<u>Precalculus Final Project 2016: Digital Art from Equations</u>

In this project, you will use mathematical equations to create an image. You will incorporate many basic graphs as well as your knowledge of transformations. I have scheduled the computer lab during class on May 16, 17, 26, June 2, 3, 6, and 9. Of course, you can work on your project outside of class.

Here is a list of basic graphs that you will use:

(x, y)	point
$y = mx + b$	line
$y = b$	horizontal line
$x = c$	vertical line
$y = x^2$	parabola
$y = c/x$	rational
$y = \sqrt{x}$	square root (type sqrt to access this function)
$(x - h)^2 + (y - k)^2 = r^2$	circle
$y = a^x$	exponential (any base)
$y = logx$	logarithmic (any base)
$y = sin\ x\ or\ y = cos\ x$	sine or cosine curve
$y = x^b$	power curve, other than parabola, square root, or basic rational

Requirements
1. Start with a rough sketch on paper before starting on the computer.
2. Use at least one each of the different basic graphs from the class list (you may use other functions—inverse trig, anyone?).
3. Use transformations for at least 50% of your equations.
4. Use restricted domains (piecewise functions) for at least 25% of your equations.
5. Use at least one composition of functions, such as $y = |sin\ x|$. Absolute value is an excellent choice for compositions.
6. You must have a minimum of twenty equations.
7. Use at least one inequality.
8. Use color. Colors of graphs can be changed by clicking on Edit.
9. Creativity is a plus!

Ideas
Something you are interested in, such as cars, music, sports, animals, and so on
A logo
Famous artwork
Letters and words, such as your name
A geometric pattern
A cartoon character
Just about anything you can imagine!

Getting started
Go to www.desmos.com. To start, click on Create Free Account the first time, later, use Sign In. I suggest reading the User Guide.

Graphing

| Inequalities	Restricted domains
$y \le 2x + 1$ will shade below the line	$2x + 1 \{-3 < x < 2\}$ will graph a line segment
$2x - 1 \le y \le 2x + 1$ will shade between two lines	between two x–values
Inequalities may be used with any function, try	$2x + 1 \{x > 5\}$ will graph a ray
$(x - h)^2 + (y - k)^2 \le r^2$	Note: use curly braces

Completing your Project

Be sure to save your graph when you are finished working.

When you are ready to turn in your project, click on Share This Graph and email it to your teacher.

Also make a small poster (11x17) of your project with your name, date, title, graph printed in color, and a few of the (more interesting) equations. I have 11x17 cardstock. Print in color in the LRC. Talk with Mrs Zimmer.

