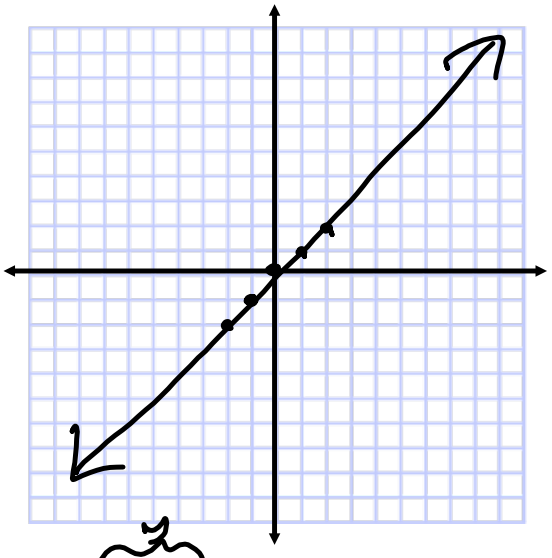
1.2 Parent Functions

Objectives:

1. I can graph parent functions

- Linear
- Absolute Value
- Exponential
- Quadratic
- Cubic
- Square Root
- Cube root

Linear



$f(x) = x$

x	y
-2	-2
-1	-1
0	0
1	1
2	2

Equation: $f(x) = x$

$y = x$

Domain $(-\infty, \infty)$

Range $(-\infty, \infty)$

Increasing $(-\infty, \infty)$

Decreasing never

Left End Behavior $-\infty$

Right End Behavior ∞

Odd/Even/Neither

x-intercepts $(0, 0)$

y-intercepts $(0, 0)$

Maximum none

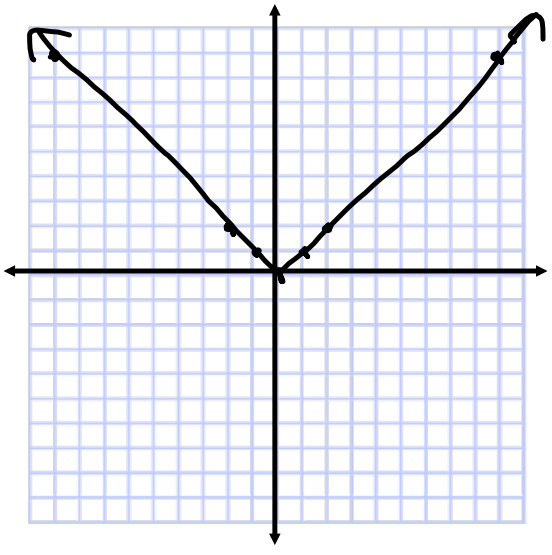
Minimum none

One-to-One yes

Asymptotes/ Discontinuities none

Absolute Value

Equation: $f(x) = |x|$



$f(x) = |x|$

x	y
-2	2
-1	1
0	0
1	1
2	2

Domain $(-\infty, \infty)$

Range $[0, \infty)$

Increasing $[0, \infty)$

Decreasing $(-\infty, 0]$

Left End Behavior ∞

Right End Behavior ∞

Odd/Even/Neither

x-intercepts $(0,0)$

y-intercepts $(0,0)$

Maximum none

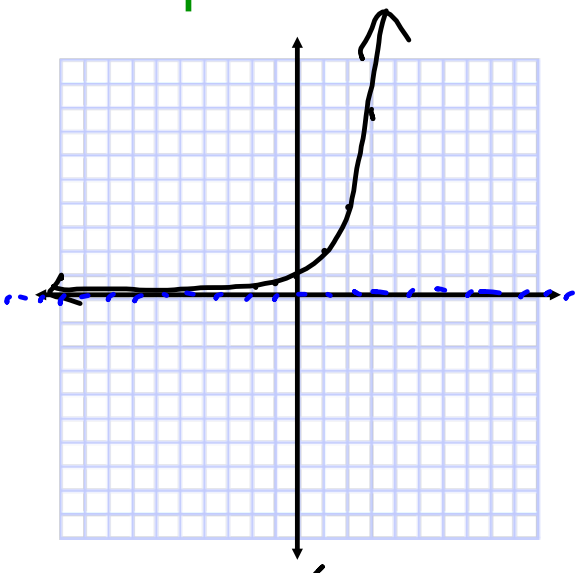
Minimum $(0,0)$

One-to-One no

Asymptotes/ Discontinuities no

Exponential

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



$f(x)=2^x$

x	y
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8

Domain $(-\infty,\infty)$

Range $(0,\infty)$

Increasing $(-\infty,\infty)$

Decreasing NA

Left End Behavior 0

Right End Behavior ∞

Odd/Even/Neither

