### **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.	Finding Values:        • Original       Transformation      Enter X:      Y:      Enter Y:      X:
Color of function	String	Any color	Color: Blue
Pattern of function	String	Any pattern (ex. Solid line, dashed line, etc.)	Solid Line
Window maximum and minimum values	Double	Any numbers where the max is above the min	Window: X min: X max: Y min: Y max:
Points in a function	Double	Any x and y value pairs	Custom Point Entry: Add Remove X: Y:
Transformation variables	double	Any number within the slide bar	a Value 1.0
Function selector	String	Any of the function names	Function 1

# **Output:**

Output	Data Type	Normal Range	Example
Graph Display	JFreeChart line graph	Any function	Graph 10.0 7.5 5.0 2.5 -5.0 -2.5 -5.0 -10.0 -10.0 -7.5 -5.0 -10.0 -7.5 -5.0 -10.0 -XAvis — Y Avis — Original — Transformation
Points table	Table containing doubles	Any numbers	Table Of Values           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
Value finder	double	Any numbers	Y: X:

### **Class Diagram**

#### Initial Class Diagram Draft:



# Final Class Diagram:

A Main GUI	EunctionSettings
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to search search to search for the search to the search	tar som giname tar sting function Type
Note that the second se	4u-double xWindow/Min
ng - Javax.swing.JLabel AddRemoveFunctionLabel	4g - double xWindowMax 4g - double yWindowMax
u-javax.swing.jTextField aSliderMaxTF	41 - double yWindowMax
-java x.swing.jTextField aSiderMidTF     -isva x.swing.iTextField aSiderMidTF	€g-String color
🕼 - Java x. swing. J TextField a Side (TF	Security Carting O
Su-javax.swing.jLabel aValueLabel	
u-java x. swing. Jslider bSlider	•-String getName()
a-java x.swing. JTextField bSliderMaxTF	
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🔄 - Java x. swing. J TextField bSlider TF	+double getWindowNin()     control to the getWindowNin()
1 - java x. swing. JLabel bValueLabel	• "double getywind/wmaxu • *String getColor()
1 - Java x. swing. Jcaber Color Laber 1 - Java x. swing. JComb oBox < String> colorSelectorComb oBox	U+void setName(String name)
a -java x. swing. JLabel custom PointEntryLabel	+void setFunctionType(String functionType)     +void setFunctionType(b)     +void setWindowMindouble WindowMin
¶i - java x. swing. JComboBox < String> dis playFunctionSele ctorComboBox I - java x. swing. IPanel dis playPanel	+void setxWindowMax(double xWindowMax)
4 - Java x. swing. JLabel enterXLabel	e+void setyWindowMindouble yWindowMin
to - Java x. swing. JTextField enterXResultTF	<ul> <li>+ Void setty wind ownak (couble: ywind downak x)</li> <li>+ void setColor(String color)</li> </ul>
- java x. swing ji teoreti enersi r - java x. swing ji abel enterYlabel	
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n - java x. swing JTextField enterYTF	
1 - Java x. swing. JLabel function TypeLabel	≜ XYPoint
9 - Java x. swing. JComb oBox < String> functionType SelectorCom boBox	41-double xValue
🐿 "Java x. swing. Jranel graph 🕼 - Java x. swing. JSlider hSlider	to double yValue
fir-Javax.swing.JTextField hSliderMaxTF	
-java x. swing JTextField hSliderMidTF     -sava x. swing ITextField hSliderMidTF	+ XYPoint()     + xVPoint()     functionSettings
1_java x. swing. J TextField hSliderTF	+double getXValue()
🗑 - Java x. swing, JLabel hValueLabel	0+double getYValue()
¶⊐ - java x. swing JSlider kSlider ¶⊐ - java x. swing TextField kSlider MayTF	+void setXValue(double xValue)     +void setXValue(double xValue)
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1 - java x. swing JTextField kSliderMinTF	1.17 - T
11-java x. swing JTextField kSliderTF 11-java x. swing Itabel kValueta bel	tableoWalves
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1 - Java x. swing JRadioButton originalRB	Ar-FunctionSettions functionSettions
-java x.swing.jButton removeButton     -java x.swing.iComboBox < Strings Surflog FunctionSelectorComboBox	S - double a
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ta java swing Jacob and a label of ane	_11
au - Java x. swing. JToggle Button toggle Transformation	+Function()
1 - java x. swing JLabel transformationGuideLabel	+Function(FunctionSettings f)
tava x. swing. JLabel windowLabel	
n -java x.swing.jLabel xLabel	double getA)
T-java x.swing.jLabel xLabel1	●+double get80
1-java.x.swing.JTextField xMaxTF	+double gettio
G-javax.swing.JLabel xMinLabel	a-ArrayList-XYPoint> getTableONalues()
91-java x. swing, TextField xMinTF 91-java x. swing, TextField xPointEntryTE	O +void setFunctionSettings (FunctionSettings functionSettings)
€ij-java x.swing.JLabel xStepLabel	s -void setAldouble a)
1 - java x. swing. jTextField xStep TF	
-java x.swing.jtabel ytabel     -java x.swing.jtabel ytabel	+vold setK(double k)
€ -java x.swing.JLabel yMaxLabel	seäxch =+void setTableOfValues(ArrayList <xypoint> tableOfValues)</xypoint>
1 - java x. swing. JT extField yMax TF	
Girlana x swing Jlabel WinLabel	
to -java x.swing.JTextField yPointEntryTF	1.1
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+double calculation(double num)	+int sequentialSearchFunction[] arr, String name)
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+double transformationCalculation(double num)  +double inverseTransformationCalculation(double num)	· In Sequence set on an and control of an ing control
e+double xTransformation(double num)	
+double y transformation(double num)  +double round(double num)	
e +int functionElementNumber()	
+void refreshSettings0	
+void refreshtable()     void refreshtable()	
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+void colorFunction(int num, XYPlot plot, String color)  +VD statest function(Int num, XYPlot plot, String color)	
A ID ataset runk comparately     A in a dataset	
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• -void originalREMouseReleased(java.awt.event.MouseEvent.evt)	
s-void mainTabsMouseReleased(java.awt.event, MouseEvent evt)	
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-void colorselectorComboBoxitemStateChanged(java.awt.event.itemEvent.evt)     -void displayEurotionSelectorComboBoxitemStateChanged(java.awt.event.itemEvent.evt)	
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son -void ymin (FKeyRelea sed(java.awt.event.KeyEvent evt)	
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b-void kSliderMinTFKeyReleased(java.awt.event.KeyEvent evt)	
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⇒vord a socier scale Lhanged (Javax, swing, event. LhangeEvent evt) ♦ -void bSilderStateChanged (Javax, swing, event. ChangeEvent evt)	
+void hSliderState Changed (Javax.swing.event.ChangeEvent.evt)	
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-void to ggreunginalMouseReleased(Java.aw.event.MouseEvent evt) -void to ggleUnginalMouseReleased(Java.awt.event.MouseEvent evt)	
-void a Slider TFKeyReleasedijava.awt.event.KeyEvent evt)	
-void bSliderTFKeyReleased(java.awt.event.KeyEvent evt)	
🧠 -void hSliderTFKeyReleased(java.awt.event.KeyEvent.evt) 🎰 -void kSliderTFKeyReleased(java.awt.event.KeyEvent.evt)	
s-void a ddButtonMouseReleased(java.awt.event.MouseEvent.evt)	
void removeButtonMouseReleased(java.awt.event.MouseEvent.evt)	
-void xStepTFKeyReleased(java.awt.event.KeyEvent.evt) +static void main(String.args)	

