
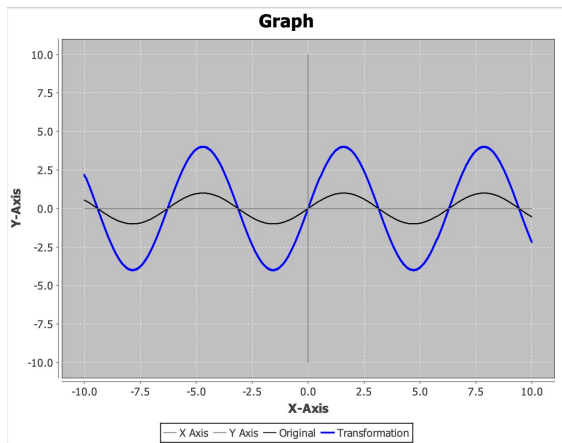


## Criterion B: Solution overview

### Input:

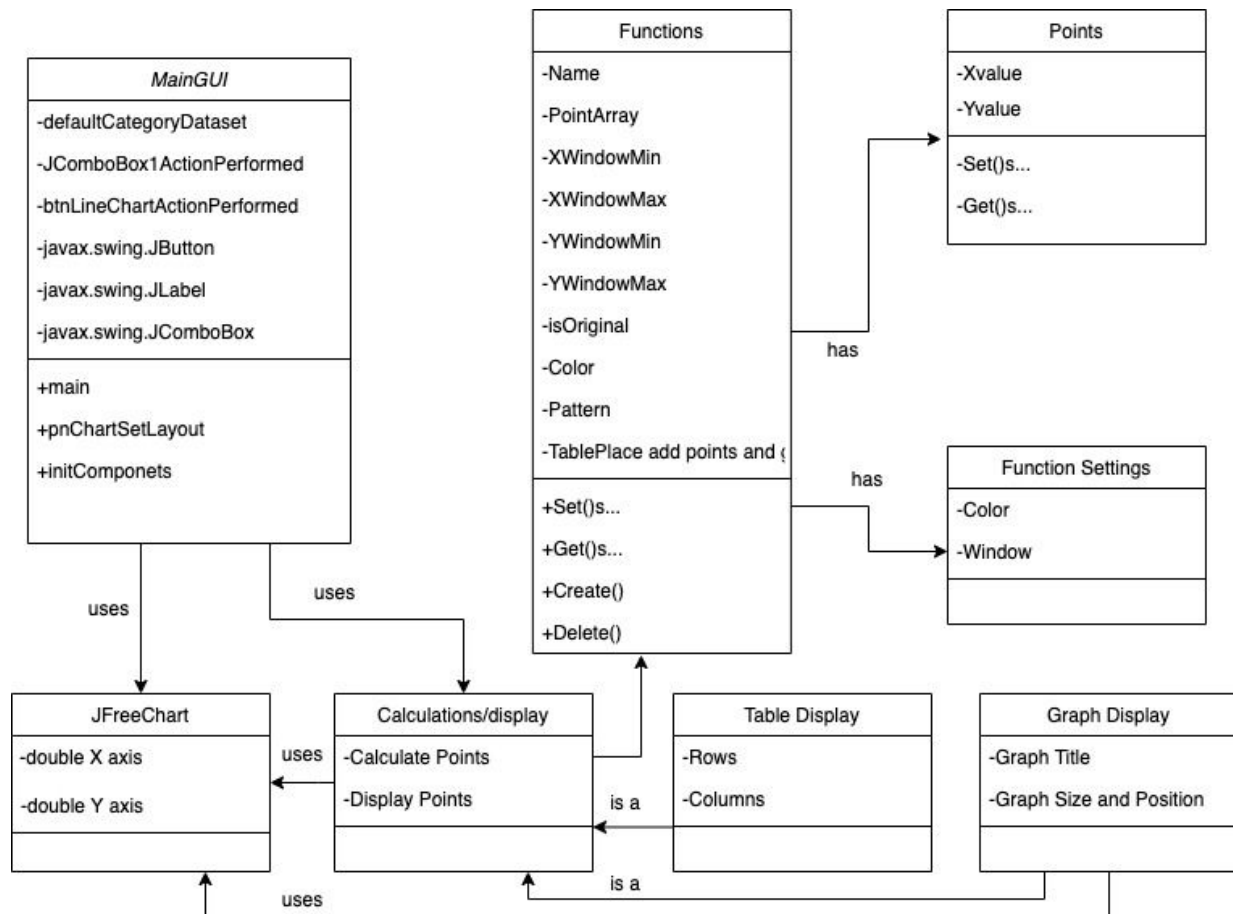
Input	Data Type	Normal Range	Example
X or Y value	double	Any x or y value. Usually within the window.	<div>           Finding Values:  <input checked="" type="radio"/> Original   <input type="radio"/> Transformation            Enter X: <input type="text"/>   Y: <input type="text"/>            Enter Y: <input type="text"/>   X: <input type="text"/> </div>
Color of function	String	Any color	<div>           Color: <span>Blue</span> ▼         </div>
Pattern of function	String	Any pattern (ex. Solid line, dashed line, etc.)	<div> <span>Solid Line</span> ▼         </div>
Window maximum and minimum values	Double	Any numbers where the max is above the min	<div>           Window:            X min: <input type="text"/>   X max: <input type="text"/>            Y min: <input type="text"/>   Y max: <input type="text"/> </div>
Points in a function	Double	Any x and y value pairs	<div>           Custom Point Entry: <span>Add</span> <span>Remove</span>            X: <input type="text"/>   Y: <input type="text"/> </div>
Transformation variables	double	Any number within the slide bar	<div>           a Value <input type="text" value="1.0"/>   </div>
Function selector	String	Any of the function names	<div> <span>Function 1</span> ▼         </div>

