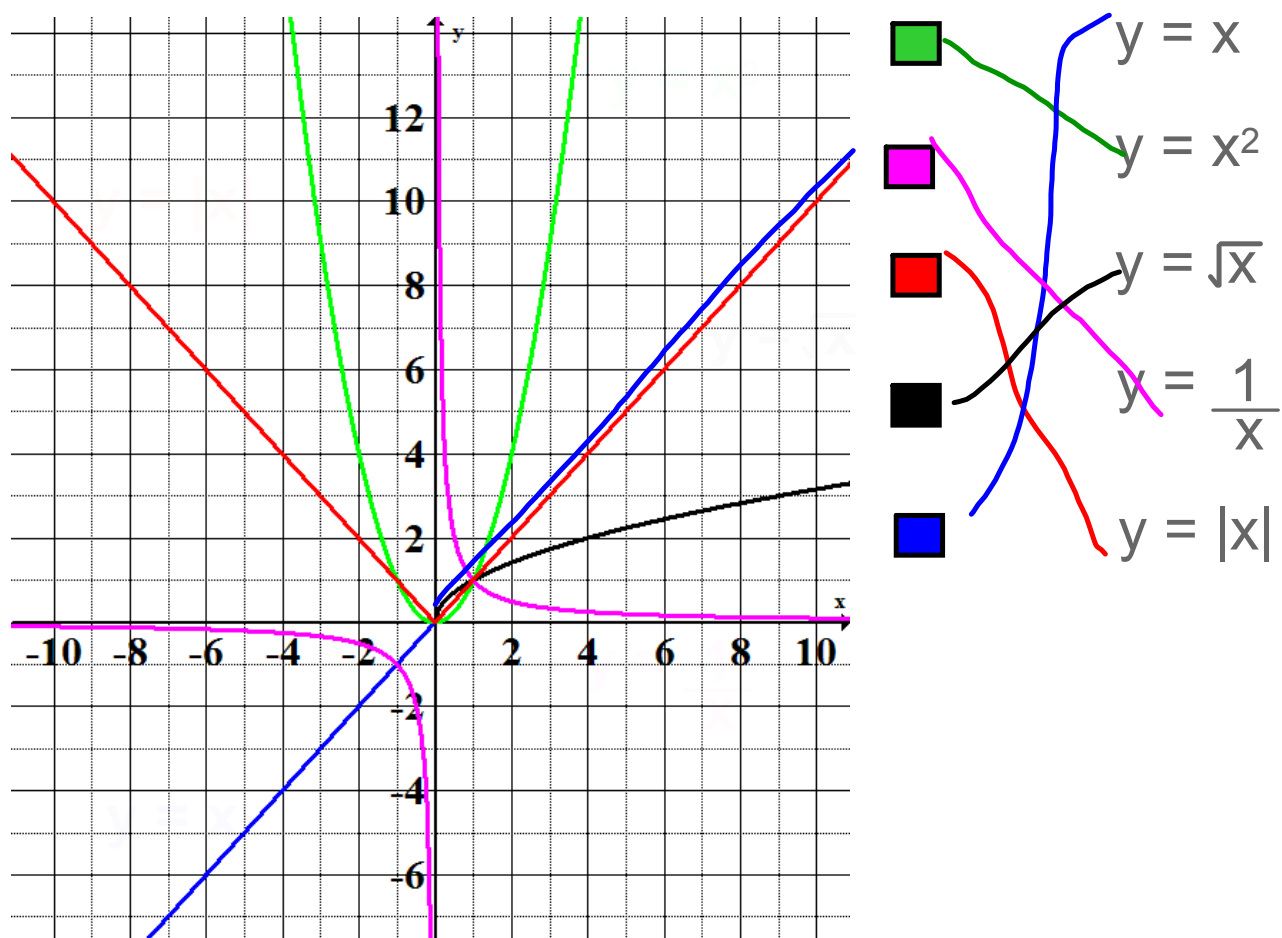
$$f(x) = |x|$$

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- only in quadrants I and II
- starts at (0,0)
- both parts are at a 45 degree angle to the horizontal
- slope of right side is 1
- slope of left side is -1
- $f(x) = f(-x)$  for any  $x$
- $f(x)$  is always POSITIVE or ZERO

# Match 'em Up!



**Action!**

# Domain and Range

First, number systems!

