Trigonometry and Mathematical Analysis PLUS
Summer Assignment 2014-2015

Overview

Trigonometry and Mathematical Analysis PLUS is a course designed to prepare you for AP Calculus by building on all of the mathematical topics you have covered previously. A strong foundation in both Algebra and Geometry is necessary, along with a positive work ethic. The following assignment will help you review some essential algebraic skills you will need at the beginning of the year and help you review critical algebra II skills. **The assignment will be collected the FIRST day of class.**

If you have difficulty with this assignment, be proactive by utilizing a mathematics tutor, study group, or internet tutorials to help you prepare for the course.

It is highly suggested that incoming freshmen complete this assignment BEFORE freshman orientation in case you would like to ask questions or get some help.

Part I: Graphing Parent Functions and The Rule of Four

Quick Review – The Rule of Four

There are four basic ways of representing functions: verbal, algebraic, numeric, and graphical.

Verbal:
Name: Absolute Value Function

Domain: $(-\infty, \infty)$ Range: $[0, \infty)$

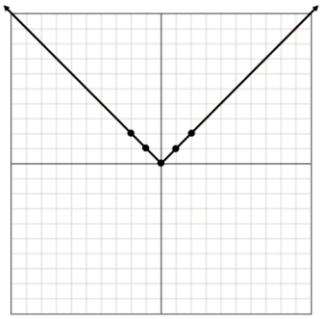
Algebraic (Formula):

$$y = |x| = \begin{cases} x & if \quad x \geq 0 \\ -x & if \quad x < 0 \end{cases}$$

Numeric (Anchor Points):

$(-2, 2)$
$(-1, 1)$
$(0, 0)$
$(1, 1)$
$(2, 2)$

Graphical:



Expectation: Graphing Parent Functions and The Rule of Four

Be sure that you are familiar with each of the following parent functions:

1. The Absolute Value Function: $y = |x|$
2. The Quadratic Function: $y = x^2$
3. The Square Root Function: $y = \sqrt{x}$
4. The Cubic Function: $y = x^3$
5. The Cube Root Function: $y = \sqrt[3]{x}$
6. The Reciprocal Function: $y = \frac{1}{x}$
7. The Exponential Function: $y = b^x$ **(for b > 1 and 0 < b < 1)**
8. The Logarithmic Function: $y = \log_b x$

Part II: Function Transformations

Quick Review – Graphing with the Transformation Approach

Example: Graphing a Transformed Equation by Writing an Anchor Point Rule

Graph: $y=\frac{1}{3}(-2x+8)^3-5$

1. Decide what ***parent*** function is in the equation, $y=\frac{1}{3}(-2x+8)^{\mathbf{3}}-5$. Parent Fnx: $y=x^3$

2. There are two parts to the Anchor Point Rule: The Horizontal and Vertical Transfomations

   a. Find the ***horizontal*** trans. by solving the expression *inside* the parent function for x_n.

   $$y=\frac{1}{3}(\mathbf{-2x+8})^3-5 \longrightarrow x_o=-2x_n+8$$
   $$x_n=-\frac{1}{2}x_o+4$$

   b. Find the ***vertical*** trans. by looking at the *outside* of the parent function

   $$y=\frac{1}{3}(-2x+8)^3-5 \longrightarrow y_n=\frac{1}{3}y_o-5$$

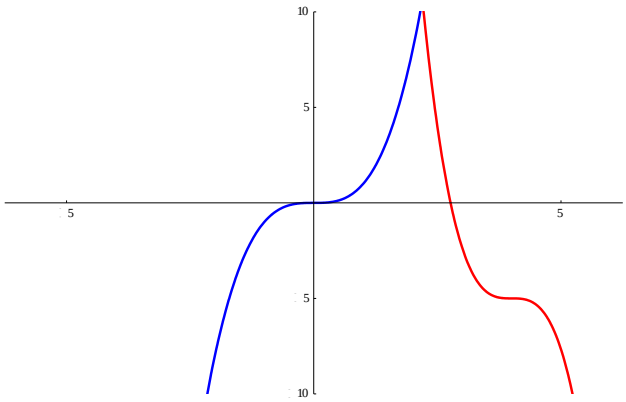
   c. The Anchor Point Rule is that each point on the parent function becomes:

   $$(x_o,y_o)\rightarrow\left(-\frac{1}{2}x_o+4,\ \frac{1}{3}y_o-5\right)$$

3. Make a list of Anchor Points on the Parent Functions (include any critical points on the graph, i.e. vertices, points of inflection). Take each point and substitute the *x* and *y* coordinates into the Anchor Point Rule:

x_o	$y_o=(x_o)^3$		$-\frac{1}{2}x_o+4$	$\frac{1}{3}y_o-5$
–2	–8		5	$-7.\overline{6}$
–1	–1	→	4.5	$-5.\overline{3}$
0	0		4	–5
1	1		3.5	$-4.\overline{6}$
2	8		3	$-2.\overline{3}$

4. Sketch both graphs and note how the parent graph has been changed:



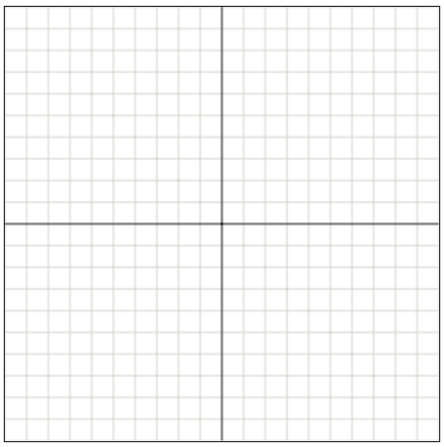
Practice Problems

State the parent function and the anchor point rule for each transformed equation, find anchor points for both and then graph both the parent and the transformed equation on the same plane.

1. $y = \sqrt{2x-3}+1$

   Parent Function: _____

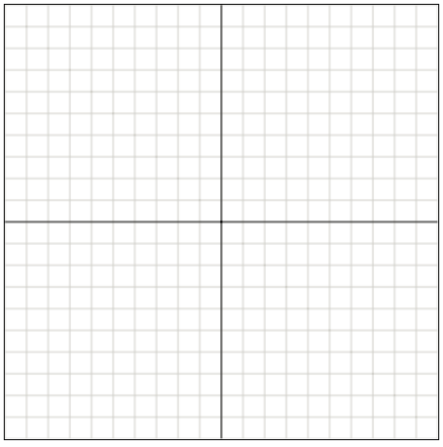
   $(x_0\ ,\ y_o) \rightarrow (\ \_\_\_\_\_\ ,\ \_\_\_\_\_)$



2. $y = \frac{2}{3}(4x-1)^3 - 3$

   Parent Function: _____

   $(x_0\ ,\ y_o) \rightarrow (\ \_\_\_\_\_\ ,\ \_\_\_\_\_)$



Part III: Solving Equations

Students should be able to solve linear, quadratic, polynomial, rational, radical and absolute value equations.

Solve the following equations. All solutions should be exact (no decimal approximations)!

1) $-2(2x-3)^2+14=0$

2) $4x^3+4x^2-2x=0$

3) $\frac{x}{x+2}-4=\frac{x+1}{x}$

4) $\frac{2x}{x-1}+\frac{1}{x-3}=\frac{2}{x^2-4x+3}$

5) $2\sqrt{4-x}+10=12$

6) $\sqrt{x+2}=6-\sqrt{7x+2}$

7) $x^{2/3}+3x^{1/3}+2=0$

8) $2x^3+7x^2+2x-3=0$