Output:

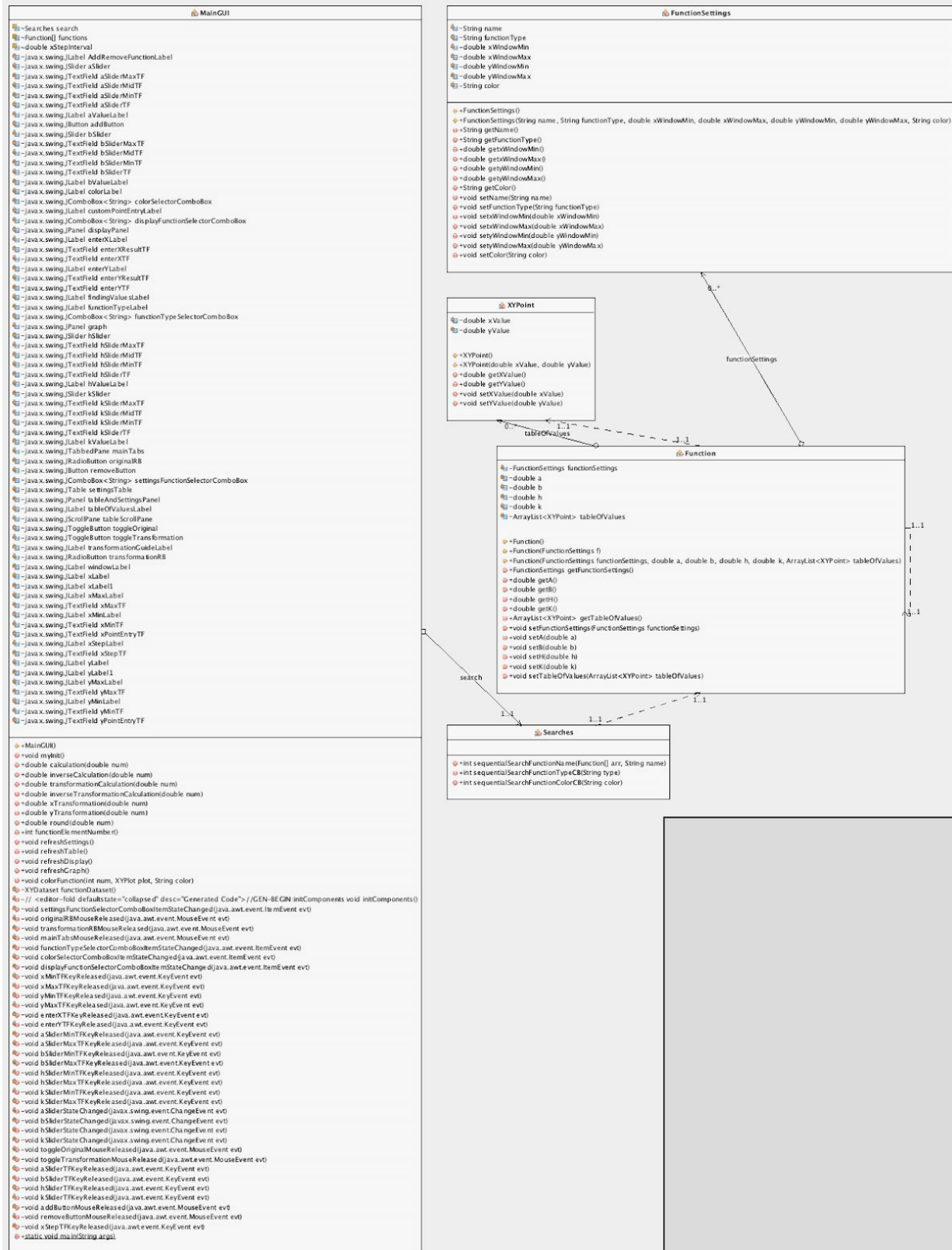
Output	Data Type	Normal Range	Example																																																																																				
Graph Display	JFreeChart line graph	Any function	<div><div>Graph</div></div>																																																																																				
Points table	Table containing doubles	Any numbers	<div><div>Table Of Values</div><table><tr><th>X Values</th><th>Original Function</th><th>Transformed Function</th></tr><tr><td>-10.0</td><td>0.544</td><td>2.1761</td></tr><tr><td>-9.0</td><td>-0.4121</td><td>-1.6485</td></tr><tr><td>-8.0</td><td>-0.9894</td><td>-3.9574</td></tr><tr><td>-7.0</td><td>-0.657</td><td>-2.6279</td></tr><tr><td>-6.0</td><td>0.2794</td><td>1.1177</td></tr><tr><td>-5.0</td><td>0.9589</td><td>3.8357</td></tr><tr><td>-4.0</td><td>0.7568</td><td>3.0272</td></tr><tr><td>-3.0</td><td>-0.1411</td><td>-0.5645</td></tr><tr><td>-2.0</td><td>-0.9093</td><td>-3.6372</td></tr><tr><td>-1.0</td><td>-0.8415</td><td>-3.3659</td></tr><tr><td>0.0</td><td>0.0</td><td>0.0</td></tr><tr><td>1.0</td><td>0.8415</td><td>3.3659</td></tr><tr><td>2.0</td><td>0.9093</td><td>3.6372</td></tr><tr><td>3.0</td><td