Samples
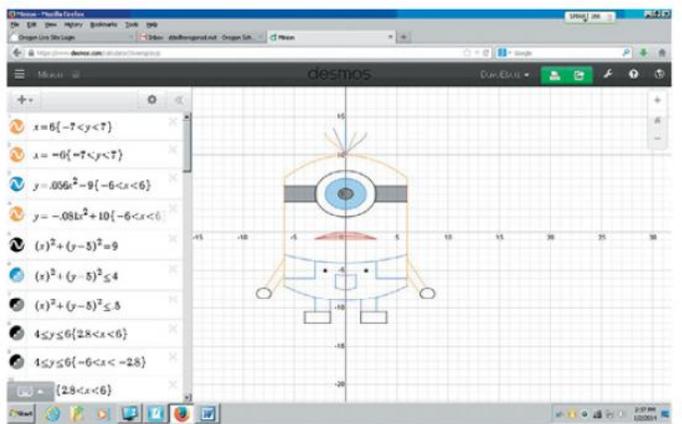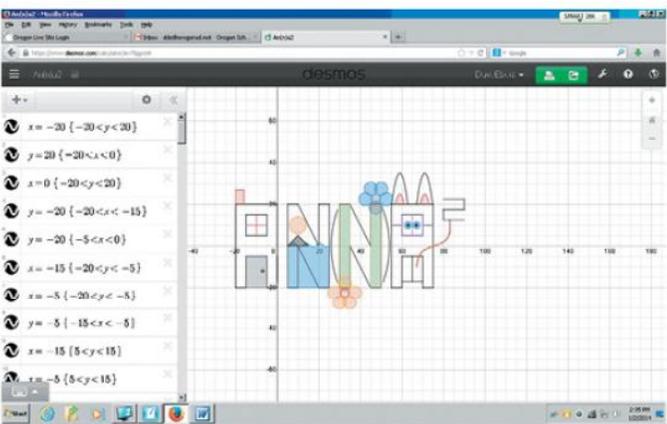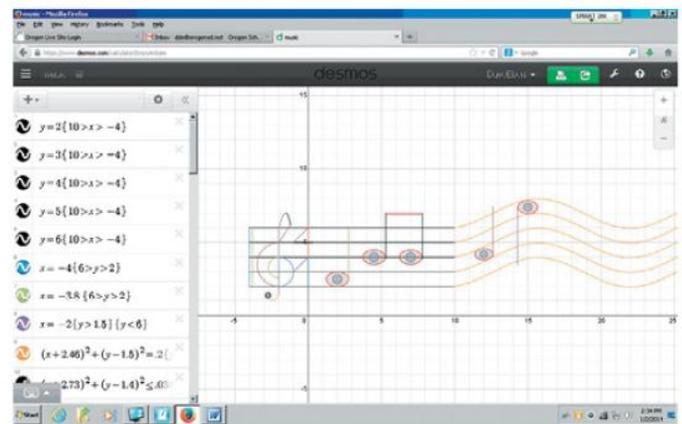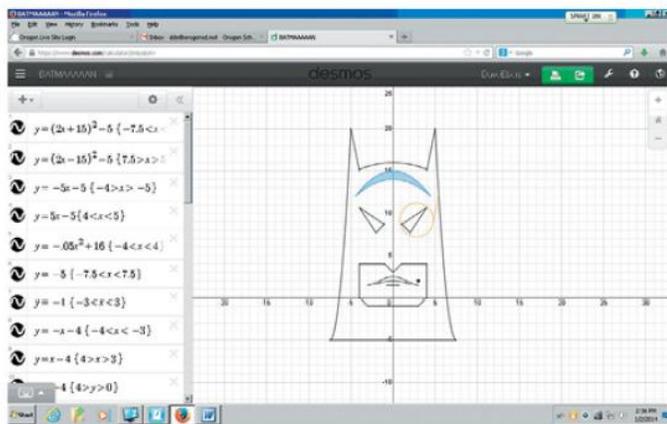
Credit for Project: *Mathematics Teacher*, December 2014/January 2015, Technology Tips, "Graphing Projects with Desmos", David Ebert.

Mathematics Teacher, November 2014, "The Algebra Artist", Darin Beigie.

Precalculus Final Project 2016

Name_____   Score_____

Title of Work

Meets the minimum = 65 to Amaze me = 100

Subject: original, school appropriate, independently created ALL projects must meet this criterion.	
Basic Functions: (3 pts each type) [36 – 45 points] <table><tr><td>(x, y)</td><td>point</td><td></td></tr><tr><td>$y = mx + b$</td><td>line</td><td></td></tr><tr><td>$y = b$</td><td>horizontal line</td><td></td></tr><tr><td>$x = c$</td><td>vertical line</td><td></td></tr><tr><td>$y = x^2$</td><td>parabola</td><td></td></tr><tr><td>$y = c /x$</td><td>rational</td><td></td></tr><tr><td>$y = \sqrt{x}$</td><td>square root</td><td></td></tr><tr><td>$(x – h)^2 + (y – k)^2 = r^2$</td><td>circle</td><td></td></tr><tr><td>$y = a^x$</td><td>exponential (of any base)</td><td></td></tr><tr><td>$y = log\ x$</td><td>logarithmic (of any base)</td><td></td></tr><tr><td>$y = sin\ x\ or\ y = cos\ x$</td><td>sine or cosine curve</td><td></td></tr><tr><td>$y = x^b$</td><td>power curve, other than parabola, square root, or basic rational</td><td></td></tr></table> Other functions (3 points each, up to 3 more types):	
Transformations: minimum 50% of functions [6 points] to 90% [10 points]	
Restricted Domain: minimum 25% of functions [5 points] to 50% [10 points]	
Inequalities: minimum one inequality [2 points], additional inequalities, [1 point each to 5 points max for category]	
Composition of Functions: Minimum one composition of functions, such as $y = \lvert sin\ x \rvert$. [2 points], additional compositions, [1 point each to 5 points max for category]	
Complexity: number of equations, minimum 20 [6 points] to 40 [10 points]	
Color: colored function graphs, colored regions (with inequalities), impact of color on work [5 – 10 points]	
Creativity – wow factor [3 – 5 points]	
On time: This project (email and poster) is due on June 9[th,], the last day of class. Late submittals will lose 10 points for each day.	