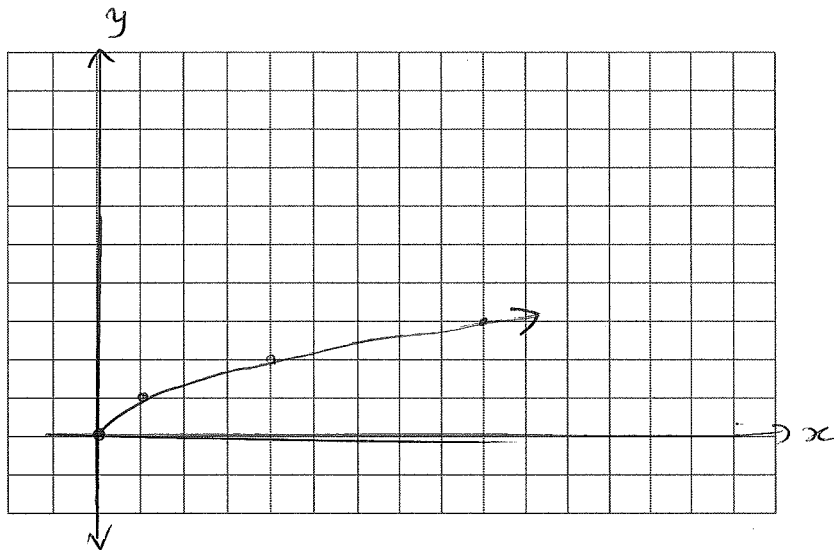


1.3: Properties of Parent Functions

Square Root Function

1. Complete the table of values for $y = \sqrt{x}$.

x	-1	0	1	2	3	4	9	16
y	NOT DEFINED (ERROR)	0	1	1.41	1.73	2	3	4

2. Draw a graph of this function for $x \in \mathbb{R}$.3. Does the value of y ever reach a minimum? maximum? Explain.

Minimum of 0. $\sqrt{\quad}$ always produces a result ≥ 0 .

4. State the domain and range of this function.

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

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

5. What are the special features of this function?

- Sideways parabola.
- It has a minimum.
- domain and range are restricted to quadrant 1.

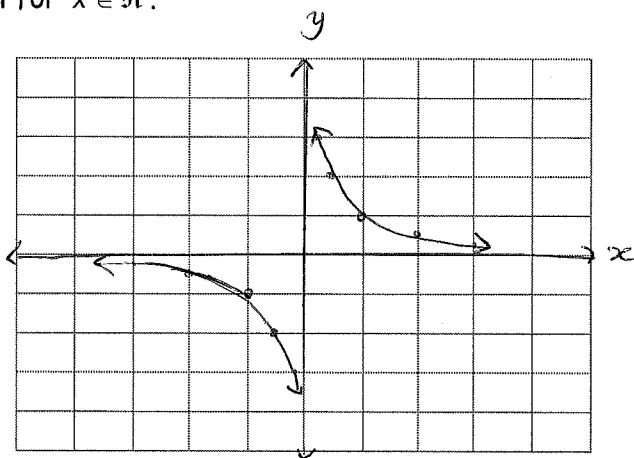
Reciprocal Function

1. Complete the table of values for $y = \frac{1}{x}$.

x	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	1	2	3	4
y	4	3	2	1	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$

x	$-\frac{1}{4}$	$-\frac{1}{3}$	$-\frac{1}{2}$	-1	-2	-3	-4
y	-4	-3	-2	-1	$-\frac{1}{2}$	$-\frac{1}{3}$	$-\frac{1}{4}$

2. Graph the function for $x \in \mathbb{R}$.



3. Why is $x = 0$ not used in the table of values?

Since we can not divide by 0, x cannot be 0 when $y = \frac{1}{x}$.

4. As the value of x increases to the right of the y -axis, what happens to the value of y ?

y -values approach 0.

5. As the value of x decreases to the left of the y -axis, what happens to the value of y ?

y -values approach 0.

