Calculus Honors
Summer Assignment

- ✓ This assignment is to reinforce what you already know. If you don't remember the information at first, you can use the internet to help with any of the problems. Youtube is a great way to "see" someone do a problem.

- ✓ The work is to be done on another piece of paper. Each problem should be numbered with the work underneath. Please be neat and organized with your work.

- ✓ This assignment will be due on the first day of class…NO exceptions.

- ✓ This must be done in PENCIL only.

Calculus Honors
Summer Review

Name________________________
Date_________________________

I. Functions

- Determine whether the equation represents y as a function of x.

1. $x^2 + y^2 = 4$

2. $y = \sqrt{x+5}$

3. $y^2 = x^2 - 1$

- Evaluate the function at each specified value of the independent variable and simplify

1. $q(x) = \frac{1}{x^2-9}$ (a) $q(0)$ (b) $q(3)$ (c) $q(x+3)$

2. $f(x) = \begin{cases} 3x-1, & x < -1 \\ 4, & -1 \le x \le 1 \\ x^2, & x > 1 \end{cases}$ (a) $f\left(\frac{1}{2}\right)$ (b) $f(-1)$ (c) $f(4)$

- Find all real value(s) of x such that $f(x) = 0$

1. $f(x) = \frac{3x-4}{5}$

2. $f(x) = 2x^2 - 5x - 12$

3. $f(x) = 3x^2 + 2x - 6$

4. $f(x) = x^3 - x$

- Find the value(s) of x for which $f(x) = g(x)$

1. $f(x) = x^2 + 2x + 1$; $g(x) = 3x + 3$

2. $f(x) = \sqrt{3x} + 1$; $g(x) = x + 1$

- Determine the domain of the function

1. $h(x) = 2x^5 - 7x^2 + 8x$
2. $g(t) = \frac{8}{t}$
3. $f(x) = \sqrt{4 - x^2}$
4. $g(x) = \sqrt[3]{x + 5}$
5. $h(x) = \frac{\sqrt{x-1}}{x-4}$
6. $h(x) = \sin x$
7. $f(x) = \frac{5x-3}{x^2-25}$

- Find the difference quotient and simplify your answer.

1. $f(x) = x^2 - x + 1;\ \ \frac{f(2+h)-f(2)}{h},\ h \neq 0$
2. $f(x) = \frac{1}{x-2};\ \ \frac{f(x)-f(1)}{x-1},\ x \neq 1$
3. $f(x) = \sqrt{5x};\ \ \frac{f(x)-f(5)}{x-5};\ x \neq 5$

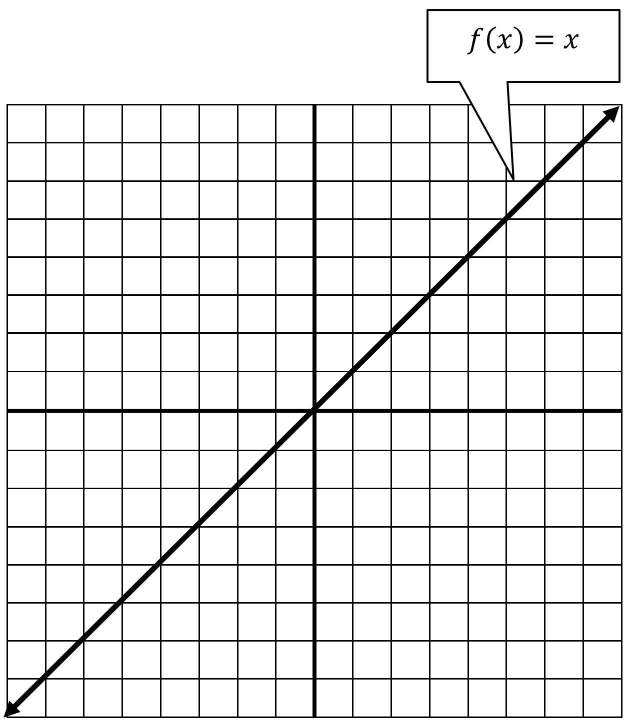
- Determine the equation of a line in standard form, $Ax + By = C$.

1. Passes through the two points $(5, -1), (-5, 5)$
2. Through the point (2, 1) and (a) parallel to the given line and (b) perpendicular to the given line. Line: $4x - 2y = 3$
3. Through the point $\left(\frac{7}{8}, \frac{3}{4}\right)$ and (a) parallel to the given line and (b) perpendicular to the given line. Line: $5x + 3y = 0$
4. Passes through the two points $(-2, 9), (-2, -5)$
5. Through the point $(-6, -1)$ and has an x-intercept of -3.

