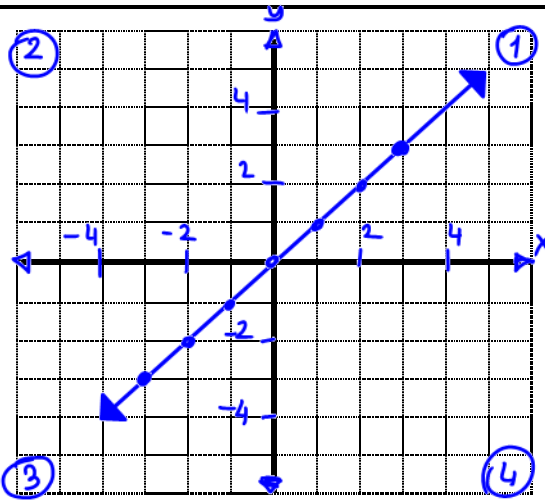
Parent functions are the **simplest** functions in a family (a group of functions with similar characterics.)

1. Linear $f(x) = x$

x	f(x)
-3	-3
-2	-2
-1	-1
0	0
1	1
2	2
3	3



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

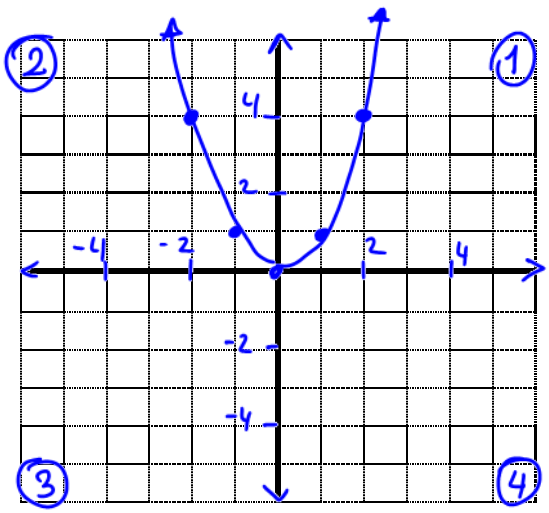
Range $\{y \in \mathbb{R}\}$

Special Features:

- Straight line that goes through origin
- Slope is 1
- divides the Cartesian plane in half diagonally
- graph only in quadrants ① and ③

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

x	f(x)
-3	$(-3)^2=9$
-2	$(-2)^2=4$
-1	$(-1)^2=1$
0	0
1	1
2	4
3	9



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

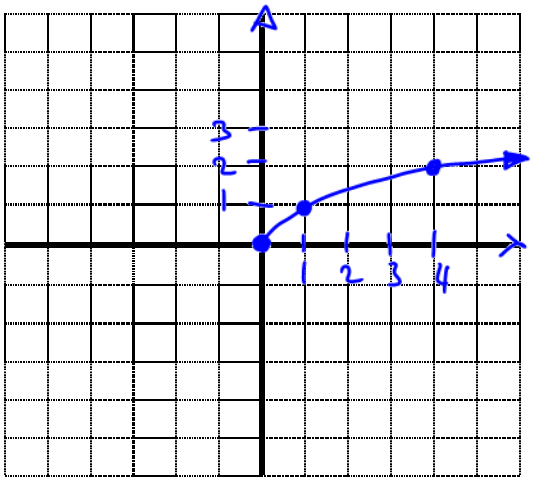
Range $\{y \in \mathbb{R} \mid y \geq 0\}$

Special Features:

- parabola that opens up
- vertex at the origin
- has a min
- "y" axis is axis of symmetry (a.o.s)
- graph only in quadrants ① and ②

3. Root $f(x) = \sqrt{x}$

x	f(x)
0	$\sqrt{0}=0$
1	$\sqrt{1}=1$
4	$\sqrt{4}=2$
9	$\sqrt{9}=3$



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

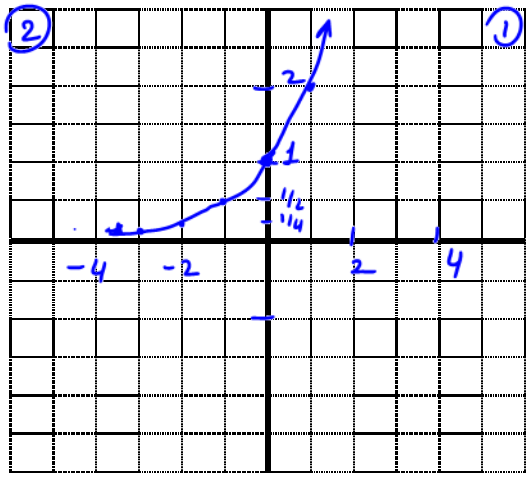
Range $\{y \in \mathbb{R} \mid y \geq 0\}$

