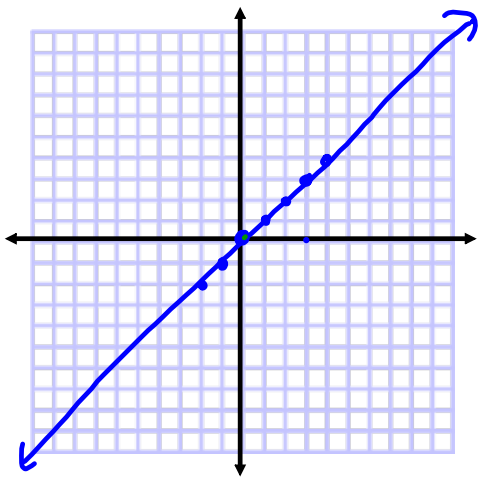
1-1 Parent Functions

Objectives:

1. I can graph the parent functions
2. I can analyze the key features of a graph

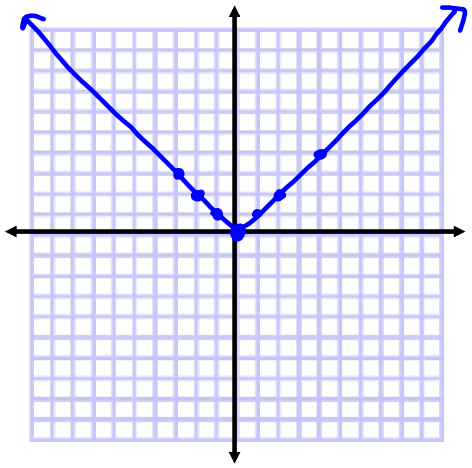
Linear

Equation: $f(x) = x$



Domain $(-\infty, \infty)$
Range $(-\infty, \infty)$
Increasing $(-\infty, \infty)$
Decreasing Never
Left End Behavior
Right End Behavior
x-intercepts $(0, 0)$
y-intercepts $(0, 0)$
Maximum None
Minimum None
Asymptotes ~~X~~

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

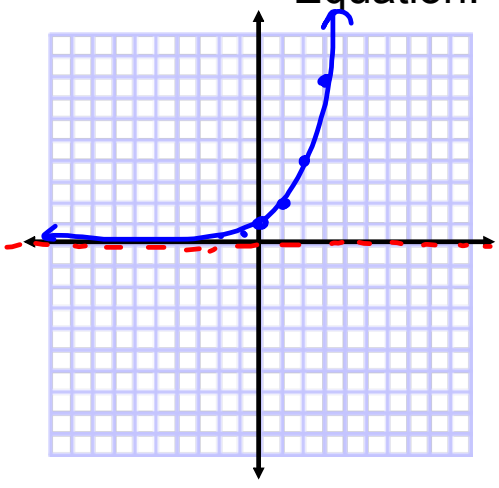


Domain $(-\infty, \infty)$
Range $[0, \infty)$
Increasing $(0, \infty)$
Decreasing $(-\infty, 0)$
Left End Behavior
Right End Behavior
~~Odd/Even/Neither~~

x-intercepts $(0, 0)$
y-intercepts $(0, 0)$
Maximum None
Minimum $(0, 0)$
One-to-One
Asymptotes/Discontinuities
None

Exponential

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



Domain $(-\infty, \infty)$
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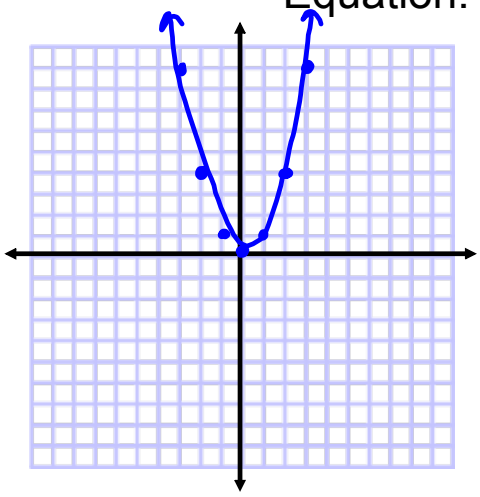
Decreasing Never
Left End Behavior
Right End Behavior
~~Odd/Even/Neither~~

x-intercepts None
y-intercepts $(0, 1)$
Maximum None
Minimum None
One-to-One
Asymptotes/Discontinuities
$y = 0$

