

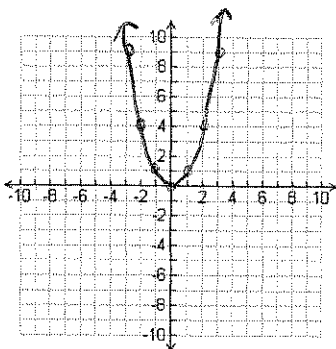
Quadratic Functions

Parent Function:

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

Example: Make a table of values and graph $f(x) = \underline{\underline{x^2}}$

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



Domain: \mathbb{R}

Range: $y \geq 0$

y-intercept(s): $(0,0)$

x-intercept(s): $(0,0)$

Asymptote(s): N/A

End Behavior:

$x \rightarrow \infty$: increasing

$x \rightarrow -\infty$: increasing

★ Even/Odd/Neither:

$$(-x)^2 = x^2 \rightarrow \text{EVEN}$$

Transformations

$$f(x) = a(x - h)^2 + k$$

Negative outside:

reflect over
x-axis

Negative inside:

reflect over
y-axis

$0 < a < 1$:

compress
vertically

$a \geq 1$:

stretch
vertically

$-h$: right

$+h$: left

$-k$: down

$+k$: up

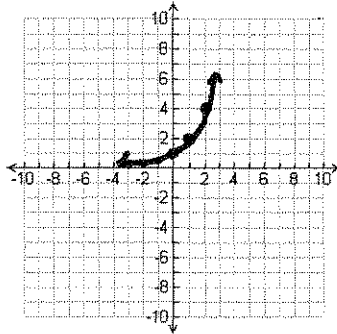
Exponential Functions

Parent Function:

$$y = 2^x$$

Example: Make a table of values and graph

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



Domain: \mathbb{R}

Range: $y > 0$

y-intercept(s): $(0, 1)$

x-intercept(s): NONE

Asymptote(s): $y = 0$

End Behavior :

$x \rightarrow \infty : \uparrow$

$x \rightarrow -\infty : \downarrow$

Transformations

$$y = a * b^{(x-h)} + k$$

Negative:

outside: reflect over x-axis

in exponent: reflect over y-axis

$0 < a < 1$
compress vertically

$a > 1$
stretch vertically

$-h$: right

$+h$: left

$-k$: down

$+k$: up

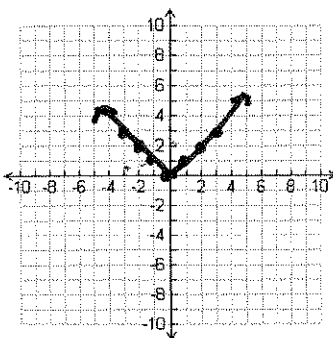
Horizontal Asymptote:

Absolute Value Functions

Parent Function: $f(x) = |x|$

Example: Make a table of values and graph $f(x) = |x|$

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



Domain: \mathbb{R}

Range: $y \geq 0$

y-intercept(s): $(0, 0)$

x-intercept(s): $(0, 0)$

Asymptote(s): N/A

End Behavior:

$x \rightarrow \infty: \uparrow$

$x \rightarrow -\infty: \uparrow$

Even/Odd/Neither:

even

Transformations

$$f(x) = a|x - h| + k$$

Negative outside:
reflect over
x-axis
Negative inside:
reflect over
y-axis

$0 \leq a < 1$:
compress
vertically
 $a \geq 1$:
stretch
vertically

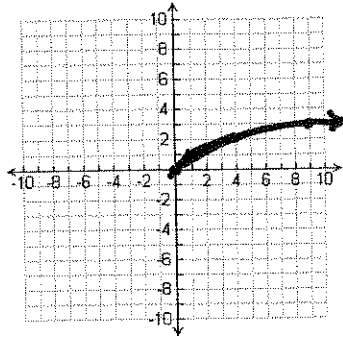
$-h$: right
 $+h$: left
 $-k$: ~~up~~ down
 $+k$: up

Square Root Function

Parent Function: $f(x) = \sqrt{x}$

Example: Make a table of values and graph $f(x) = \sqrt{x}$

x	y
-9	—
-4	—
0	0
1	1
2	1.41
4	2
9	3



Domain: $x \geq 0$

* Range: $y \geq 0$

y-intercept(s): $(0,0)$

x-intercept(s): $(0,0)$

Asymptote(s): N/A

End Behavior:

$x \rightarrow \infty$: \uparrow

$x \rightarrow -\infty$: \downarrow

Even/Odd/Neither:

NEITHER

Transformations

$$f(x) = a\sqrt{x-h} + k$$

Negative outside:
reflect over
y-axis
Negative inside:
reflect over
x-axis

$0 < a < 1$:
compress
vertically
 $a \geq 1$:
stretch
vertically

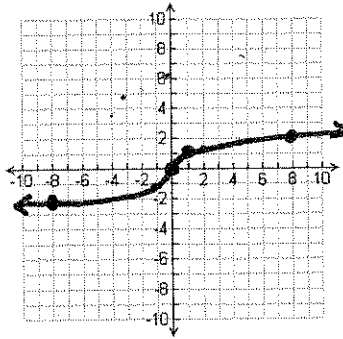
$-h$: right
 $+h$: left
 $-k$: down
 $+k$: up

