MCR3U Feb 24

Ms. Kueh

Parent Functions

Parent functions are the simplest functions in a family (a group of functions with similar characterics.) Later, you will learn how to move and to transfer these functions, so you must memorize these parent functions.

Check graphs at home on the graphing program geogebra. To download:

http://www.geogebra.org/cms/en/installers

It's **free!** This is an extremely useful tool for this course.

In the program, use ^ for exponents. $sqrt(x)$ for square root. $abs(x)$ for absolute value.

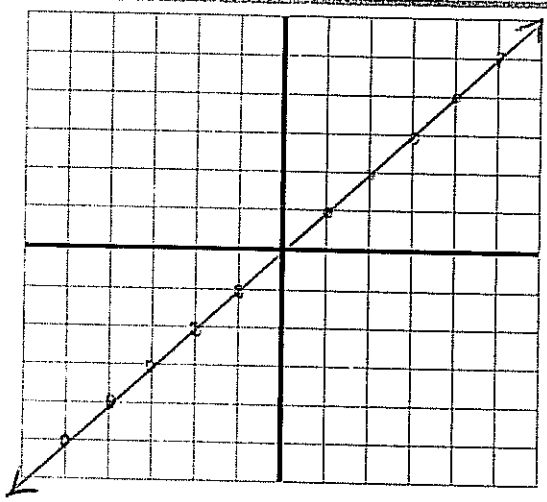
Youtube ① "Six Basic Functions" by Randy Anderson → mandatory

② "Exploring Properties of Parent Functions – MCR3U1 ^{SS} → optional

③ "Introduction to exponential Functions" by Bill Witte → mandatory

1. Linear $f(x) = x$ (Function)

x	$f(x)$
−3	−3
−2	−2
−1	−1
0	0
1	1
2	2
3	3



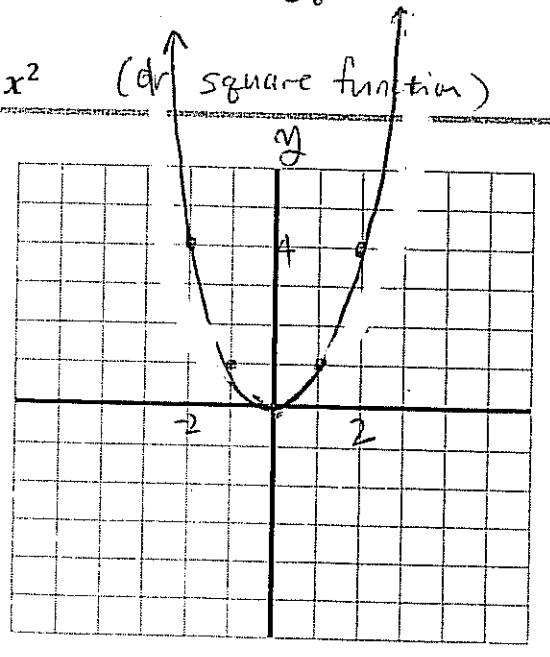
Domain $\{x \in \mathbb{R}\}$

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

* Note: You must memorize and match name, shape and the equation of all 7 parent functions.

2. Quadratic $f(x) = x^2$ (or square function)

x	$f(x)$
−3	9
−2	4
−1	1
0	0
1	1
2	4
3	9

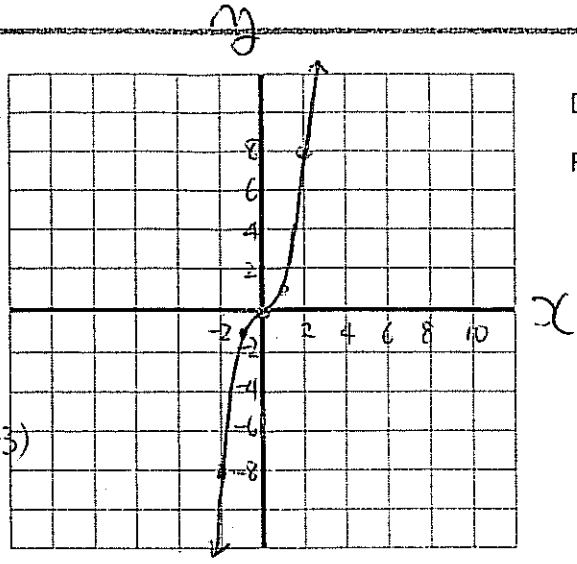


Domain $\{x \in \mathbb{R}\}$

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

3. Cubic $f(x) = x^3$

x	$f(x)$
−3	−27
−2	−8
−1	−1
0	0
1	1
2	8
3	27



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

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

Nick Name : Waterfall

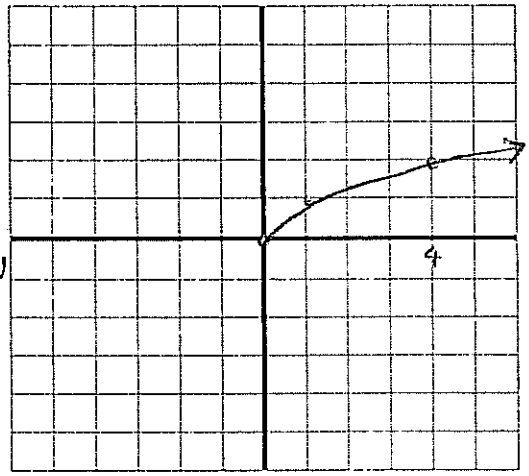
$f(-3) = (-3)^3 = (-3) \times (-3) \times (-3)$

$= -27$

$f(-2) = (-2)^3 = -8$

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

x	$f(x)$
0	0
1	1
4	2
9	3



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

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

* When x is a negative number $f(x)$ is non — real number.
∴ x can never become a negative number.