Quadratic

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



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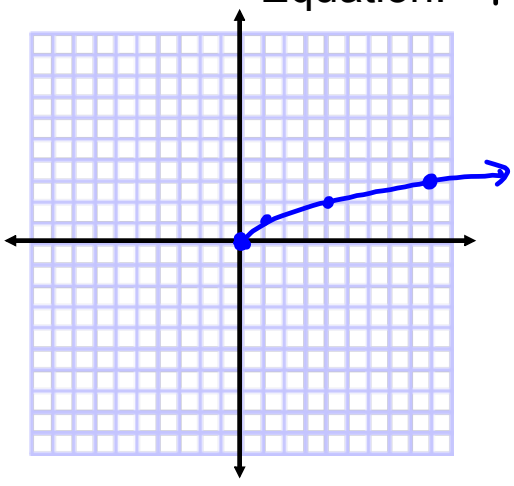
One-to-One
Asymptotes/Discontinuities

Sq Root

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



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y-intercepts $(0, 0)$
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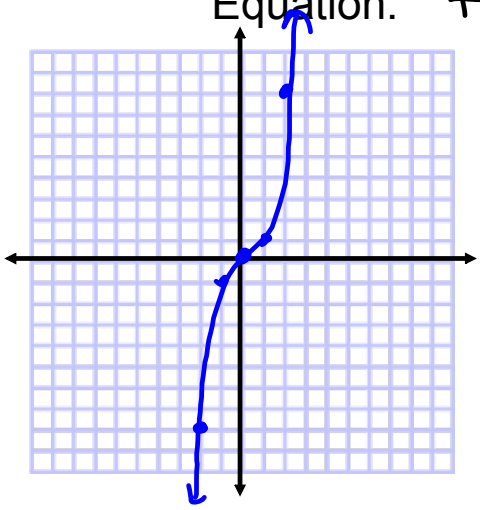
One-to-One
Asymptotes/Discontinuities

No taking $\sqrt{}$ of a negative #!

Cubic

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



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x-intercepts $(0,0)$
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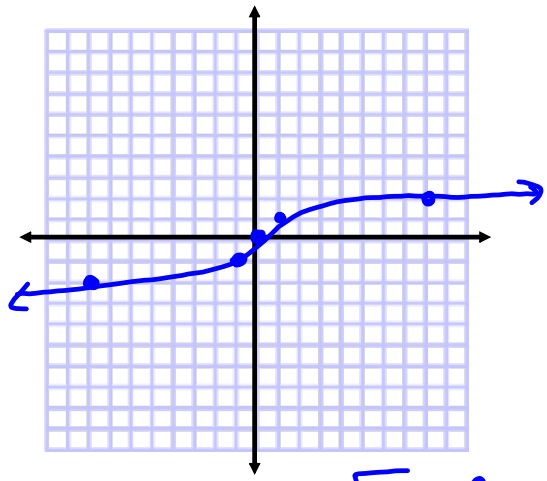
One-to-One
Asymptotes/Discontinuities

Cube Root

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



CAN take $\sqrt[3]{}$ of a negative #!

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Domain & Range

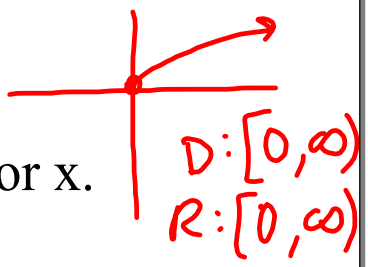
Domain: x-values - input
read x's from left to right (smallest to largest)

$(-\infty, \infty)$

*some functions have domain restrictions

can't have a neg. # in a sq. root

to find: set the radicand ≥ 0 and solve for x.



Range: y-values - output
read y's from bottom to top (smallest to largest)

$(-\infty, \infty)$

x & y intercepts

y-intercepts: where the graph crosses the y-axis and x = 0 $(0, y)$

x-intercepts: where the graph crosses the x-axis and y = 0 $(x, 0)$

intercepts are points on a graph & should be written as ordered pairs!!! (x,y)