Cube Root Function

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

Example: Make a table of values and graph $f(x) = \sqrt[3]{x}$

x	y
-27	-3
-8	-2
0	0
1	1
2	1.26
8	2
27	3



Domain: \mathbb{R}

Range: \mathbb{R}

y-intercept(s): $(0, 0)$

x-intercept(s): $(0, 0)$

Asymptote(s): ~~100~~ N/A

End Behavior:

$x \rightarrow \infty: \uparrow$

$x \rightarrow -\infty: \downarrow$

Even/Odd/Neither:

ODD

Transformations

$$f(x) = a\sqrt[3]{x - h} + k$$

Negative outside:
reflect over
x-axis
Negative inside:
reflect over
y-axis

$0 \leq a < 1$:
compress
vertically
 $a \geq 1$:
stretch
vertically

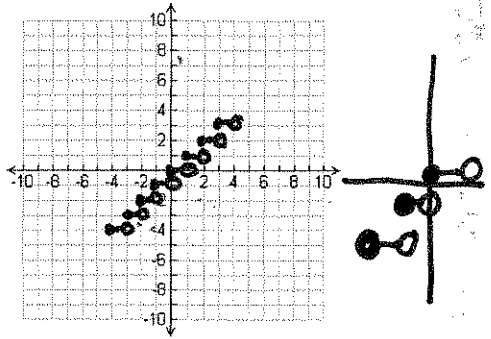
$-h$: right
 $+h$: left
 $-k$: down
 $+k$: up

Step Function (Greatest Integer)

Parent Function: $f(x) = \llbracket x \rrbracket =$ The greatest integer less than or equal to x

Example: Make a table of values and graph $f(x) = \llbracket x \rrbracket$

x	y
-3.3	-4
-2	-2
-1.7	-2
0	0
1.6	1
2	2
3.1	3



Domain: \mathbb{R}

* Range: All Integers

* y-intercept(s): $(0, 0)$

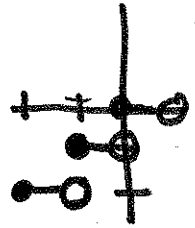
* x-intercept(s): $(0 \leq x < 1, 0)$

Asymptote(s): NONE

End Behavior:

$x \rightarrow \infty:$ \uparrow

$x \rightarrow -\infty:$ \downarrow



Even/Odd/Neither:

NEITHER

Transformations

$$f(x) = a \llbracket x - h \rrbracket + k$$

Negative outside:
reflect over
x-axis
Negative inside:
reflect over
y-axis

$0 \leq a < 1:$
compress
vertically
 $a \geq 1:$
stretch
vertically

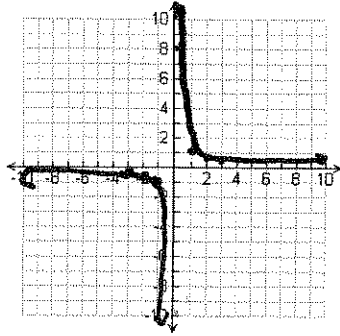
$-h:$ right
 $+h:$ left
 $-k:$ down
 $+k:$ up

Rational Function (Inverse Variation)

Parent Function: $f(x) = \frac{1}{x}$

Example: Make a table of values and graph $f(x) = \frac{1}{x}$

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



* End Behavior:

$x \rightarrow \infty: \downarrow$

$x \rightarrow -\infty: \uparrow$

Domain: $x \neq 0$

Range: $y \neq 0$

y-intercept(s): NONE

x-intercept(s): NONE

Asymptote(s): $y=0 \div x=0$ **ODD**

Even/Odd/Neither:

Transformations

$$f(x) = \frac{a}{x-h} + k$$

Negative outside:
reflect over
x-axis
Negative inside:
reflect over
y-axis

$0 \leq a < 1$:
compress
vertically
 $a \geq 1$:
stretch
vertically

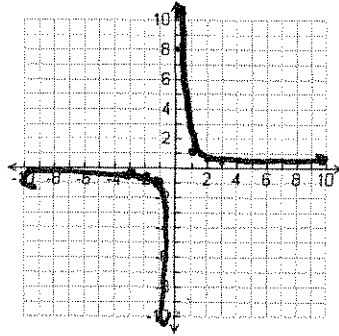
-h: right
+h: left
-k: down
+k: up

Rational Function (Inverse Variation)

Parent Function: $f(x) = \frac{1}{x}$

Example: Make a table of values and graph $f(x) = \frac{1}{x}$

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



* End Behavior:

$x \rightarrow \infty: \downarrow$

$x \rightarrow -\infty: \uparrow$

Domain: $x \neq 0$

Range: $y \neq 0$

y-intercept(s): NONE

x-intercept(s): NONE

Asymptote(s): $x=0$ and $y=0$

Even/Odd/Neither:

ODD

Transformations

$$f(x) = \frac{a}{x-h} + k$$

Negative outside:
reflect over
x-axis
Negative inside:
reflect over
y-axis

$0 \leq a < 1$:
compress
vertically
 $a \geq 1$:
stretch
vertically

$-h$: right
 $+h$: left
 $-k$: down
 $+k$: up