NEW TERM

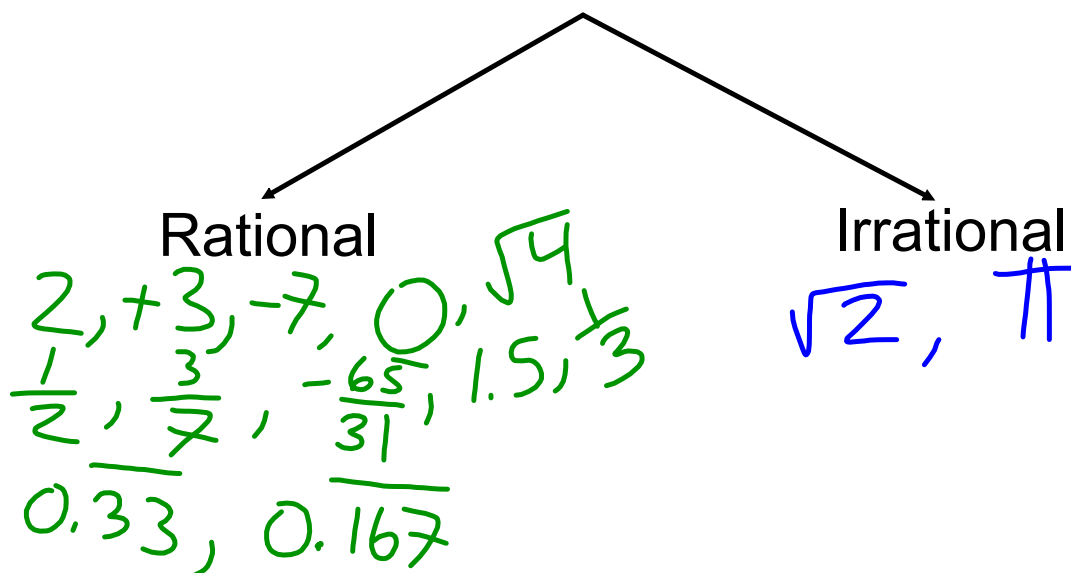
## Real Numbers:

Numbers that are either rational or irrational; these include positive and negative integers, zero, fractions, and irrational numbers such as  $\sqrt{2}$  and  $\pi$ .

## Action!

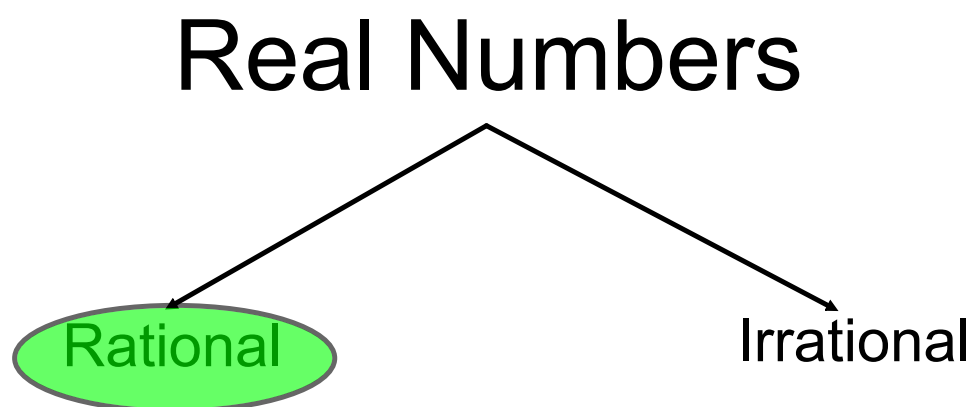
Real numbers are either Rational or Irrational

# Real Numbers



An irrational number is any number that CANNOT be represented as a fraction of two integers.

**Action!**



Rational Numbers include all *integer fractions*, integers, whole numbers and natural numbers.