Example

$f(x) = 2x + 1$

y-int: $(x = 0)$

$2(0) + 1 =$

$0 + 1 = 1$

$(0, 1)$

x-int: $(y = 0)$

$0 = 2x + 1$

$-1 \quad -1$

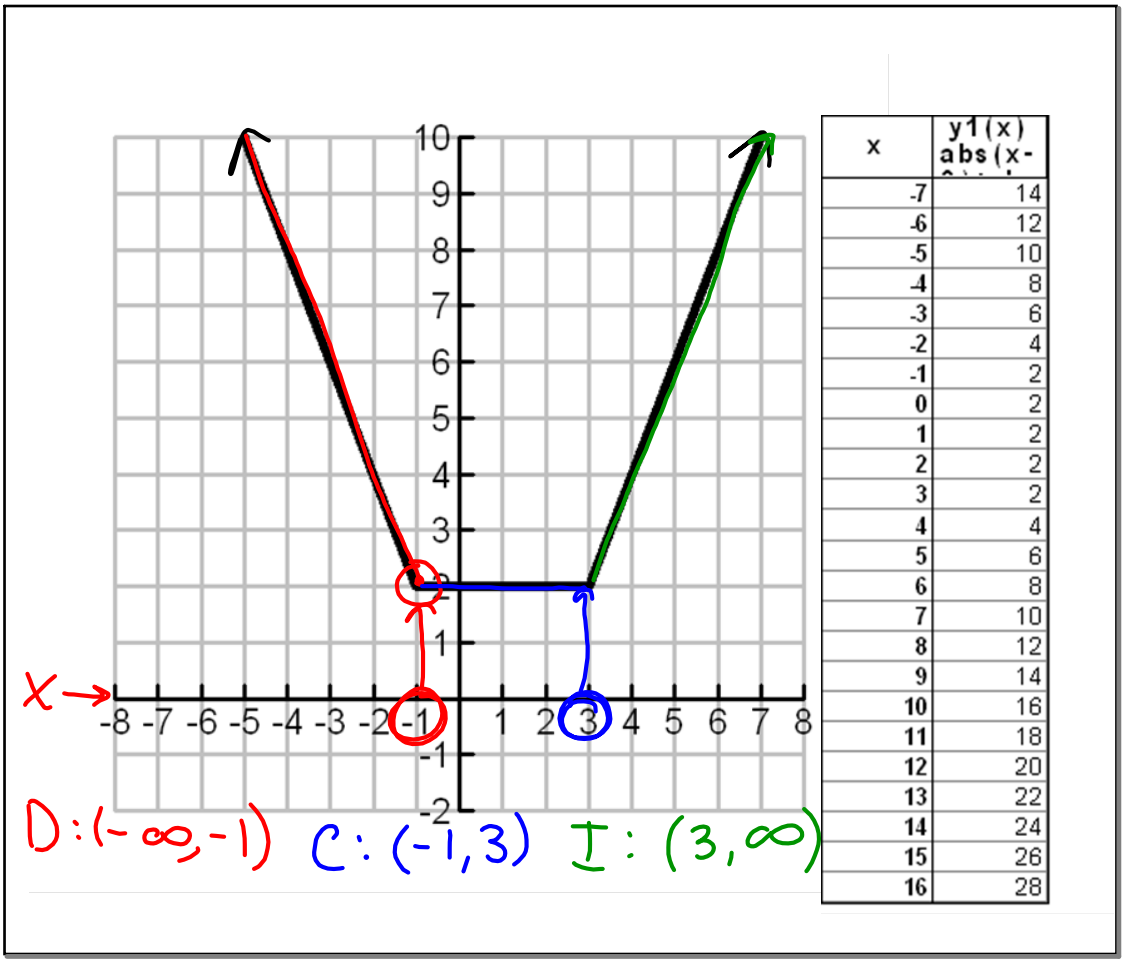
$\frac{-1}{2} = \frac{2x}{2}$ $x = -\frac{1}{2}$

$(-1/2, 0)$

Increasing, Decreasing and Constant

- Increasing: as you move from left to right the y-values increase
- Decreasing: as you move from left to right the y-values decrease
- Constant: as you move from left to right the y-value do not change

this behavior is reported using interval notation for the **X-VALUES** where the graph has a certain behavior

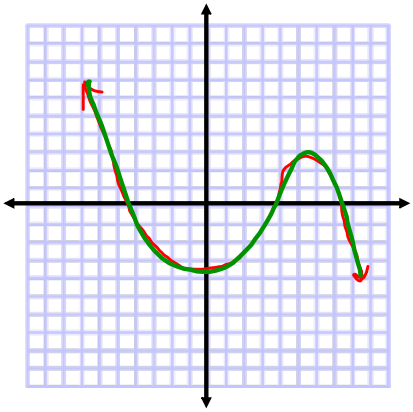


x	y1(x) abs(x-
-7	14
-6	12
-5	10
-4	8
-3	6
-2	4
-1	2
0	2
1	2
2	2
3	2
4	4
5	6
6	8
7	10
8	12
9	14
10	16
11	18
12	20
13	22
14	24
15	26
16	28

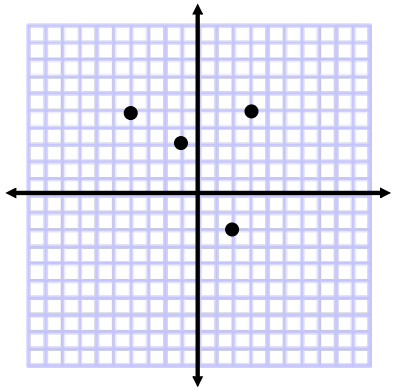
Continuous: A function is continuous if you can draw it in one motion without picking up your pencil.

