

Challenging Precalculus Alternative Assessments Using the Free Online Desmos Calculator

**By Neil D. Cooperman
Millburn High School
NCoop@att.net**

**Stephanie H. Cooperman
Chatham Middle School
Shc283@att.net**

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Innovation in Technology for Mathematics Education



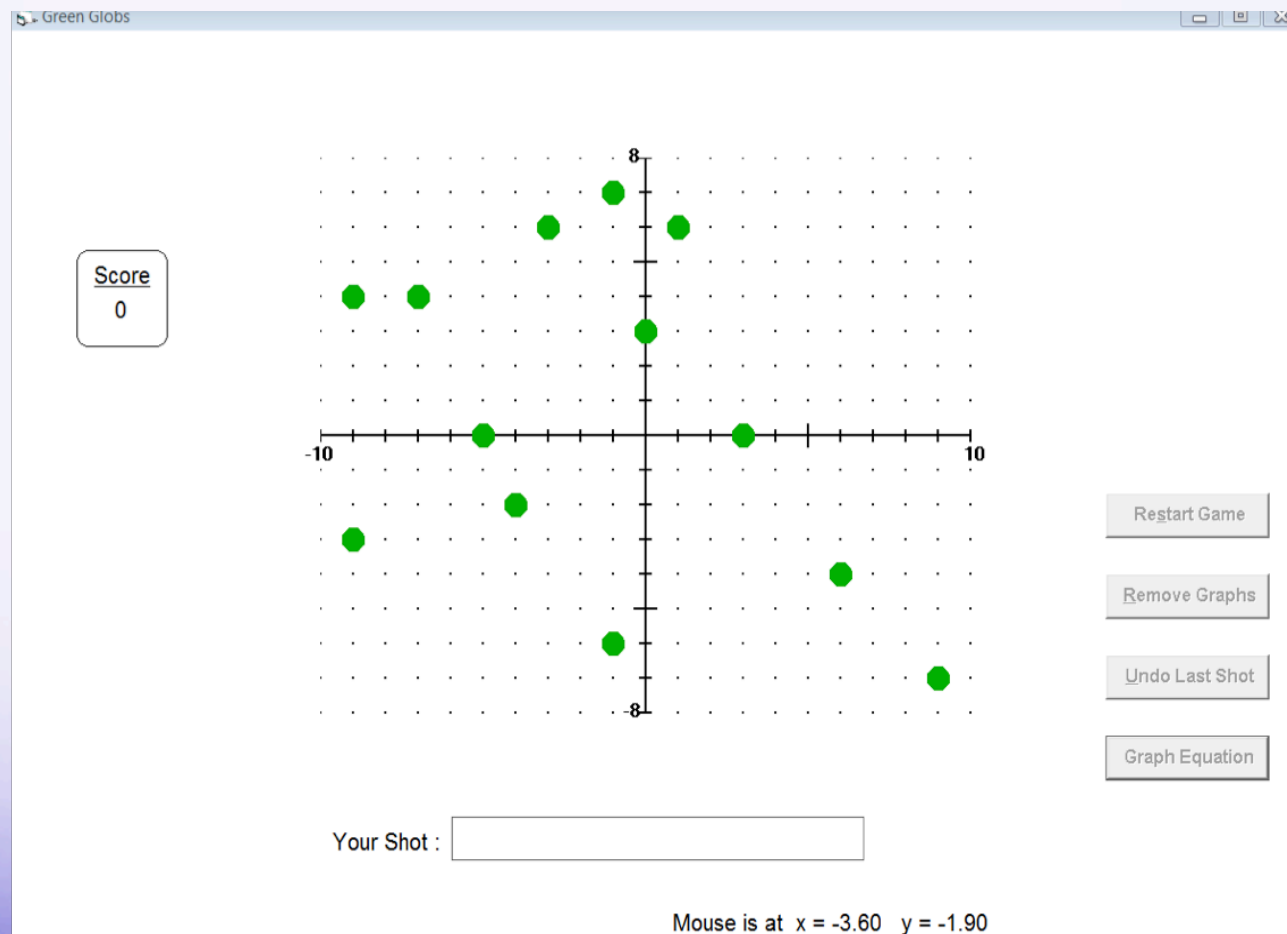
CIESE

THE CENTER FOR INNOVATION IN
ENGINEERING AND SCIENCE EDUCATION

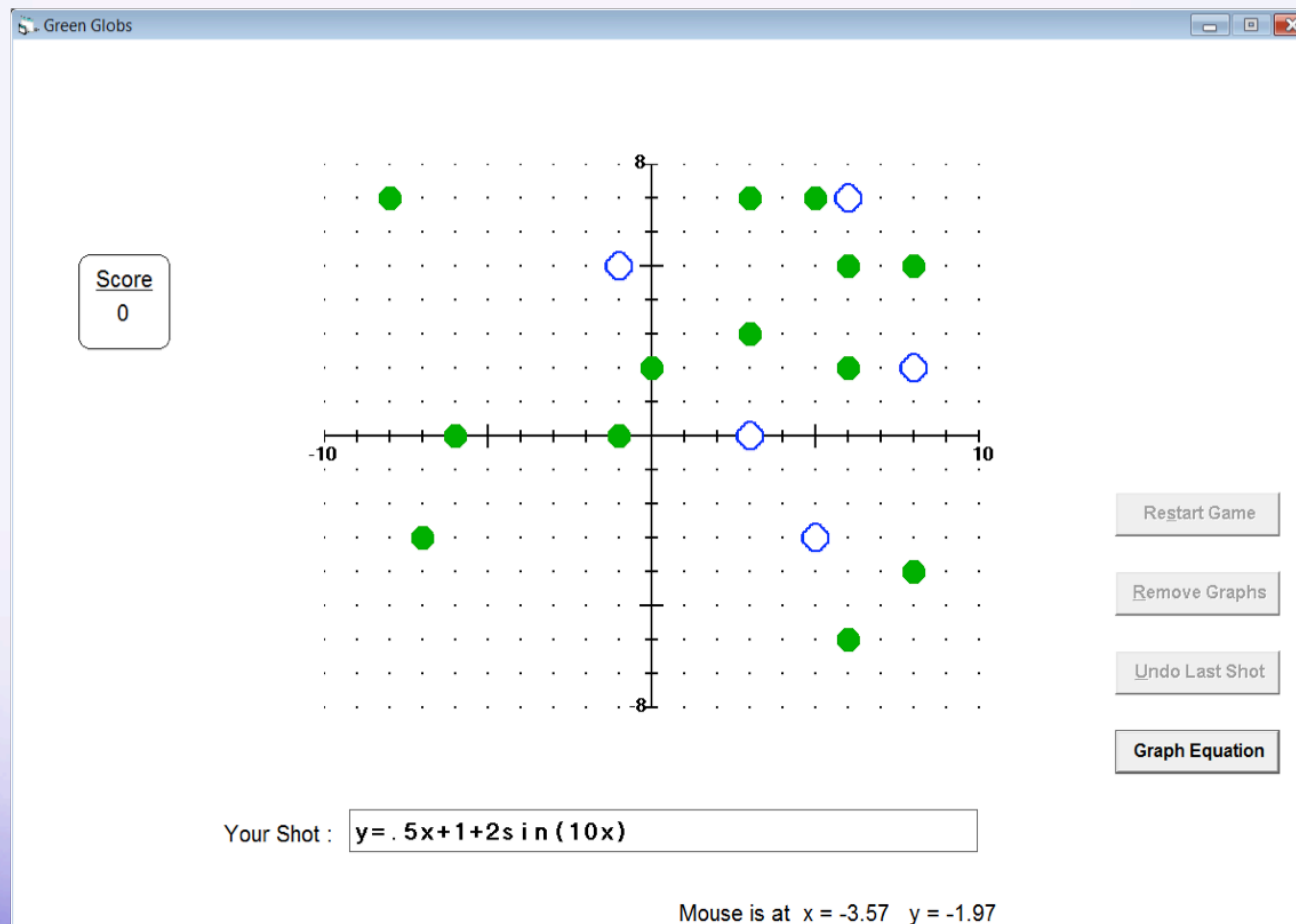
Exploring Mathematics Software for Education

- Geometric Supposer
- Green Globes & Graphing Equations
- Mathematics Exploration Toolkit
- Discovery Learning in Trigonometry