x-intercepts NA

y-intercepts $(0,1)$

Maximum NA

Minimum NA

One-to-One yes

Asymptotes/ $y=0$

Discontinuities

$2^{-2}=\frac{1}{2^2}=\frac{1}{4}$

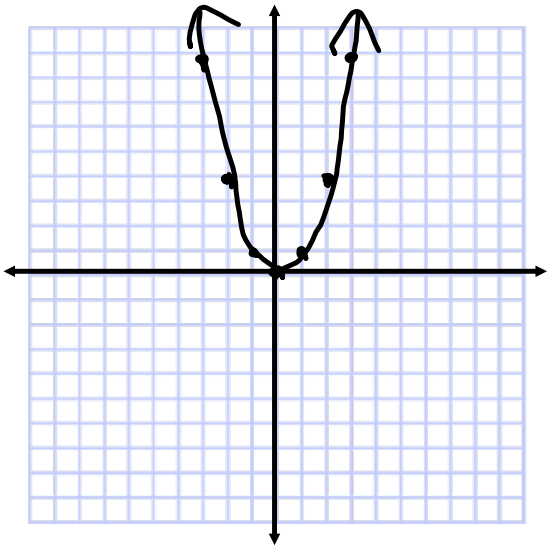
$2^{-1}=\frac{1}{2^1}=\frac{1}{2}$

$2^0=1$

$2^3=2\cdot2\cdot2=8$

Quadratic

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



$f(x)=x^2$

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

Domain $(-\infty, \infty)$

Range $[0, \infty)$

Increasing $[0, \infty)$

Decreasing $(-\infty, 0]$

Left End Behavior $y \to \infty$

Right End Behavior $y \to \infty$

Odd/Even/Neither Even

x-intercepts $(0,0)$

y-intercepts $(0,0)$

Maximum None

Minimum $(0,0)$

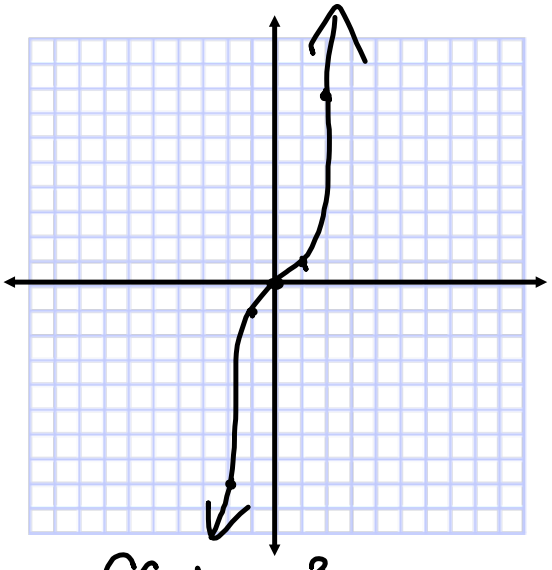
One-to-One NO

Asymptotes/ Discontinuities NONE

$-2^2 = -2 \cdot -2 = 4$

Cubic

Equation: $f(x) = x^3$



$f(x) = x^3$

x	y
-2	-8
-1	-1
0	0
1	1
2	8

Domain $(-\infty, \infty)$

Range $(-\infty, \infty)$

Increasing $(-\infty, \infty)$

Decreasing none

Left End Behavior $-\infty$

Right End Behavior ∞

Odd/Even/Neither odd

x-intercepts $(0, 0)$

y-intercepts $(0, 0)$

Maximum none

Minimum none

One-to-One yes

Asymptotes/ none

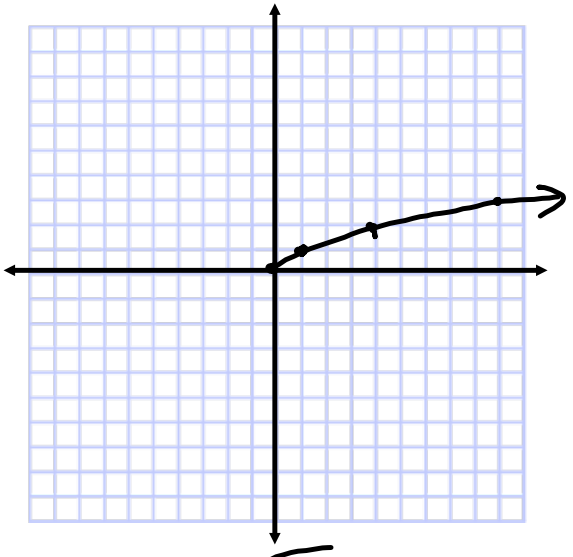
Discontinuities

$-2^3 = -2 \cdot -2 \cdot -2$

$4 \cdot -2 = -8$

$-1^3 = +1 \cdot +1 \cdot -1 = -1$

Square Root