>0.1411</td><td>0.5645</td></tr><tr><td>4.0</td><td>-0.7568</td><td>-3.0272</td></tr><tr><td>5.0</td><td>-0.9589</td><td>-3.8357</td></tr><tr><td>6.0</td><td>-0.2794</td><td>-1.1177</td></tr><tr><td>7.0</td><td>0.657</td><td>2.6279</td></tr><tr><td>8.0</td><td>0.9894</td><td>3.9574</td></tr><tr><td>9.0</td><td>0.4121</td><td>1.6485</td></tr><tr><td>10.0</td><td>-0.544</td><td>-2.1761</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table></div>	X Values	Original Function	Transformed Function	-10.0	0.544	2.1761	-9.0	-0.4121	-1.6485	-8.0	-0.9894	-3.9574	-7.0	-0.657	-2.6279	-6.0	0.2794	1.1177	-5.0	0.9589	3.8357	-4.0	0.7568	3.0272	-3.0	-0.1411	-0.5645	-2.0	-0.9093	-3.6372	-1.0	-0.8415	-3.3659	0.0	0.0	0.0	1.0	0.8415	3.3659	2.0	0.9093	3.6372	3.0	0.1411	0.5645	4.0	-0.7568	-3.0272	5.0	-0.9589	-3.8357	6.0	-0.2794	-1.1177	7.0	0.657	2.6279	8.0	0.9894	3.9574	9.0	0.4121	1.6485	10.0	-0.544	-2.1761																		
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Value finder	double	Any numbers	<div><div>Y:</div><div></div><div>X:</div><div></div></div>																																																																																				

## Class Diagram

Initial Class Diagram Draft:

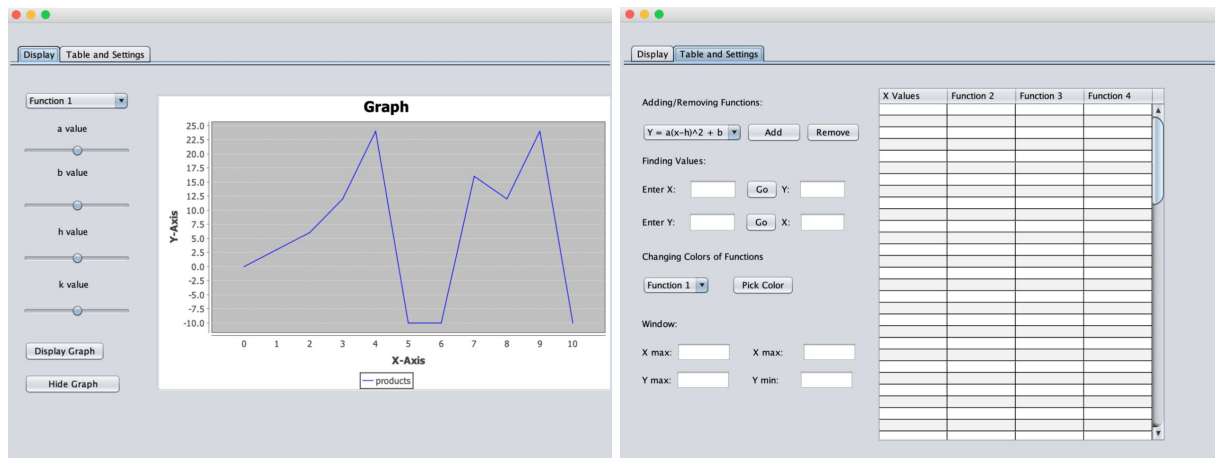


## Final Class Diagram:

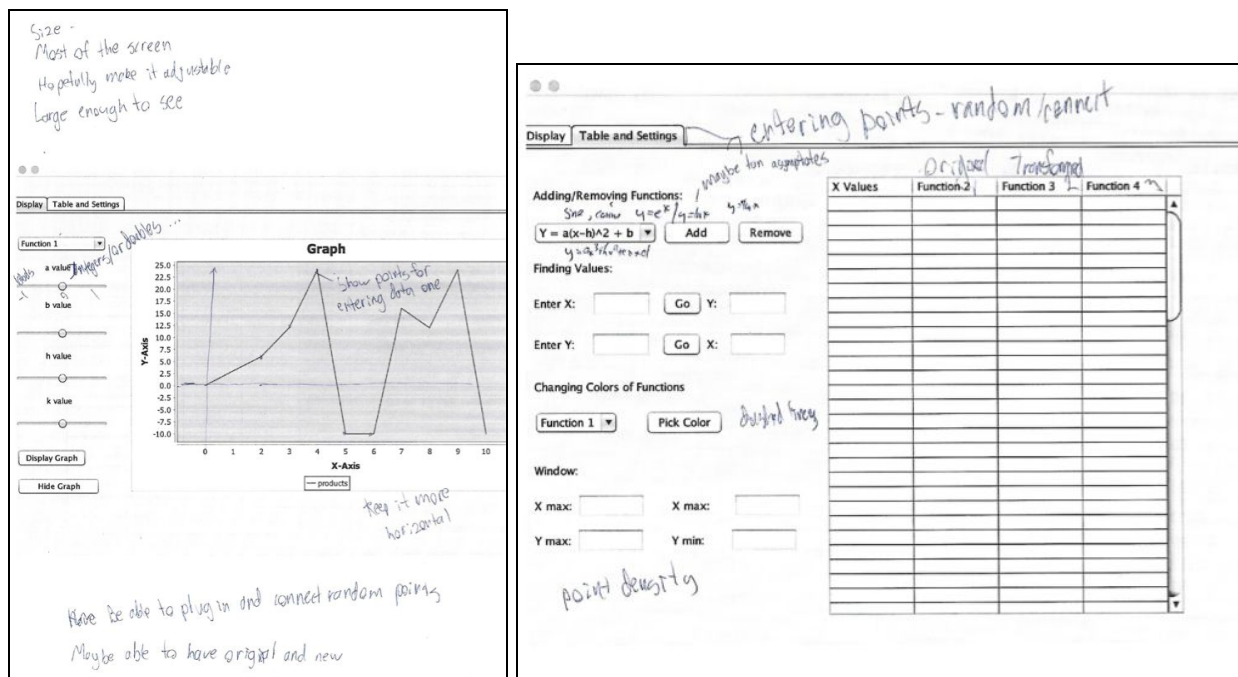


## Prototype Process

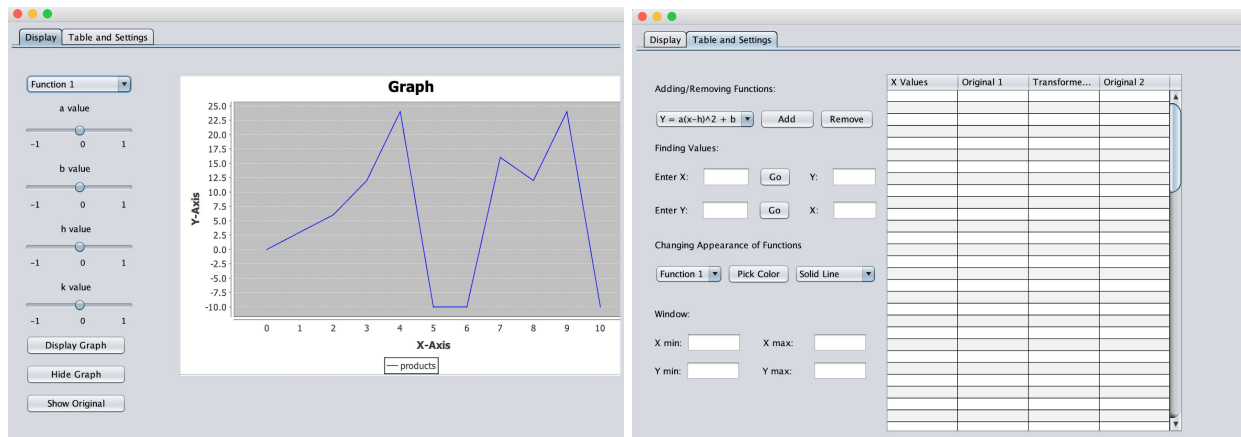