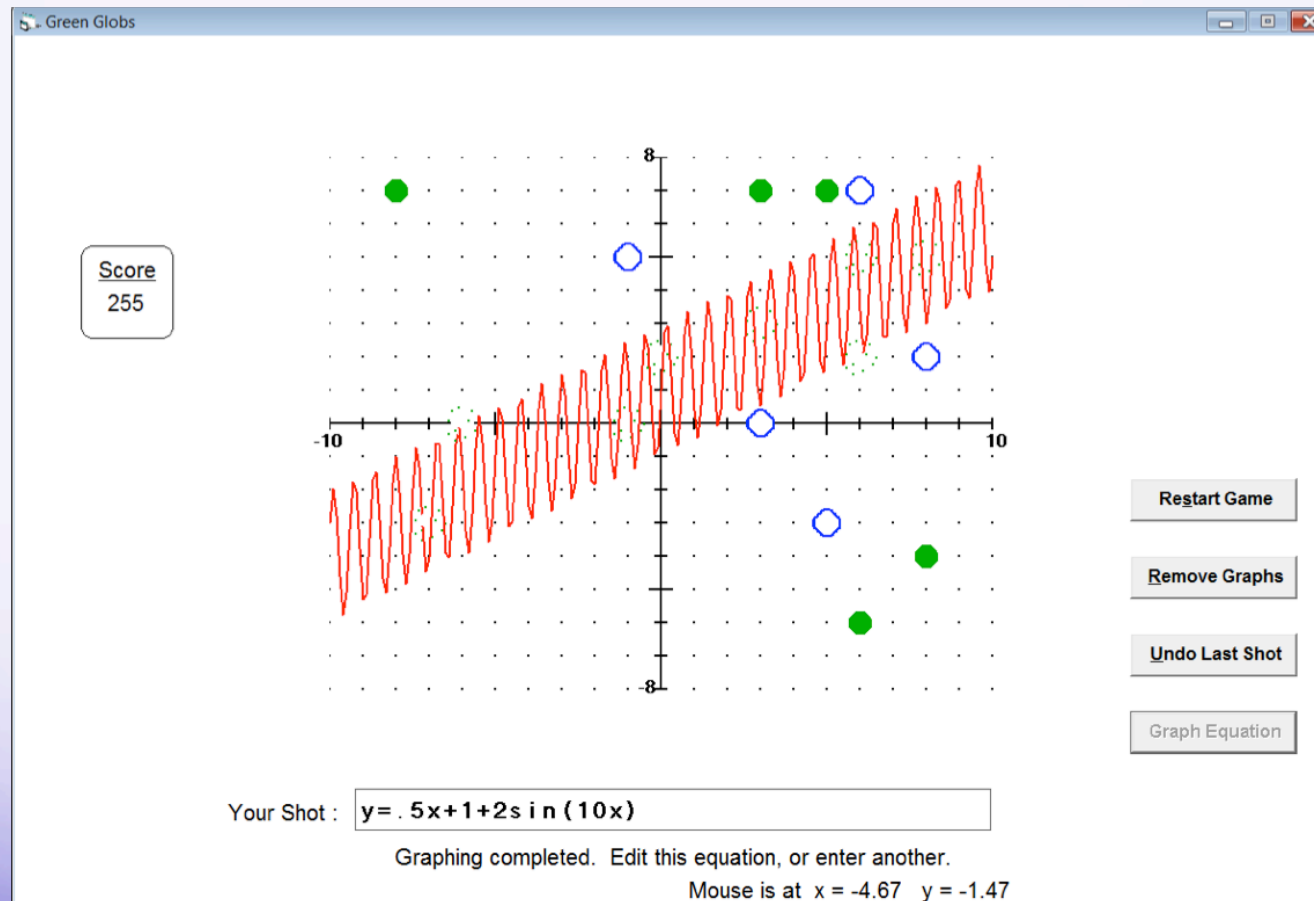
Learning Mathematics by Playing Games



Learning Mathematics by Playing Games



Learning Mathematics by Playing Games



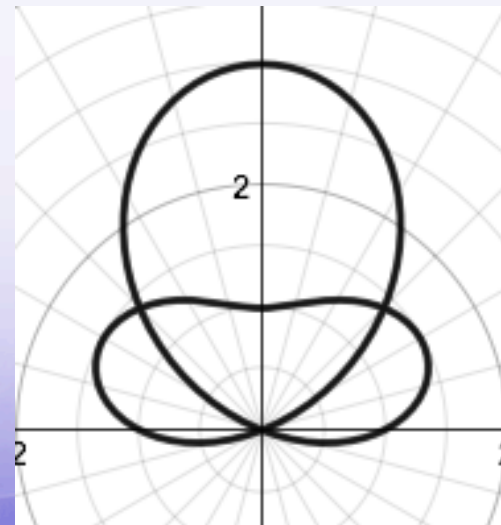
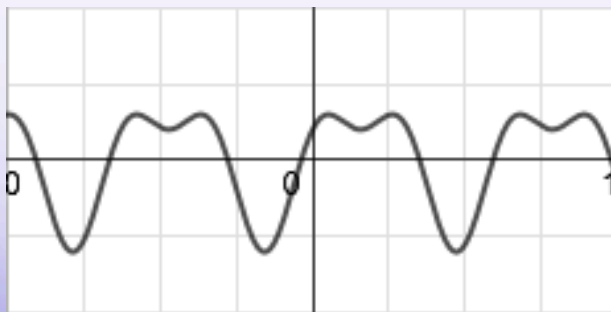
Trig Graphs and Their Polar Counterparts



