

## **Programming Project**

Work in groups of 2 or 3 students to generate a general finite element code. The group is responsible for submitting one report. All of the students on the report will be given the same grade. Each of the group members is expected to be familiar with all of the contents of the work (please do not just do a divide and conquer). Please make this report with a sense of pride or professionalism.

For the final report include:

- A description of how your code works, which should include a flow chart of how it works. A list of functions you wrote with a description of when they are called and how.
- Evidence you verified that your code is working.
- Implementation of the code to solve different applied problems. This should include a description of how you applied boundary conditions and used your general functions to solve this. See problems below for examples of solution strategies.

### **Verification and Implementation Problems:**

For your group, you will be required to include at least one implementation problem for every student in the group. Each must solve a type or problem (i.e. Heat, elastic elongation etc). For each type of problem, you are required to include verification that the code is working properly by comparing with an analytic solution for a different geometry. For the implementation, you are tasked with determining your own problem and solving it using your FEA code. The implementation problem must be approved by me, the instructor. You can find examples in the book, speak with me, or come up with your own 1-D problem of interest that can be solved using your code. The problem must have some complexity that makes solving analytically difficult.

For the write up, you must detail your verification step. Show your results compared with the analytical solution. For the implementation, you must: clearly describe the problem you are trying to solve, describe the solution strategy, present your results and explain if they make intuitive sense.