

Programming Languages – CSCI 169

Project Phase 3

Part b)

For this part of the project I would like to learn Matlab's Symbolic Math Toolbox which is used for symbolic computations. I think that this is a great aspect of Matlab to learn because it's one of the strengths of this language and IDE. Exploring the methods of this toolbox will assist me in being able to solve and manipulate mathematical expressions just like one would do with pencil and paper. This is particularly important for those cases where one deals with very large expressions that can be too long to fit on a sheet of paper, but are ideal for a programming environment where one can use symbolic variables and expressions. Therefore, the aspect of Matlab that I will take advantage of for this project is how the language is built around facilitating the work of scientists and engineers by providing tools for symbolic computation where one doesn't have to deal with the precision problems of floating point numbers.

In order to implement my program, I plan is to first learn a new tutorial that introduces symbolic math with Matlab. The tutorial introduces how to work with symbolic variables and expressions, and uses examples from mathematics and the real world to teach the Symbolic Math Toolbox. So there are real-world cases like finding the rotation of a robot arm and modeling a the path of a bungee jumper. After finishing the tutorial, my plan is to use the things that I learned to implement my own functions that use numerical methods to approximate the integral and the derivative. After finishing the functions, I will use Matlab's graphing capabilities to create a table where I compare the relative error between my functions and Matlab's built-in functions that do the same thing. My program will also generate plots where one can visualize the relative error. Thus, I will also be learning how to generate plots and tables in Matlab.

Tutorial:

<https://matlabacademy.mathworks.com/details/introduction-to-symbolic-math-with-matlab/symbolic>