Trig Graphs and Their Polar Counterparts

Part 1

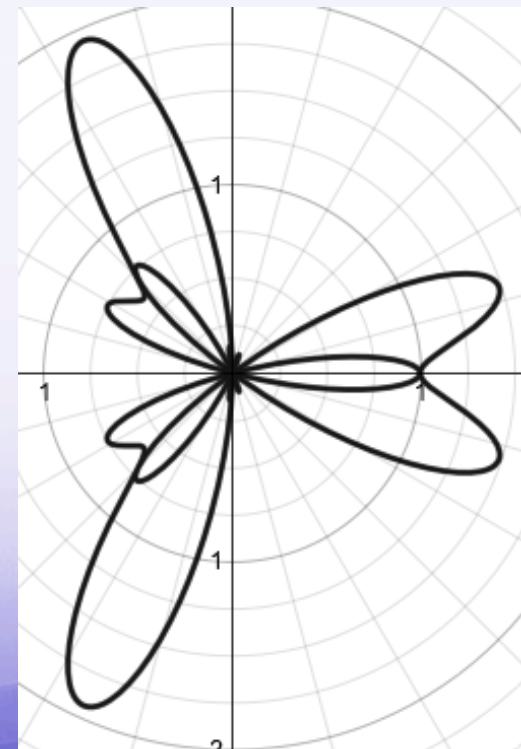
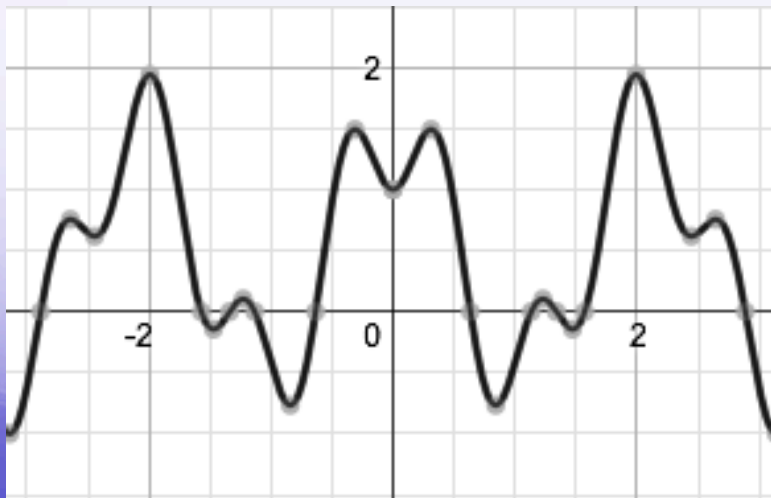
- $f(x) = 2\sin(x)$
- $f(x) = \cos(2x)$
- $f(x) = 2\sin(x) + \cos(2x)$
- $f(\theta) = 2\sin(\theta) + \cos(2\theta)$



Trig Graphs and Their Polar Counterparts

Part 2

- $f(x) = \sin(4x)^2$
- $f(x) = \cos(3x)$
- $f(x) = \cos(3x) + \sin(4x)^2$
- $f(\theta) = \cos(3\theta) + \sin(4\theta)^2$