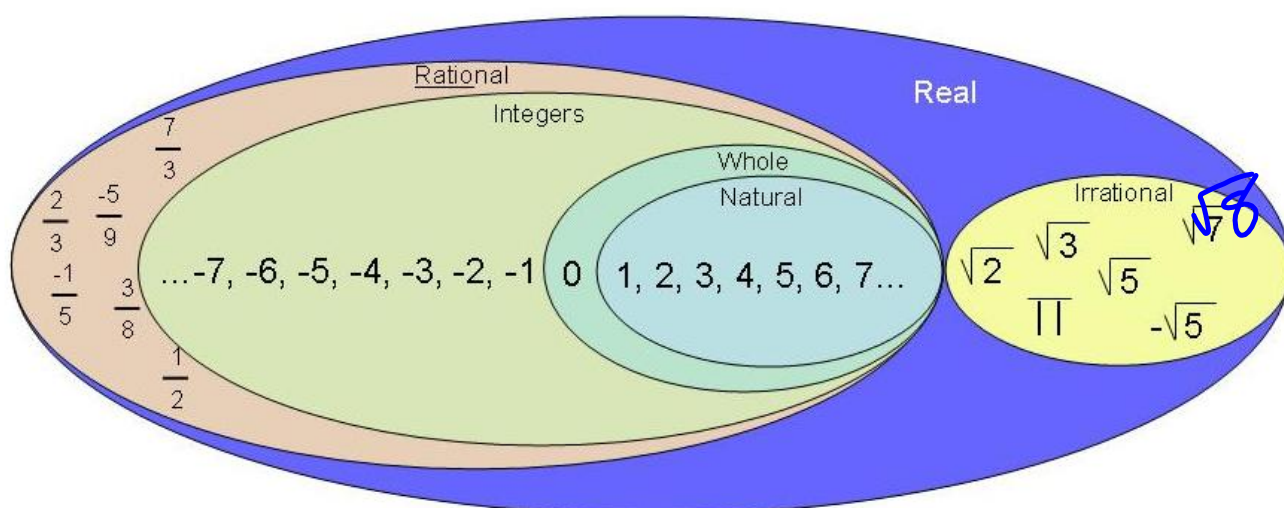
**All natural numbers are whole numbers.**

**All whole numbers are integers.**

**All integers are rational.**

**Action!**

Real



## 1.4 Determining the Domain and Range of a Function

Natural	Whole	Integer	Rational	Irrational
$\mathbb{N}$	$\mathbb{W}$	$\mathbb{Z}$	$\mathbb{Q}$	$\overline{\mathbb{Q}}$

$\mathbb{R}$

real

**Action!**

## Domain and Range

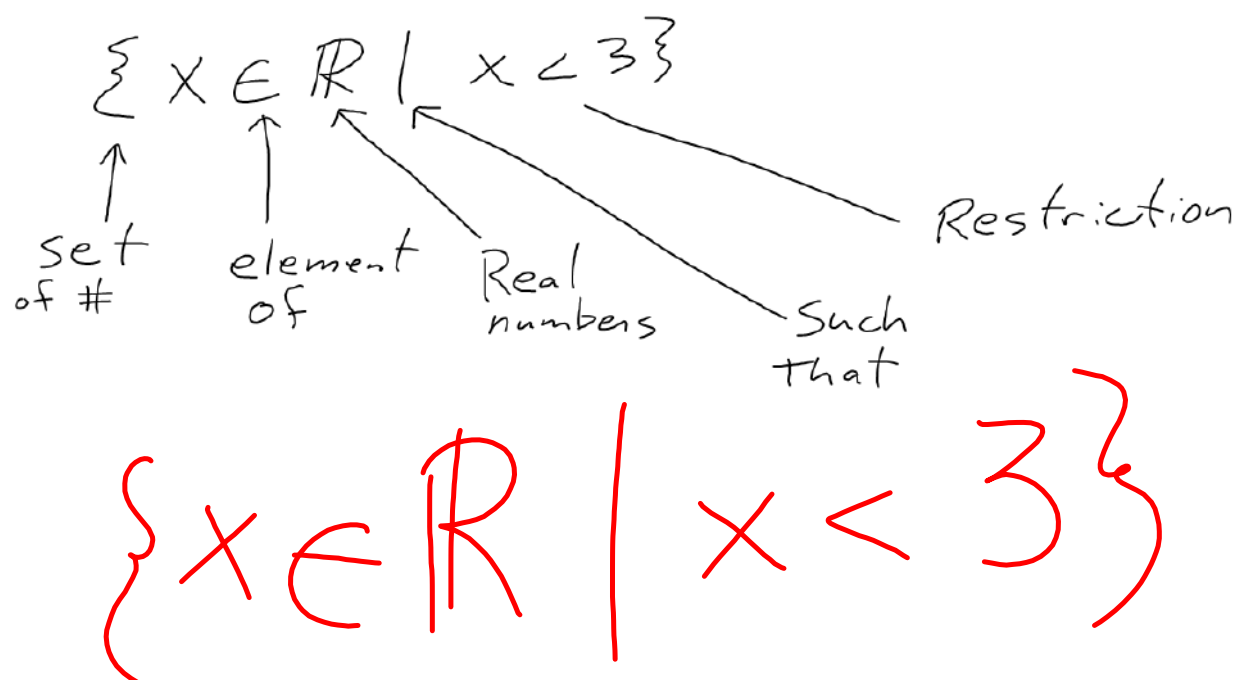
The domain of a relation is the set of all values of the independent variable.