Discrete: made of ordered pairs or individual parts

Continuous
Function

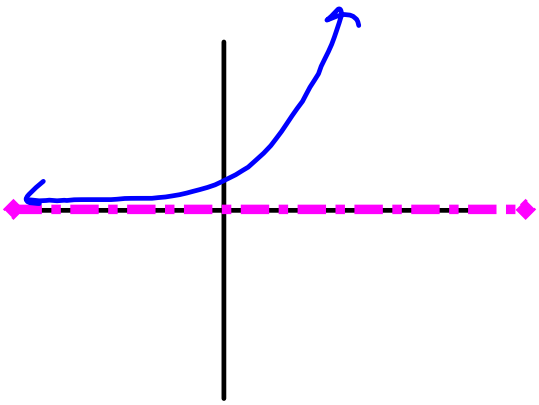


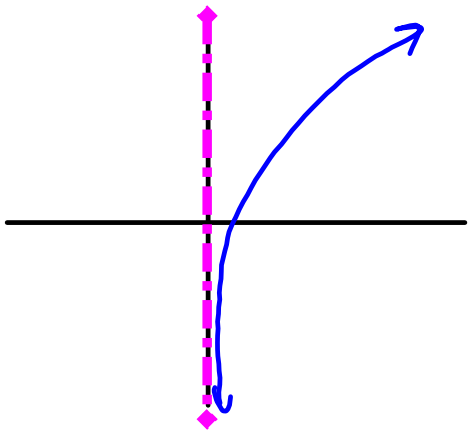
Discrete
Function



Asymptotes

A line that a graph approaches but never touches*





*This is true for vertical asymptotes, we will go into more detail for horizontal asymptotes later

Extrema

maximum

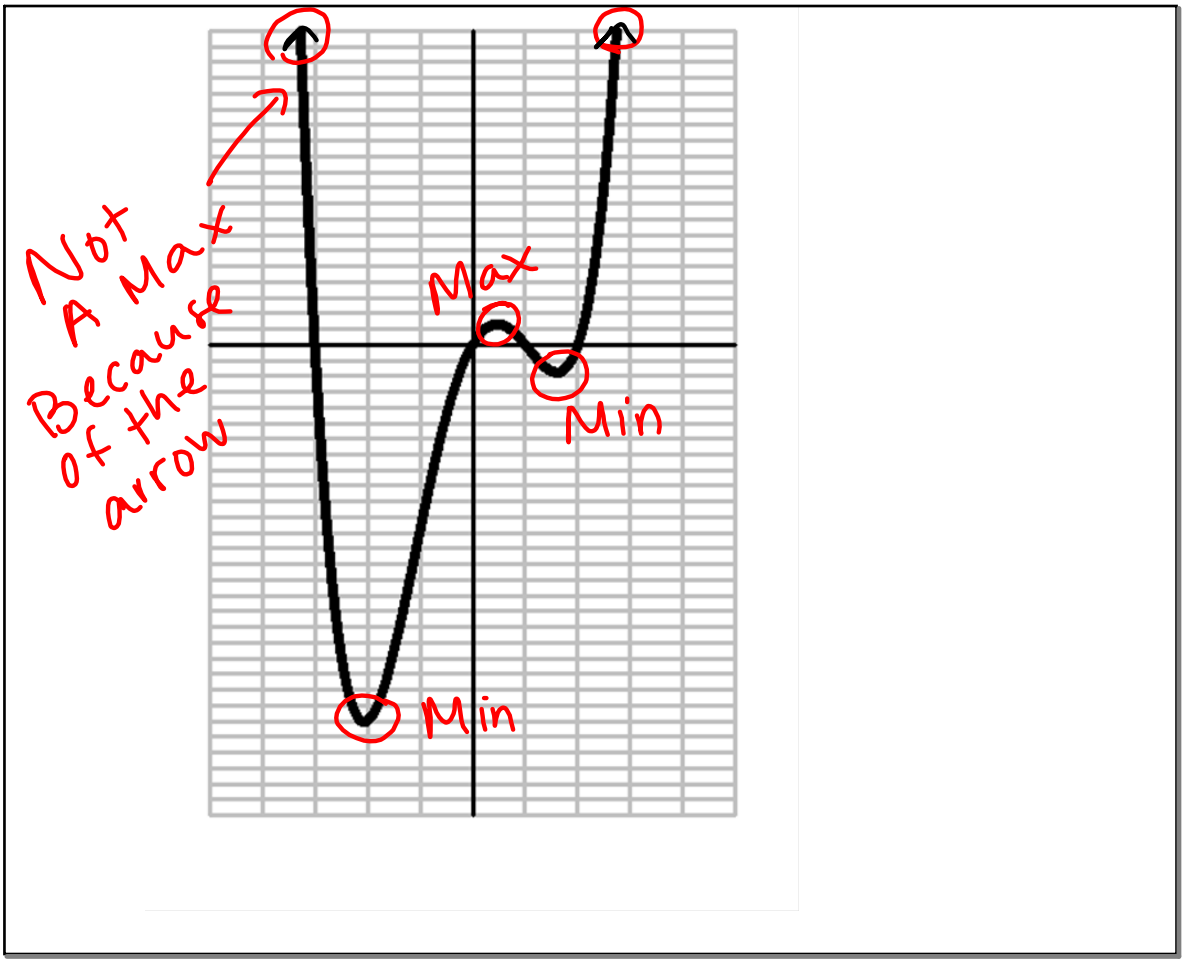
· The highest **point** on a graph.