#### **Prototype Process**

#### Initial GUI Prototype:



#### Initial GUI Prototype printed with notes by client and author:



#### Middle-Stage GUI Prototype:



#### Final GUI Prototype:



•••				
Display Table and Settings				
	Table Of Values			
Function Selector: Function 1	X Values	Original Function	Transformed Function	
	-10.0	0.544	2.1761	
Function Type: Sine	-9.0	-0.4121	-1.6485	
	-8.0	-0.9894	-3.9574	
Color: Blue	-7.0	-0.657	-2.6279	
	-6.0	0.2794	1.1177	
Window:	-5.0	0.9589	3.8357	
	-4.0	0.7568	3.0272	
C min: -10.0 X max: 10.0	-3.0	-0.1411	-0.5645	
	-2.0	-0.9093	-3.6372	
min: -10.0 X max: 10.0	-1.0	-0.8415	-3.3659	
111110.0 1 max. 10.0	0.0	0.0	0.0	
inding Values:	1.0	0.8415	3.3659	
inding values.	2.0	0.9093	3.6372	
Original	3.0	0.1411	0.5645	
	4.0	-0.7568	-3.0272	
Inter X· Y·	5.0	-0.9589	-3.8357	
	6.0	-0.2794	-1.1177	
	7.0	0.657	2.6279	
Enter Y: X:	8.0	0.9894	3.9574	
	9.0	0.4121	1.6485	
Custom Point Entry: Add Remove	10.0	-0.544	-2.1761	
K: Y:				
X Step Interval: 1				

#### **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, funtionSettings, 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:

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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**