Follow That Curve

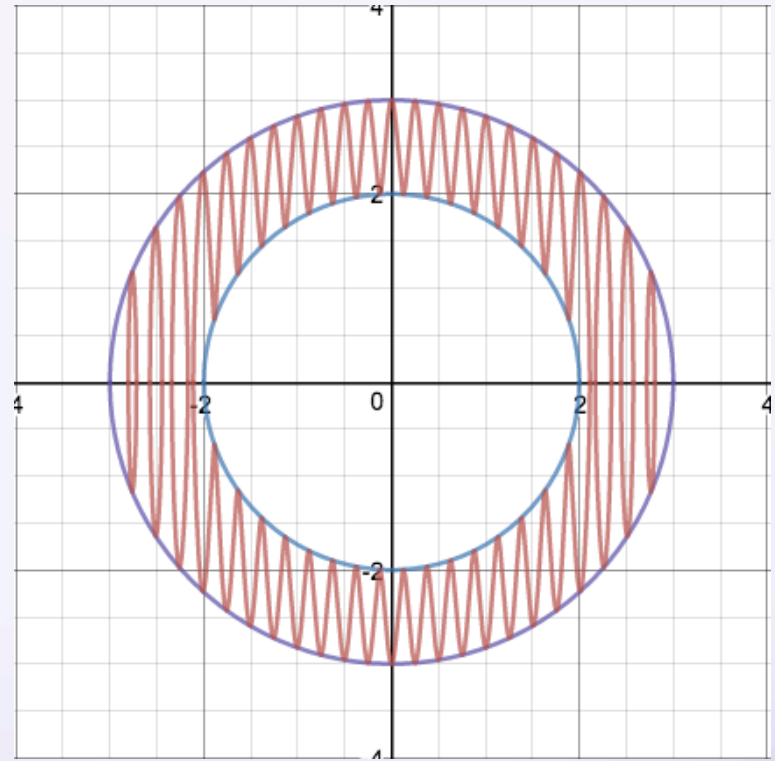
- Follow That Curve
 - $y = x$
 - $y = x + \sin(x)$
 - $y = x + 3\sin(x)$
 - $y = x + \sin(10x)$
 - $y = x^2$
 - $y = ((x + \sin(x))^2$
 - $y = ((x + \sin(4x))^2$
 - $y = 0.1x^2$
 - $y = 0.1((x + \sin(4x))^2$

Create a Filled in Circle

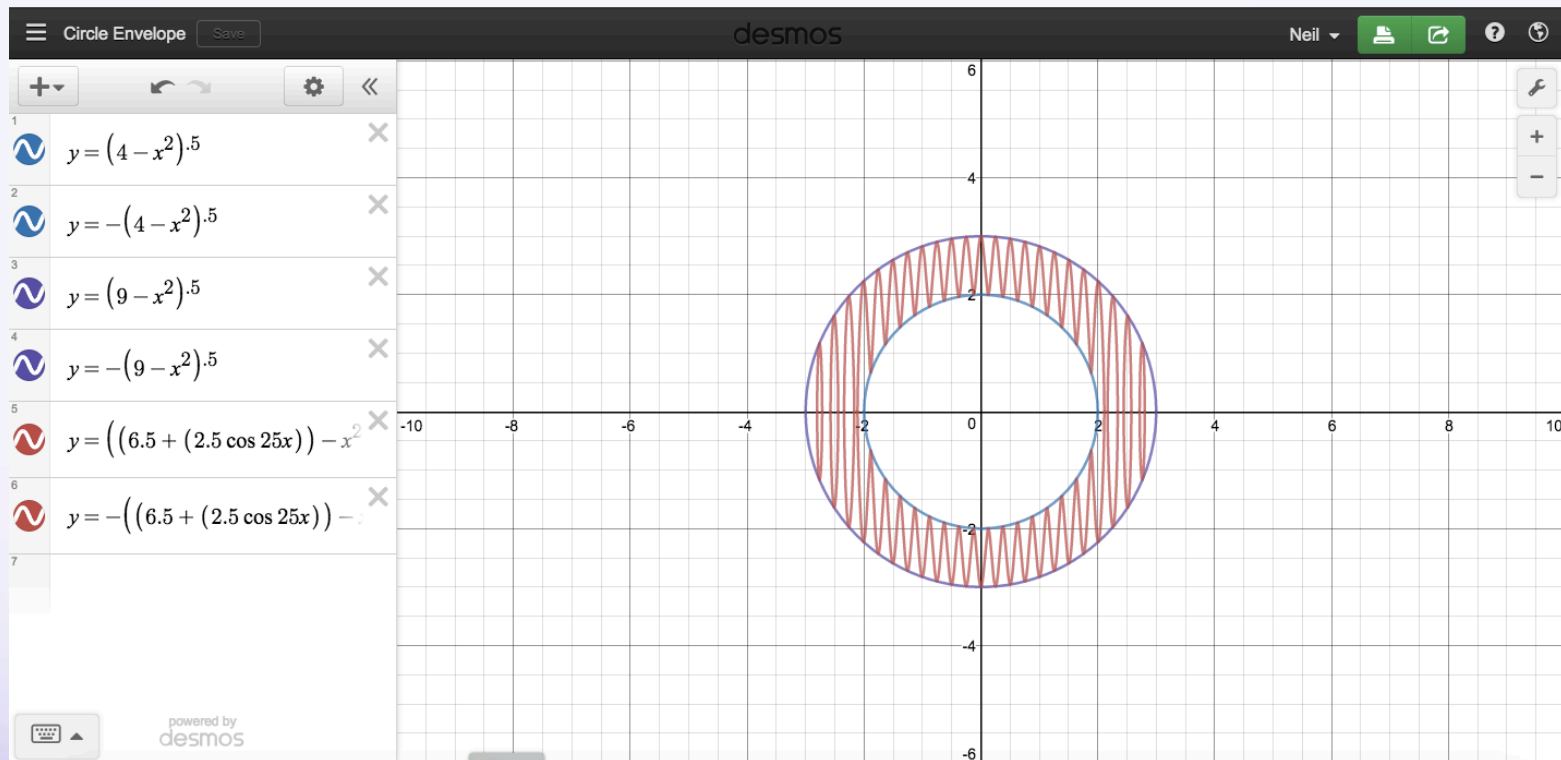
- Create Inner Ring
 - $y = (4 - x^2)^{.5}$
 - $y = -(4 - x^2)^{.5}$
- Create Outer Ring
 - $y = (9 - x^2)^{.5}$
 - $y = -(9 - x^2)^{.5}$
- Fill in the Circle
 - $y = ((6.5 + (2.5\cos(25x)) - x^2)^{.5}$
 - $y = -((6.5 + (2.5\cos(25x)) - x^2)^{.5}$

