

CMSI 186

PROGRAMMING LABORATORY

Spring 2008

Program 7: Synthesis

For this final assignment of the semester, we try to bring a number of elements together. Plus, you get to take charge of most of the program's final design — also appropriate for this concluding exercise.

Code to Write

Write a program that plots a 2D function specified by the user on a GUI window. The program must be invoked through the `math.FunctionPlotter` class, and no command-line arguments are required:

```
java math.FunctionPlotter
```

Your function plotter must have, at a minimum, the following capabilities:

- User-specified lower and upper bounds
- User-specified function to plot: the list of available functions must include every function that you implemented for Riemann integration, including polynomials of arbitrary degree
- User-specified parameters for these functions, as applicable (e.g., polynomial coefficients, etc.)

Sound familiar? It should — for this exercise, you are asked to reuse as much as your original Riemann source code as possible. The fewer changes needed to the original code, the better. Of course, if changes are necessary, then make them.

The rest...is up to you, including but not limited to the following:

- GUI controls for dynamically changing plotting parameters (bounds, functions, parameters) on the fly — in Java Swing, this means learning how to use a whole new menagerie of objects: windows, panels, layout managers, listeners, buttons, text fields, combo boxes, radio buttons, menus, checkboxes, borders, and more
- Chart customizations, including but not limited to colors, “zoom” level, chart styles, etc.
- GUI help, documentation, and error handling
- Anything else that you feel would improve the quality and functionality of your program (3D, speech, function expression parser, etc.)

As you can see, with this last assignment, you have an opportunity to make virtually every design decision about your program, from its structure to its user interface. Have a ball!

Workflow Suggestions

While you have a lot of flexibility for this project, here are a few suggestions:

- Design your GUI on paper *in its entirety* before coding it — this helps clarify what you need to do, and will also help me understand what you'd like to do (so I can help you more effectively)
- Design your function plotter component so that it accepts an arbitrary array of (x, y) coordinates — this will make it easier for you to reuse your existing function evaluation code

Specific Lab Report Content

This final assignment means to exercise a number of explicit elements:

- Revisiting code that you wrote a few weeks ago
- Reusing that code in a new program, noting the changes necessary (if any) for successful reuse
- Learning by example, ranging from GUI code that you already have (i.e., *edu.lmu.cs.maze*) to code in the textbooks and on the Internet
- Self-teaching of new code libraries (in this case Java Swing), ranging from finding and reading documentation (tutorials, references, etc.) to experimentation and trial-and-error

Accordingly, please pay special attention to the above elements in your lab reports for this assignment. Make special mention of the following:

- What it was like to revisit and re-understand the Riemann code that you wrote previously
- What changes were necessary (if any) to adapt your Riemann code to this new program
- How you used the code examples to figure out what to do with this program's GUI
- Documentation sources that you used in order to learn about the Java Swing library

These are all implementation details, so they best belong in Section II.B of your lab report.