Initial GUI Prototype:



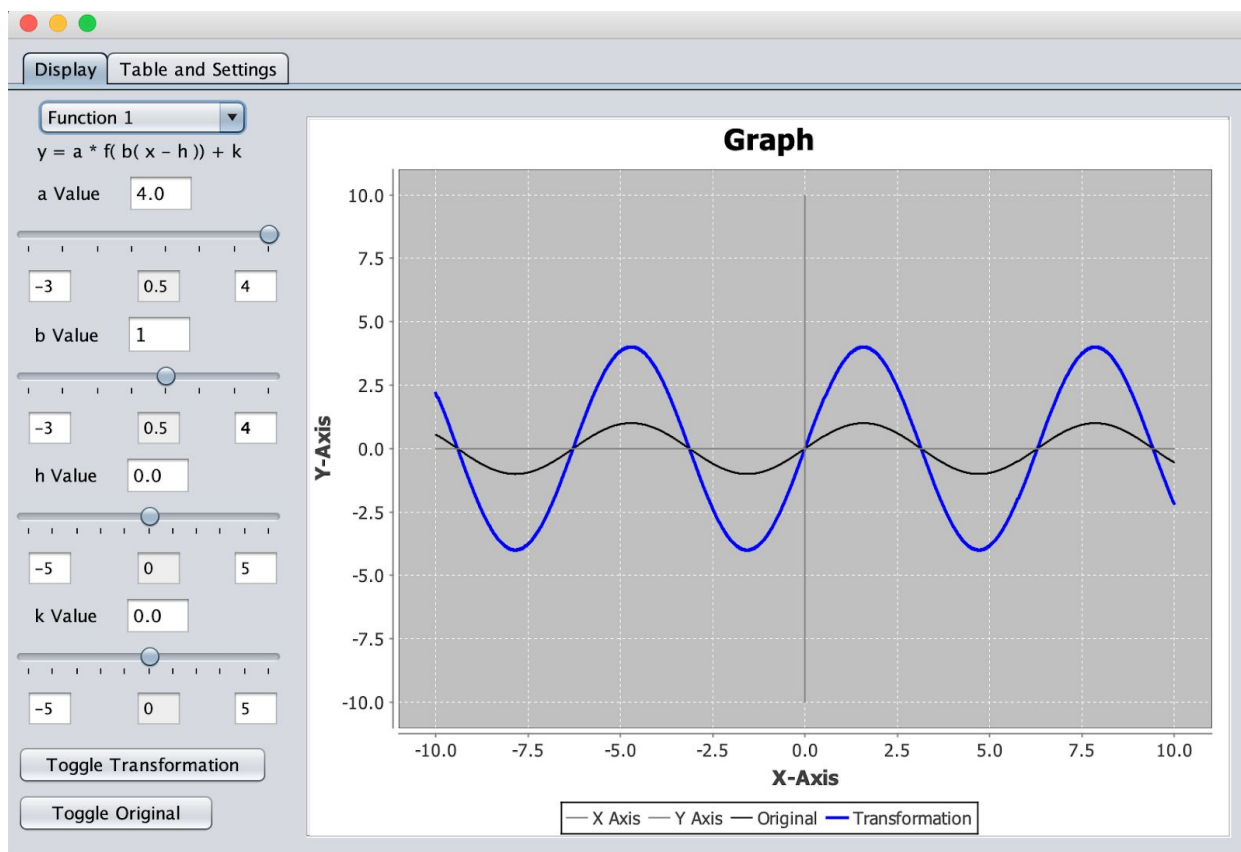
Initial GUI Prototype printed with notes by client and author:



## Middle-Stage GUI Prototype:



## Final GUI Prototype:



X Values	Original Function	Transformed Function
-10.0	0.544	2.1761
-9.0	-0.4121	-1.6485
-8.0	-0.9894	-3.9574
-7.0	-0.657	-2.6279
-6.0	0.2794	1.1177
-5.0	0.9589	3.8357
-4.0	0.7568	3.0272
-3.0	-0.1411	-0.5645
-2.0	-0.9093	-3.6372
-1.0	-0.8415	-3.3659
0.0	0.0	0.0
1.0	0.8415	3.3659
2.0	0.9093	3.6372
3.0	0.1411	0.5645
4.0	-0.7568	-3.0272
5.0	-0.9589	-3.8357
6.0	-0.2794	-1.1177
7.0	0.657	2.6279
8.0	0.9894	3.9574
9.0	0.4121	1.6485
10.0	-0.544	-2.1761

## Chronological Plan

- Complete application framework (1 week)
  - Create GUI elements
  - Create classes
  - Comment class purposes
- Write code for creating the functions, displaying them on the table, and finding values (2 weeks)
  - Finish function, functionSettings, and XYPoint classes
- Write code displaying the functions on the graph and controlling graph settings (2 weeks)
  - Implement jFreeChart xyLineChart
- Write code making the transformations for the graph work and continuously refresh (1 week)
  - Finish Sliders and refreshGraph() method

Pseudocode:

```
private void aSliderStateChanged(ChangeEvent event) { //event triggered when slider is moved
    functions[ functionElementNumber() ].setA(aSlider.getValue()); //storing the value
    aSliderTF.setText(aSlider.getValue()); //outputting the value for text field feedback
    refreshGraph(); //automatically refreshing graph
}
```

- Final Program Coding (1 week)
  - Finish all code while ensuring functionality
- Final Testing (3 days)
  - Complete testing plan

### Mid-coding Changes

While coding I made several changes to the program. I changed the class structure as I eliminated unnecessary classes. I also realized there was no point in storing all the points as they were constantly changing. I also changed the GUI setup, by moving things around and adding features such as the slide bar range adjuster.

### Testing Plan

- Test all features for basic functionality.
- Test all features for specific errors.
- Use a third party to run over everything and test for accessibility and ease of use.
- Test program with client.

Input	Normal	Border	Abnormal	Extreme
Window X and Y maximums and minimums	Values around 10 away from each other near the origin or covering the function	Values creating very rectangular windows	Values creating very large or small windows far from the origin	Values with max's less than or equal to minimums that will cause an error popup asking for re-entry
Finding point's X and Y values	Integer values within the window	Double values within the window	Values not within the window causing an error popup asking for re-entry	Non-number values causing an error popup asking for re-entry
Entering custom point entry values to create a function	Values with integer coordinates within 10 units of the origin	Values with decimal coordinates within 10 units of the origin	Values further than 10 units of the origin	Non-number values causing an error popup asking for re-entry

**Criterion B Word Count: 103**