Create a Filled in Circle

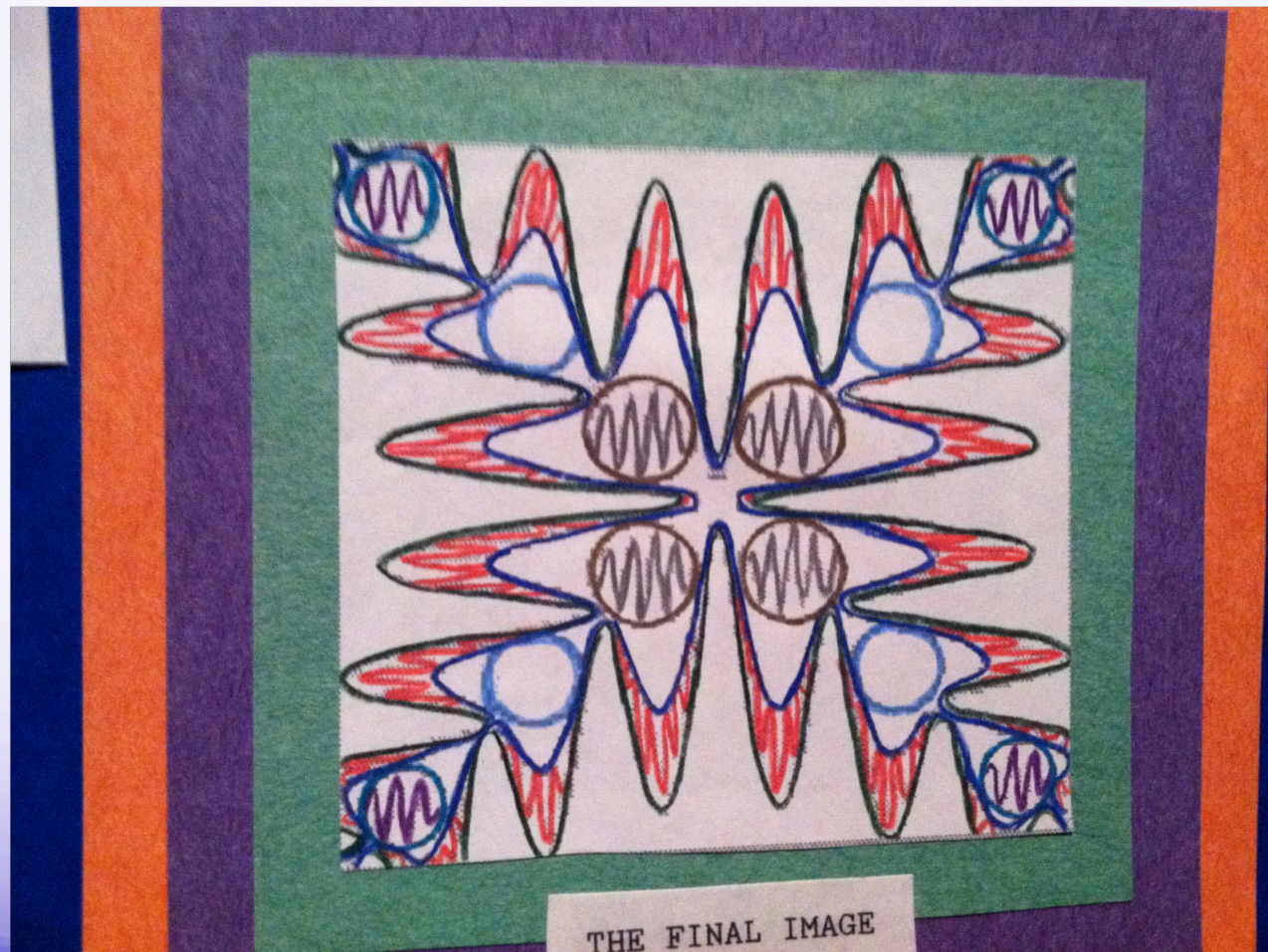
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