MATLAB GUI Project Report

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**Design and Coding Process**

When Noah and I started this project, Noah had the idea of making an integral calculator for our GUI in MATLAB, since it is related to our major and we as mechanical engineers use different integral calculators quite often. Laura Hilger is the LA that approved of the idea. We first started by finding out what kind of built-in functions MATLAB offers dealing with integrals. It turns out that they do have an integral solving function that takes in three inputs: fun, xmin, and xmax. For the double integral function, it takes in the same inputs as the normal integral function as well as ymin and ymax. We used the lab we did on GUIs to help us make the main structure of the integral calculator GUI.

The first big difficulty we had with the code was figuring out what the input for the integral function had to look like. Just typing in a function the way it looks on paper doesn’t work, because you need to use array operators instead of matrix operators. For example, instead of using the “\*”(star) symbol to multiply, you need to use “.\*”(dot star). Once we figured that out, the calculator still didn’t work, we got a bunch of errors instead. After doing some more research we found that you have to have include a function handle at the beginning of the function. This is just for indicating which variable you are using. For x you use @(x) and for y it’s @(y). After that integral solver worked and returned the correct answer.

For our second callback function, we decided to also have a double integral solver. This time, we ran into a problem with inputting the mins and maxes. For double integrals, the bounds of the integral can be a function themselves, and we didn’t realize that they need to be inputted the same way as the actual function is. So we had to use the function handles and array operators for that. The next problem we had was that the calculator worked fine when we had functions in the y bounds, but for the x bounds we got errors. It turns out that for some reason the double integral function only works with function bounds if they are for the y bounds.

The last problem we had was with the ymin and ymax inputs. Depending on whether you want to include variables in the input, you have to use either str2func or str2double on ymin and ymax so that the input is in the right form. So we just added a simple if statement that detects whether there is a variable in the input or not, and applies str2func or str2double accordingly.

# **Future Use of GUIs**

Graphical User Interfaces, or GUIs, are a part of everyday life for most people. Even something as simple as the desktop on your computer is a GUI. The purpose of a GUI is to have a visual representation of what is actually going on in the code so that it is easier for the user to interact with. Without GUIs, you would have to manually enter the required commands and code to get the desired effect, but with them, it’s as simple as clicking buttons to get where you want to go or do what you want to do.

For mechanical engineering, there are tons of uses for GUIs. A very common one that I and most other students that take math classes uses is online calculators. There’s integral, derivative, and limit calculators, to name a few. Each of them have a text box for your function and a solve button, as well as additional checkboxes for different types of functions or solving. So that is one use for GUI’s I’ll have in the future. Another example for a GUI might be making a game. For example, the rock paper scissors lizard spock game we did earlier in the semester could be made into more usable game with a GUI.