

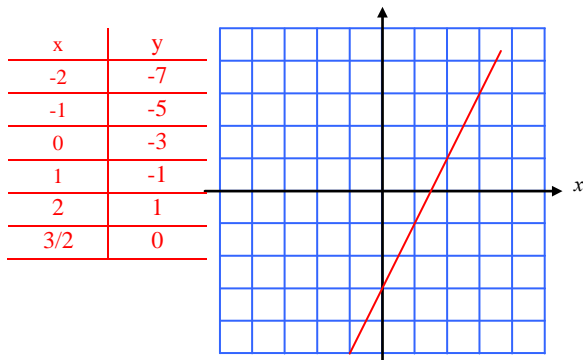
TWELVE BASIC FUNCTIONS

Lesson Targets

1. Graph and Identify all 12 parent functions
2. Graph a piecewise function

Parent Function #1: Linear Function (books refer to this as the identity function): Equation: $y = 2x - 3$

Graph this function (label 5 points)



Domain: R (all real numbers)

Range: R (all real numbers)

Symmetry: *No Symmetry*

Boundedness: *Not Bounded*

Asymptotes: *No Asymptotes*

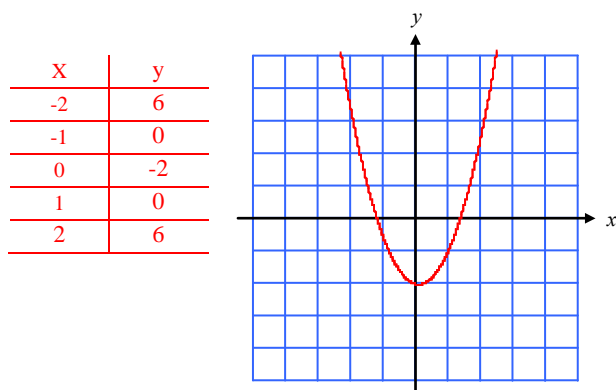
Discontinuities: *No Discontinuity*

Increasing/Decreasing: *Constant Increasing*

Extrema: *None*

Parent Function #2: Quadratic Function (books refer to this as the squaring function): Equation: $y = 2x^2 - 2$

Graph this function (label 5 points)



Domain: R (all real numbers)

Range: $[-2, +\infty)$

Symmetry: *X=0 axis of Symmetry-Even*

Boundedness: *Bounded from Below at y=-2*

Asymptotes: *No Asymptotes*

Discontinuities: *No Discontinuity*

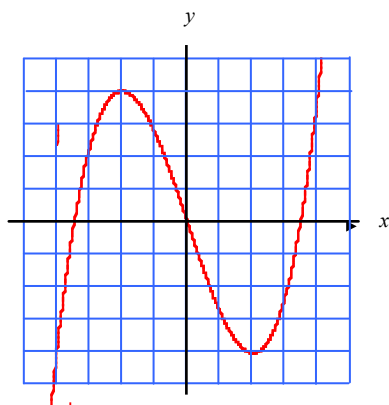
Increasing/Decreasing: $(-\infty, 0) \searrow$ $(0, +\infty) \nearrow$

Extrema: *Abs Min at the Vertex (0,-2)*

Parent Function #3: Cubic Function (books refer to this as the cubing function) : Equation: $y = x^3 - 3x$

Graph this function (label 3 points)

X	y
-2	-2
-1	2
0	0
1	-2
2	2



Domain: $(-\infty, +\infty)$

Range: $(-\infty, +\infty)$

Symmetry: *Symmetry to (0,0)- Odd*

Boundedness: *Not Bounded*

Asymptotes: *No Asymptotes*

Discontinuities: *No Discontinuity*

Increasing/Decreasing: $(-\infty, -1) \nearrow (-1, 1) \searrow (1, +\infty) \nearrow$

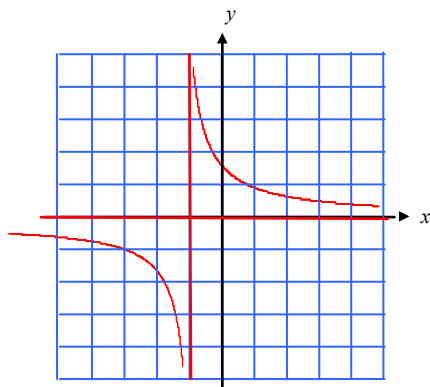
Extrema: *Local Min at (1,-2),*

Local Max at (-1, 2)

Parent Function #4: Inverse Linear Function (Rational or also called Reciprocal Function): Equation: $y = \frac{3}{2x + 2}$

Graph this function
(label 2 points, a H.A., and a V.A.)