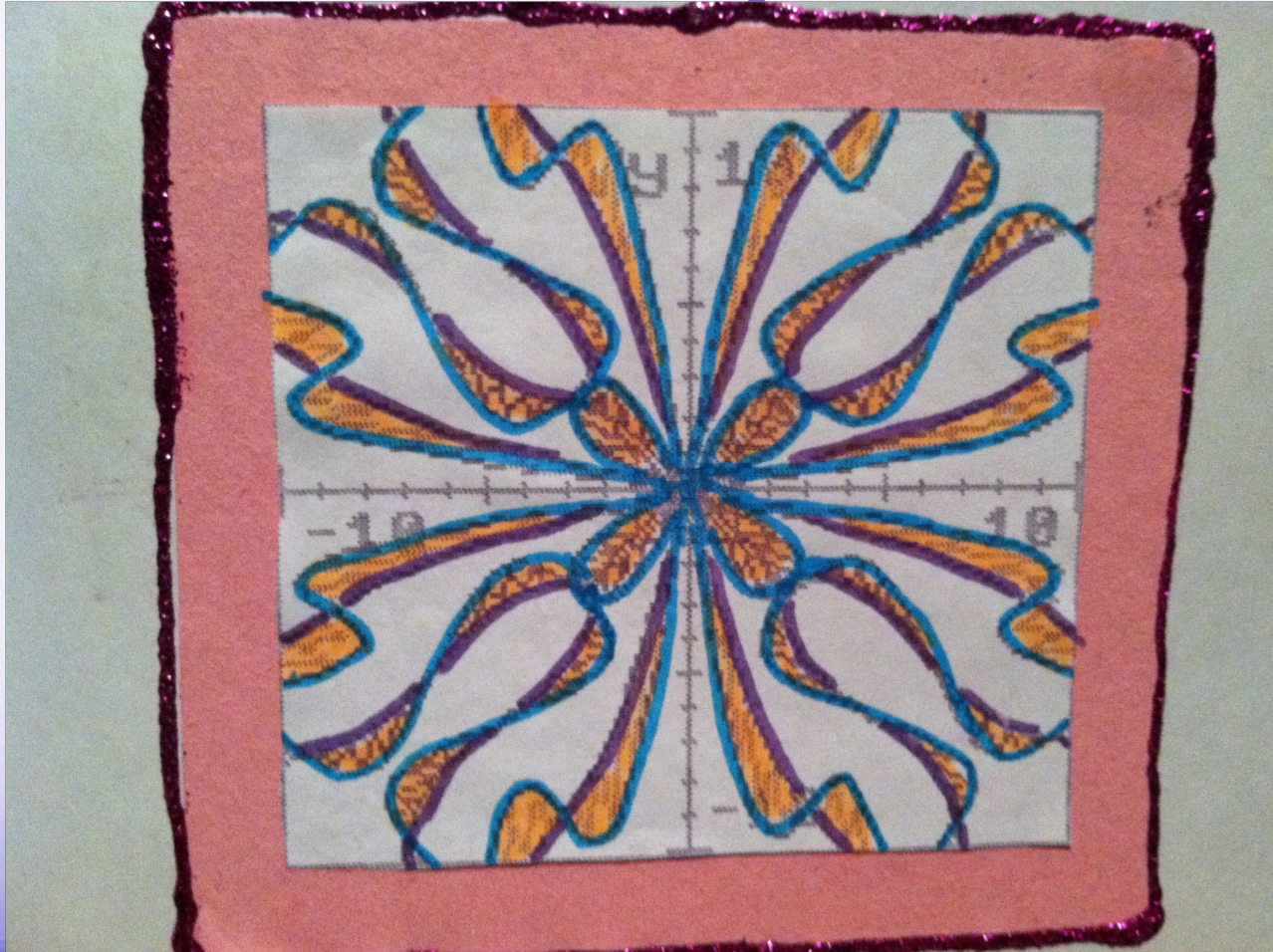
What It Looks Like on Desmos