(x, y)

minimum

· The lowest **point** on a graph.

(x, y)



End Behavior
↳(arrow)

What happens to y when x is very large or very small?

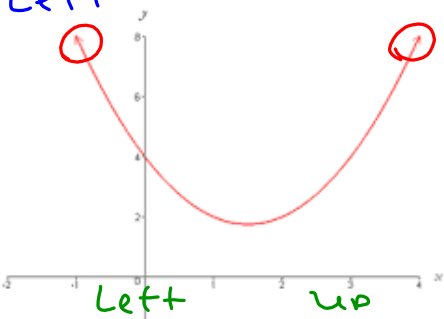
Left/Right, Up/down

When $x \to \infty$, $y \to ?$ $-\infty$ (Down)

Right

When $x \to -\infty$, $y \to ?$ ∞ (Up)

Left

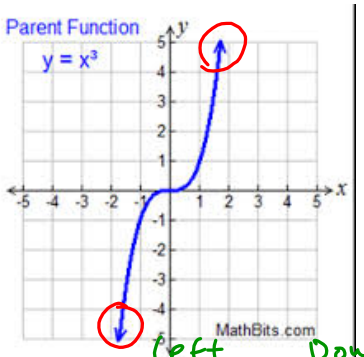


Left Up

as $x \to -\infty$, $y \to +\infty$

as $x \to +\infty$, $y \to +\infty$

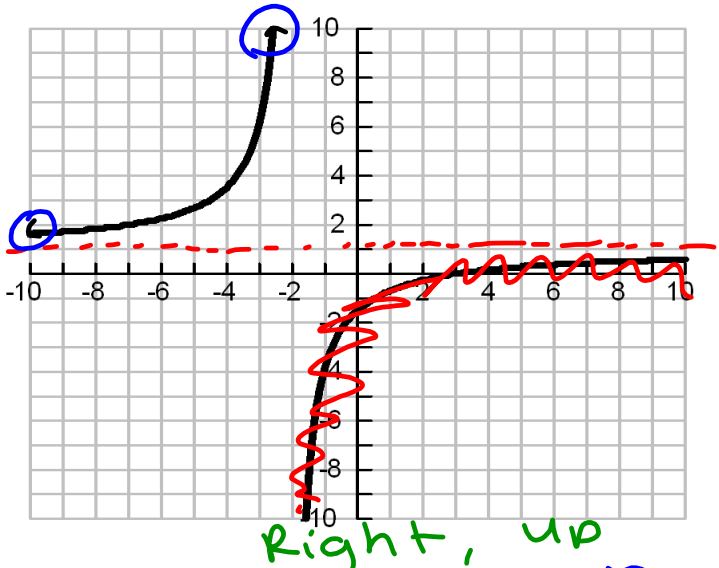
Right Up



Left Down

as $x \to -\infty$, $y \to -\infty$

as $x \to \infty$, $y \to +\infty$



$y = 1$

Right, up

as $x \to \infty$, $y \to \infty$

as $x \to -\infty$, $y \to 1$