6. State the domain and range for this function.

$$D = \{x \in \mathbb{R} \mid x \neq 0\} \quad R = \{y \in \mathbb{R} \mid y \neq 0\}$$

7. What are the special features of this function?

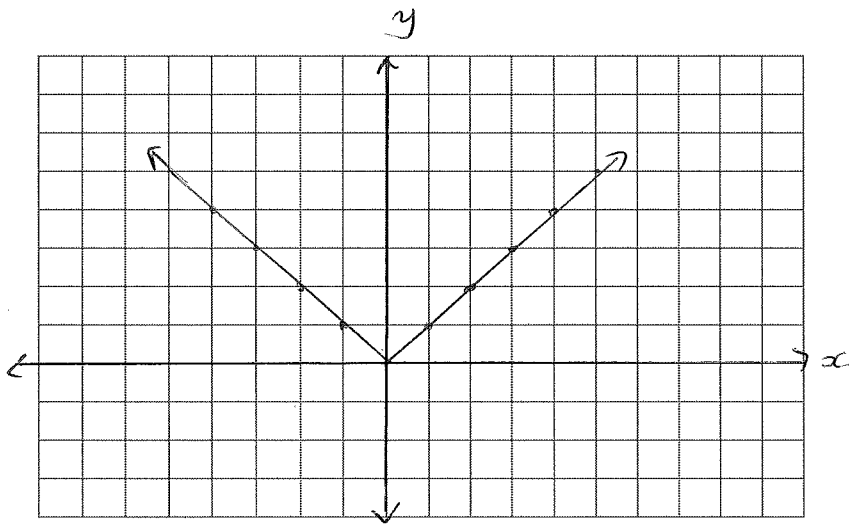
It has a horizontal asymptote $y = 0$ and vertical asymptote $x = 0$.

Absolute Value Function

1. Complete the table of values for $y = |x|$.

x	-3	-2	-1	0	1	2	3	4
y	3	2	1	0	1	2	3	4

2. Draw a graph of this function for $x \in \mathbb{R}$.



3. Does the value of y ever reach a minimum? maximum? Explain.

The minimum value of y is 0.

4. State the domain and range of this function.

$$D = \{x \in \mathbb{R}\}$$

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

5. What are the special features of this function?

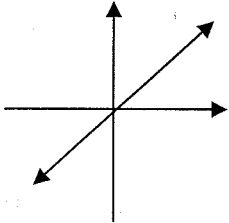
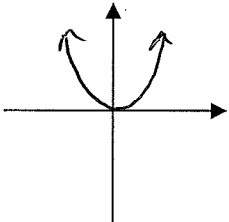
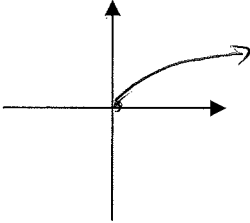
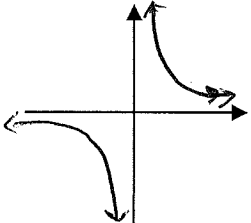
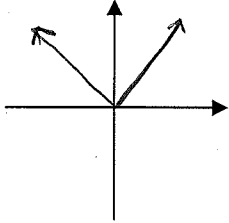
Graph in Q1 and Q2

Minimum of 0

2 straight lines (one positive slope and the other is negative)

y is always positive.

1.3 - Properties of Parent Functions - Summary

Equation	Name	Sketch	Special Features	Domain
				Range
$y = x$	linear		<ul style="list-style-type: none"> • straight line through origin • graph in quadrants 1 and 3 • no max or min y values 	$\{x \in \mathbb{R}\}$
				$\{y \in \mathbb{R}\}$
$y = x^2$	parabola		<ul style="list-style-type: none"> • parabola through the origin • graph in quadrants 1 and 2 • minimum of 0. 	$\{x \in \mathbb{R}\}$
				$\{y \in \mathbb{R} \mid y \geq 0\}$
$y = \sqrt{x}$	square root		<ul style="list-style-type: none"> • graph in Q1 • minimum of 0 	$\{x \in \mathbb{R} \mid x \geq 0\}$
				$\{y \in \mathbb{R} \mid y \geq 0\}$
$y = \frac{1}{x}$	reciprocal		<ul style="list-style-type: none"> • graph in Q1 and Q3 • horizontal asymptote $y = 0$ • vertical asymptote $x = 0$ • no max/min 	$\{x \in \mathbb{R} \mid x \neq 0\}$
				$\{y \in \mathbb{R} \mid y \neq 0\}$
$y = x $	absolute value graph.		<ul style="list-style-type: none"> • graph in Q1 and Q2 • minimum of 0. • 2 straight lines one with positive slope and other with negative 	$\{x \in \mathbb{R}\}$
				$\{y \in \mathbb{R} \mid y \geq 0\}$

Homework: Text: p. 35 #1-4, 10, 14

Read 1.1 - 1.4, especially Key Ideas and Need to Know for each Section (Reminder: Quiz tomorrow)