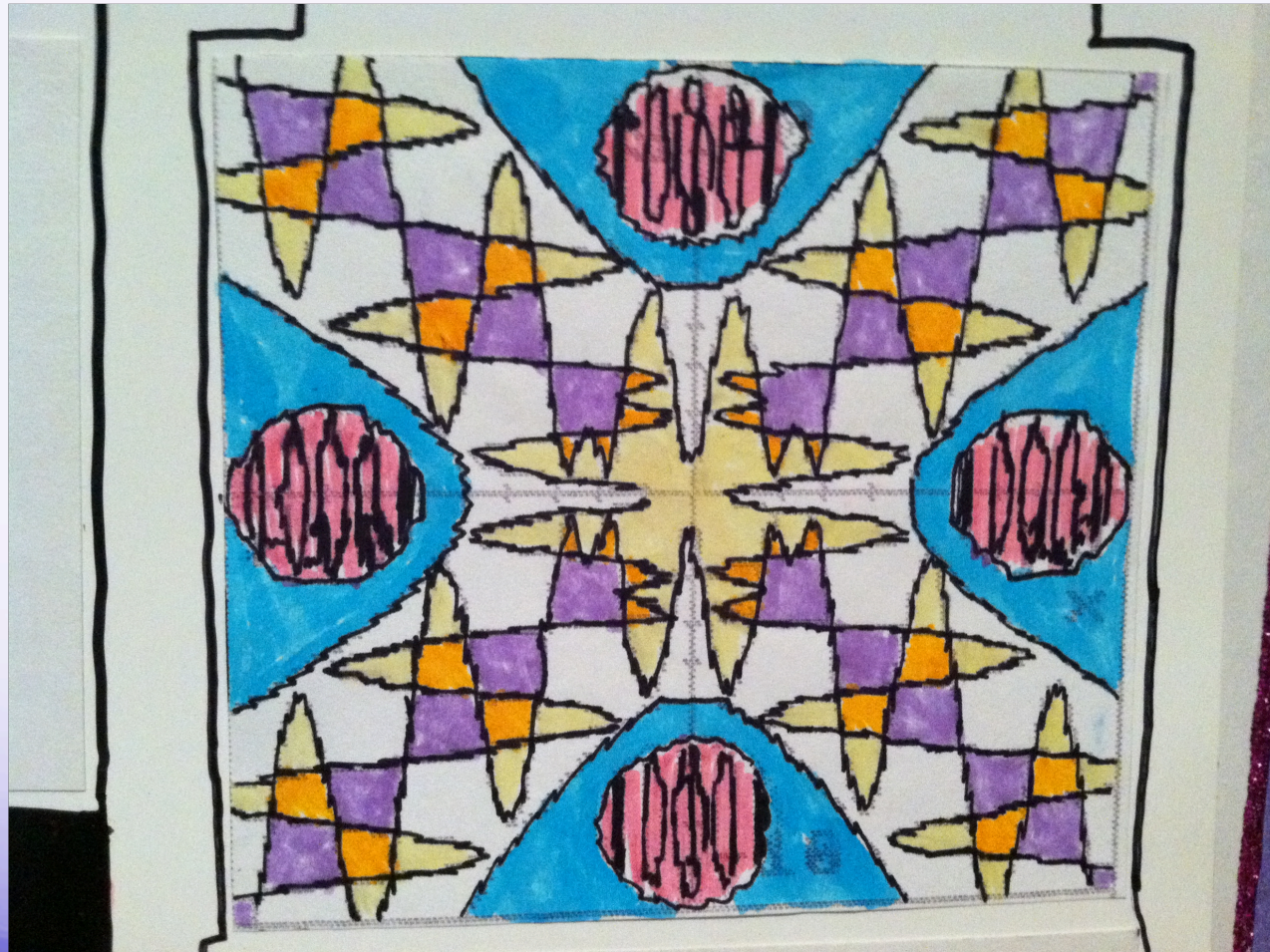
Creating Mathematical Envelopes



Creating Mathematical Envelopes



Creating Mathematical Envelopes



Graphing Borders of Envelopes

- Borders
 - $y^2 = (\sin(x) + x)^2$
 - $y^2 = (3\sin(x) + x)^2$
- Fill
 - $y^2 = ((\cos(10x) + 2)\sin(x) + x)^2$
- Repeat with Inverses
 - $x^2 = (\sin(y) + y)^2$
 - $x^2 = (3\sin(y) + y)^2$
 - $x^2 = ((\cos(10y) + 2)\sin(y) + y)^2$

Creating Mathematical Envelopes