X	y
-2	$-3/2$
0	$3/2$



Domain:

Range:

Symmetry: *No Symmetry*

Boundedness: *Not Bounded*

Asymptotes: $x = -1, y = 0$

Discontinuities: *Non Removable Discontinuity*

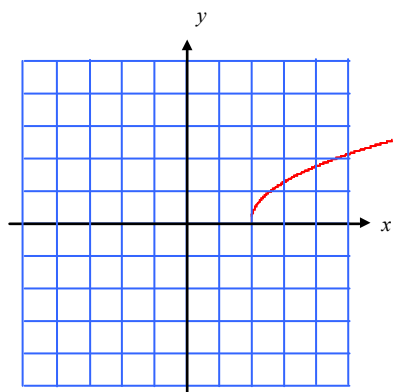
Increasing/Decreasing: *Constant Decreasing*

Extrema: *None*

Parent Function #5: Square Root Function: Equation: $y = \sqrt{x - 2}$

Graph this function (label 3 points)

x	y
2	0
3	1
6	2



Domain: $[2, +\infty)$

Range: $[0, +\infty)$

Symmetry: *No Symmetry*

Boundedness: *Bounded from below: $y=0$*

Asymptotes: *No Asymptotes*

Discontinuities: *No Discontinuity*

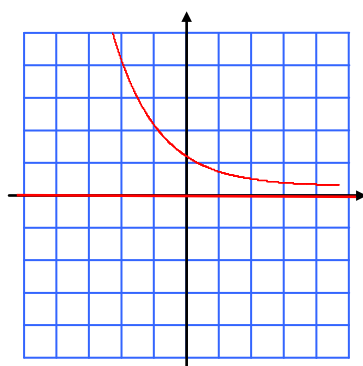
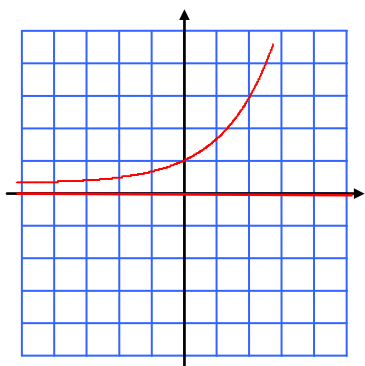
Increasing/Decreasing: *Constant Increasing*

Extrema: *Abs Min*

Parent Function #6: Exponential Function: (some book use only $f(x) = e^x$)

I would like you to use the equation $f(x) = b^x$

where $b > 1$ represents $b=2$, and $0 < b < 1$ represents $b = \frac{1}{2}$



Domain: $(-\infty, +\infty)$

[

Range: $(0, +\infty)$

Symmetry: *No Symmetry*

Boundedness: *Bounded from below $y=0$*

Asymptotes: *Horizontal Asymptote $y=0$*

Discontinuities: *No Discontinuity*

Increasing/Decreasing: 2^x increasing, $\left(\frac{1}{2}\right)^x$ decreasing

Extrema: *None*

Parent Function #7: Logarithm Function: (some books only use a natural logarithm)

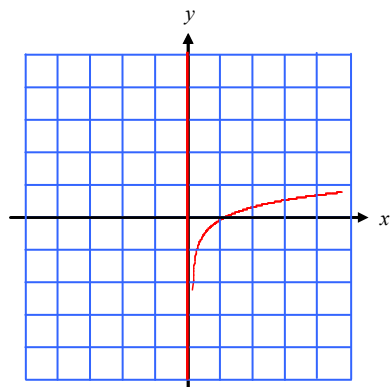
I would like you to use

$$y = \log_b x$$

where $b=2$

Graph this function (label 2 points and a V.A.)