* Nick Name : Space arrow (= arrow without gravity)

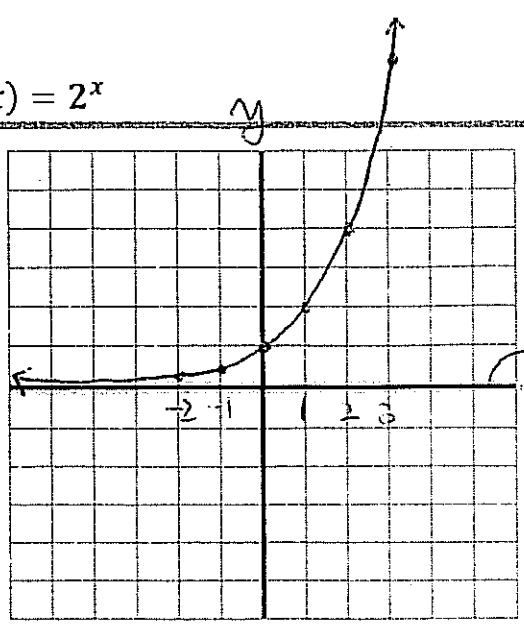
$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

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

x	f(x)
-3	$\frac{1}{8}$
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8

$2^{-1} = \frac{1}{2}$

$2^{-2} = \frac{1}{2^2}$



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

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

$y = 0$ is asymptote.

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

This graph has one asymptote. What is it?

$y = 0$

* y can never be negative number.

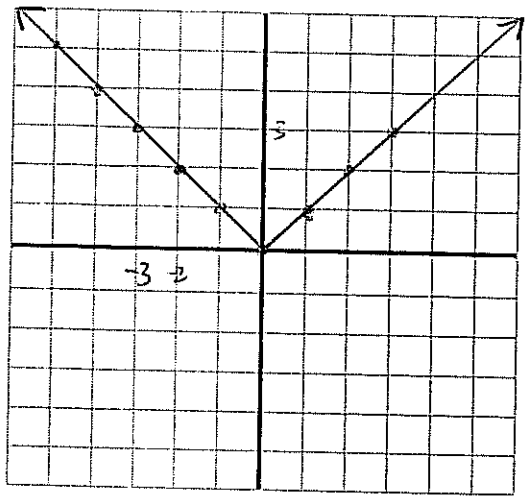
* y never touches x axis.

* Nick name : (Skateboard) Ramp

6. 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
−2	2
−1	1
0	0
1	1
2	2
3	3



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

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

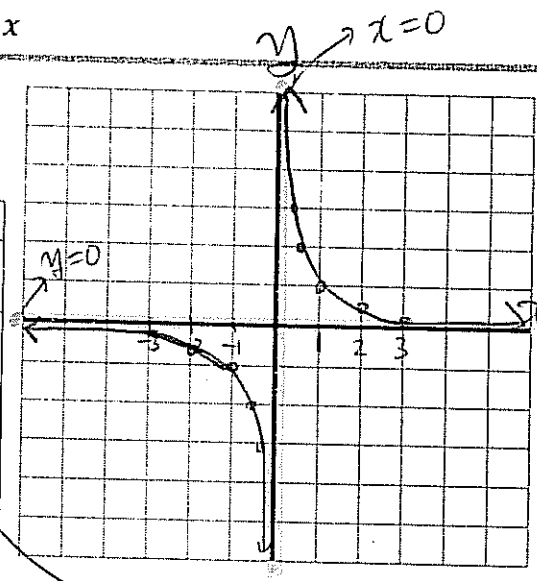
* Nick Name : V shape or "flying V"

* Remember: Absolute Value

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

*Leave your y values as fractions

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



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

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

This graph has two asymptotes. What are their equations?

$x = 0$

$y = 0$

* Nick Name: Butterfly

$$f\left(\tfrac{1}{2}\right) = \frac{1}{\left(\frac{1}{2}\right)} = 1 \div \frac{1}{2} = 1 \times \frac{2}{1} = 2$$

$$f\left(-\tfrac{1}{3}\right) = \frac{1}{\left(-\frac{1}{3}\right)} = 1 \div \left(-\tfrac{1}{3}\right) = 1 \times -\frac{3}{1} = \frac{-3}{1} = -3$$

* Announcement: Quiz on Wed (only radicals)