Carter Rhea

Final Project Proposal

Main Objective:

To determine the accuracy of a written FEM program compared to commercial software. If the errors are within a certain realistic tolerance, then the personal code would be considered adequate.

Subsidiary Objectives:

- Create a FEM program which approximates solutions to 1 and 2 dimensional PDEs given the weak formulation of the problem and boundary conditions.
- Allow the user to choose from a number of elements (i.e. triangular or square)
- Integrate basic mesh-creation software into my program

Motivation:

I find the development of software pertaining to the finite element method to not only be fascinating mathematically, but also from a programming standpoint. I believe that an OOP approach would use a FEM software more user friendly. As a programmer and mathematician, I find that writing my own code for projects to be the most fulfilling and often times more useful than simply using commercial code. The creation of these two programs (1d and 2d finite element solvers) would be an extension on a mini-project I started in undergrad of which I was only able to scratch the surface. I also would like to further explore C++ based code (compared to the python code I have already developed) and compare the timings of the two.