X	y
1	0
2	1



Domain: $(0, +\infty)$

Range: $R = \text{all Real numbers}$

Symmetry: *No Symmetry*

Boundedness: *Not Bounded*

Asymptotes: *Vertical Asymptote $x=0$*

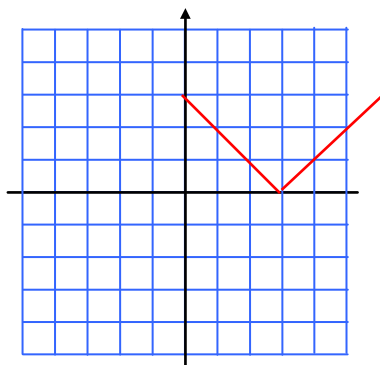
Discontinuities: *No Discontinuity*

Increasing/Decreasing: *Constant Increasing*

Extrema: *None*

Parent Function #8: Absolute Value Function: Equation: $y = |x - 3|$

X	y
6	3
5	2
4	1
3	0
2	1
1	2
0	3



Domain: $(-\infty, +\infty)$

Range: $[0, +\infty)$

Symmetry: *$X=3$ but not an even function*

Boundedness: *Bounded Below $y=0$*

Asymptotes: *No Asymptotes*

Discontinuities: *No Discontinuity*

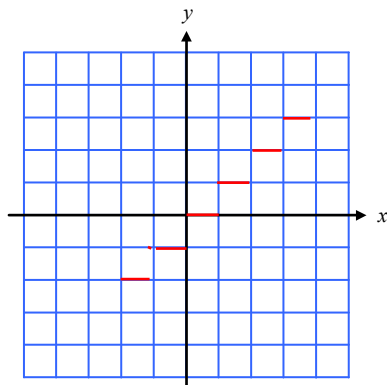
Increasing/Decreasing: *$(-\infty, 3)$ ↘ $(3, +\infty)$ ↗*

Extrema: *Abs Min $x=3$*

Parent Function #9: Greatest Integer Function: Equation: $y = [x]$

Graph this function (label at least 6 points)

0.5	0
0.7	0
1.2	1
1.5	1
1.7	1
2.1	2
2.6	2



Domain: $(-\infty, +\infty) = R = \text{all reals}$

Range: $(-\infty, +\infty)$

Symmetry: *No Symetry*

Boundedness: *Not Bounded*

Asymptotes: *No Asymptotes*

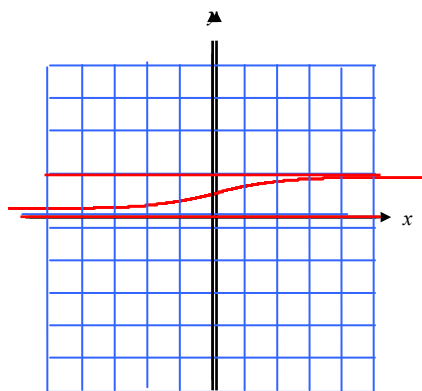
Discontinuities: *Jump-Non-removab Discon*

Increasing/Decreasing: *Increasing*

Extrema: *None*

Parent Function #10: Logistic Function: Equation: $y = \frac{1}{1 + e^{-x}}$

Graph this function (label 1 point and 2 H.A.)



Domain: $(-\infty, +\infty) = R = \text{all reals}$

Range: $(0,1)$

Symmetry: *No Symmetry*

Boundedness: *Bounded above and below*

Asymptotes: *Hori Asympt: y=0, y=1*

Discontinuities: *No Discontinuity*

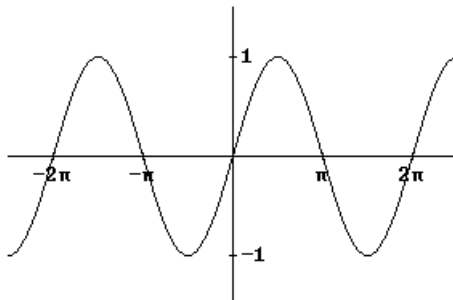
Increasing/Decreasing: *Constant Increasing*

Extrema: *None*

You won't need to graph the next two until 2nd Semester ... just be able to tell the difference between the two for now.

Parent Function #11: Sine Function: Equation: $y = \sin(x)$

Here's a graph of this function



Domain: $(-\infty, +\infty) = R = \text{all reals}$

Range: $(-1,1)$

Symmetry: *Odd - Symmetry with respect to (0,0)*

Boundedness: *Bounded above $y=1$, below $y=-1$*

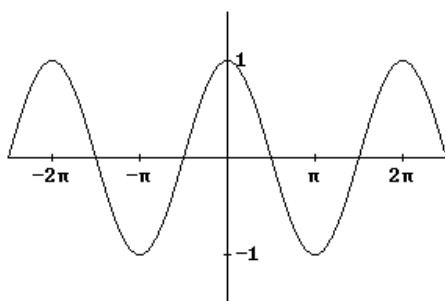
Asymptotes: *No Asymptotes*

Discontinuities: *No Discontinuity*

Extrema: $\frac{\pi}{2} + 2k\pi - \text{max}, -\frac{\pi}{2} + 2k\pi - \text{min}$

Parent Function #12: Cosine Function: Equation: $y = \cos(x)$

Here's a graph of this function



Domain: $(-\infty, +\infty) = R = \text{all reals}$

Range: $(-1,1)$

Symmetry: *Even y-axis Symmetry*

Boundedness: *Bounded above $y=1$, below $y=-1$*

Asymptotes: *No Asymptotes*

Discontinuities: *No Discontinuity*

Extrema: $0 + 2k\pi - \text{max}, \pi + 2k\pi - \text{min}$