Special Features:

- the curve begins at the origin and rises in a concave downward way
- the rate of rise is forever slowing although never stopping to rise.
- graph only in quadrant ①
- min 0, no max
- x-int = 0
- y-int = 0

4. Exponential $f(x) = 2^x$

x	f(x)
-3	$2^{-3}=1/8$
-2	1/4
-1	1/2
0	1
1	2
2	4
3	8



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

Range $\{y \in \mathbb{R} \mid y > 0\}$

An **asymptote** is a line that a graph gets closer and closer to, but never actually touches.

This graph has one asymptote. What is the equation of it?

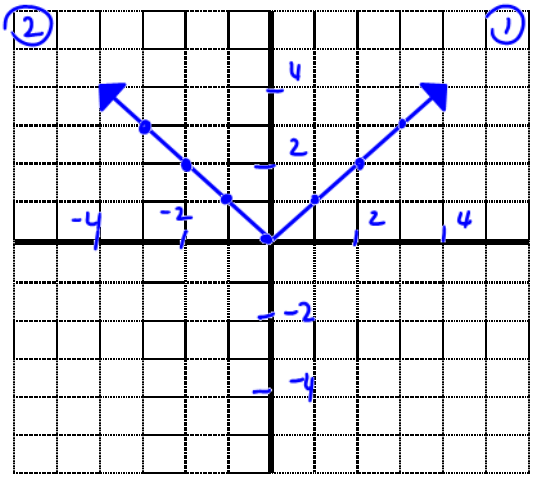
$y = 0$

Features
- y-int = 1
- asymptote y=0
- graph in ① and ②
- growth

5. Absolute Value $f(x) = |x|$

The absolute value sign, $|\ |$, means to take the value of the number and drop the negative signs. For example, the absolute value of –5 which is written as $|-5|$ is 5.

x	f(x)
-3	$\|-3\|=3$
-2	2
-1	1
0	0
1	1
2	2
3	3



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

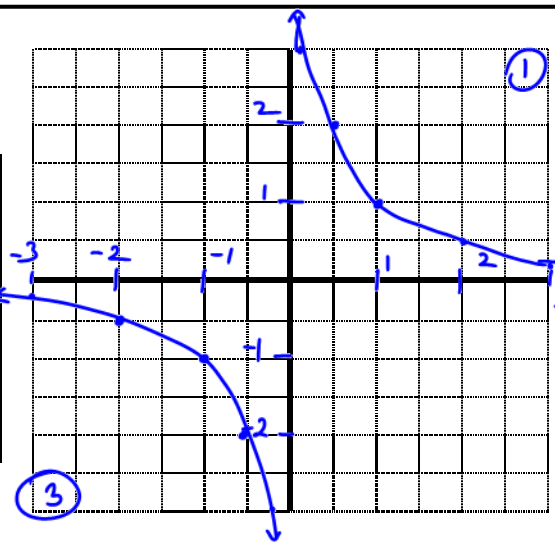
Range $\{y \in \mathbb{R} \mid y \geq 0\}$

- graph in ① and ②
- has a min 0
- symmetric about x=0
- x-int (0,0)
- y-int (0,0)
- vertex (0,0)

6. Reciprocal $f(x) = \frac{1}{x}$

***Leave your y values as fractions**

x	f(x)	x	f(x)
-3	$-1/3$	3	$1/3$
-2	$-1/2$	2	$1/2$
-1	-1	1	1
$-\frac{1}{2}$	-2	$\frac{1}{2}$	2
$-\frac{1}{3}$	-3	$\frac{1}{3}$	3



Domain $\{x \in \mathbb{R} \mid x \neq 0\}$

Range $\{y \in \mathbb{R} \mid y \neq 0\}$

This graph has two asymptotes. What are their equations?

$y = 0$

$x = 0$

Features
- hyperbola
- no max no min
- symmetrical
- graph in ① and ③