x

The range of a relation is the set of all values of the dependent variable.

y or  $f(x)$



**Set Notation:**

$x$  is an element of the real numbers such that  $x$  is less than 3

**Action!**

# Domain and Range

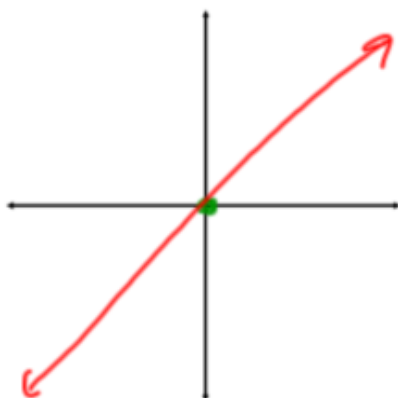
Let's revisit our parent functions!

Linear Function

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$$f(x) = x$$

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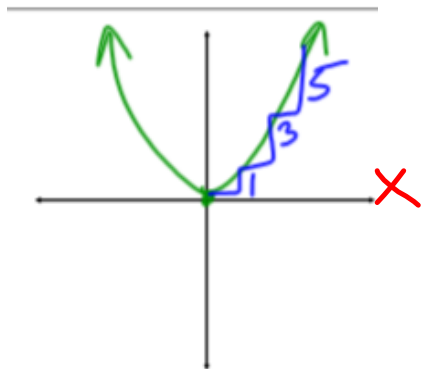


$$\text{Domain} = \{x \in \mathbb{R}\}$$

$$\text{Range} = \{y \in \mathbb{R}\}$$

## Quadratic Function

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

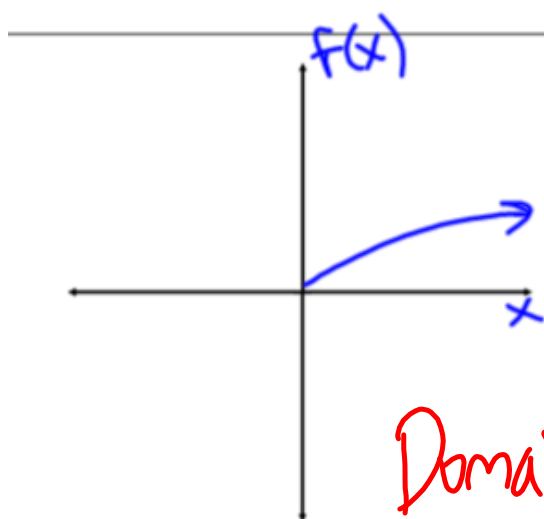


$$\text{Domain} = \{x \in \mathbb{R}\}$$

$$\text{Range} = \{y \in \mathbb{R} \mid y \geq 0\}$$

## Square Root Function

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

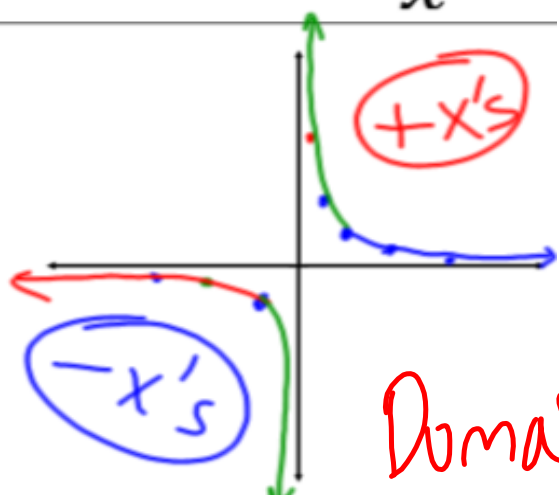


$$\text{Domain} = \{x \in \mathbb{R} \mid x \geq 0\}$$

$$\text{Range} = \{y \in \mathbb{R} \mid y \geq 0\}$$

## Reciprocal Function

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



$$\text{Domain} = \{x \in \mathbb{R} \mid x \neq 0\}$$
$$\text{Range} = \{y \in \mathbb{R} \mid y \neq 0\}$$

## Absolute Value Function

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

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