II. Library of Parent Functions

One of the goals of this course is to enable you to recognize the basic shapes of the graphs of different types of functions. For example, the graph of a ***linear function***, $f(x) = ax + b$ is a line with slope $m = a$ and a y-intercept at $(0, b)$. Some characteristics of a linear function is as follows:

- Domain: $(-\infty, \infty)$
- Range: $(-\infty, \infty)$
- Will have one x-intercept at $\left(-\frac{b}{m}, 0\right)$
- Graph will be an increasing function when $m > 0$ and a decreasing function when $m < 0$
- Graph of 'parent function' is below ("parent" graph means no transformations)



For the following functions, you are to state the following information as well as the "parent" graph **All information is about the "parent" graph

- Parent Graph
- Domain
- Range
- Intercepts (both x and y), if any
- Any symmetry
- Any relative maximums or minimums
- Intervals where function is increasing, decreasing or constant
- Any asymptote lines

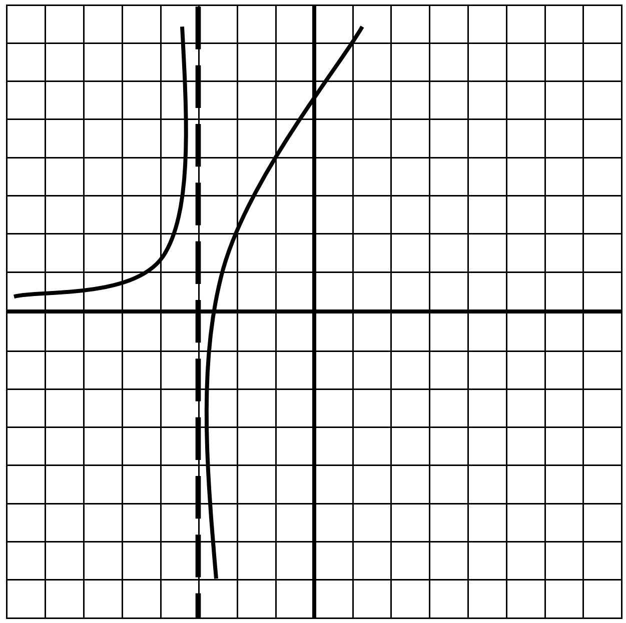
1. Constant Function; $f(x) = c$
2. Quadratic Function; $f(x) = x^2$
3. Cubic Function; $f(x) = x^3$
4. Square Root Function; $f(x) = \sqrt{x}$
5. Absolute Value Function; $f(x) = |x|$
6. Reciprocal Function; $f(x) = \frac{1}{x}$

III. Limits

- Determine the limit.

1. $\lim_{x \to 5} \sqrt{x^2 - 5}$
2. $\lim_{x \to 9} \frac{x^2 - 13x + 36}{2x^2 - 15x - 27}$
3. $\lim_{x \to -2} \frac{5x}{x+2}$
4. $\lim_{x \to \infty} \frac{3x^2 - 7x + 2}{2x^2 + 5}$

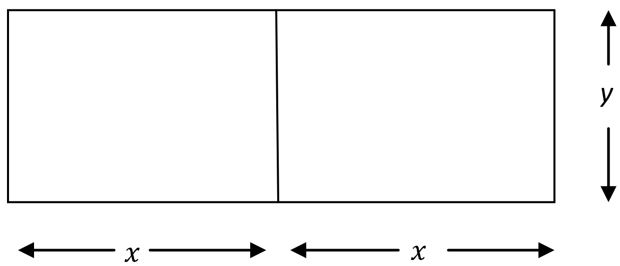
- Determine the limit from the graph.



1. $\lim_{x \to 0} f(x)$
2. $\lim_{x \to -3^+} f(x)$
3. $\lim_{x \to -3^-} f(x)$
4. $\lim_{x \to -3} f(x)$
5. $\lim_{x \to -\infty} f(x)$
6. $\lim_{x \to \infty} f(x)$

III. Application

1. A rancher has 200 feet of fencing to enclose two adjacent rectangular corrals (see figure).



   (a) Write the area A of the corral as a function of x.
   (b) Create a table showing possible values of x and the corresponding areas of the corral. Use the table to estimate the dimensions that will produce the maximum enclosed area.
   (c) Use a graphing utility to graph the area function. Use the graph to approximate the dimensions that will produce the maximum area.
   (d) Write the area function in stand form to find analytically the dimensions that will produce the maximum area.
   (e) Compare your results from parts (b), (c), and (d).

2. The total revenue R earned (in thousands of dollars) from manufacturing handheld video games is given by

$$R(p) = -25p^2 + 1200p$$

   (a) Find the revenue earned for each price per unit given below.
   $20
   $25
   $30
   (b) Find the unit price that will yield maximum revenue. What is the maximum revenue? Explain your results.