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

Domain $[0, \infty)$

Range $[0, \infty)$

Increasing $[0, \infty)$

Decreasing None

Left End Behavior $\uparrow$

Right End Behavior $\uparrow$

Odd/Even/Neither

x-intercepts $(0,0)$

y-intercepts $(0,0)$

Maximum None

Minimum $(0,0)$

One-to-One yes

Asymptotes/ None

Discontinuities

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

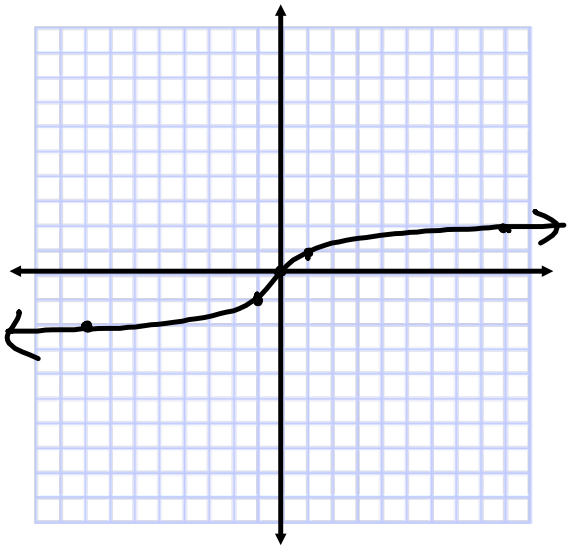
x	y
-1	imag.
0	0
1	1
4	2
9	3

$\sqrt{-1} = i$

$\sqrt{0}$

Cube Root

Equation: $f(x) = \sqrt[3]{x}$



Domain $(-\infty, \infty)$

Range $(-\infty, \infty)$

Increasing $(-\infty, \infty)$

Decreasing Never

Left End Behavior $-\infty$

Right End Behavior ∞

Odd / Even/Neither

x-intercepts $(0, 0)$

y-intercepts $(0, 0)$

Maximum None

Minimum None

One-to-One Yes

Asymptotes/ None
Discontinuities

x	y
-8	-2
-1	-1
0	0
1	1
8	2

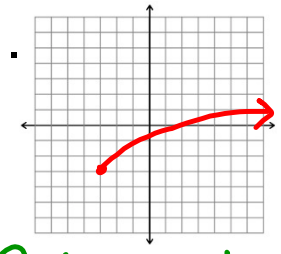
$\sqrt[3]{-8}$

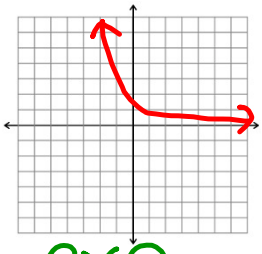
-2 4

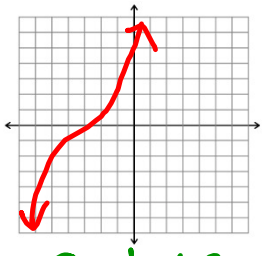
-2 -2

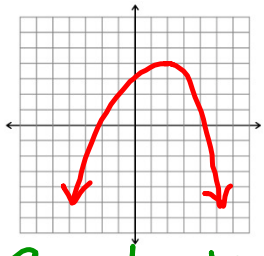
Think-Pair-Share

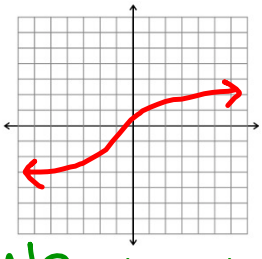
Identify the parent graph

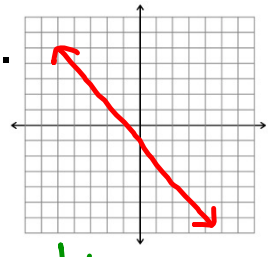
1. 
Sq. root

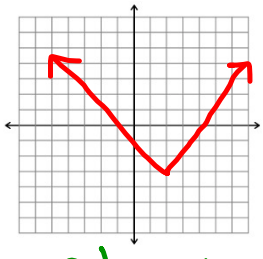
2. 
exp.

3. 
cubic

4. 
quadratic

5. 
Cube root

6. 
linear

7. 
abs val.