**Mech 12 Computational Project #1e, Fall 2015**

(Due October 30, 2015 – 100 pts)

***Well, I’m sure it is obvious by now that part 1e of the project is a team-based activity!***

Herein, I will try to describe to you what is needed from your team to wrap up the trunk design and optimization project. Aunt Ada has provided for each team design specifications that can be converted into Ltot, E(x), P(x), and A(x) for a 1D finite element analysis. She simplified things and went with a single construction material; thus, E(x) is constant. Because part of P(x) comes from the weight of the structure, A(x) and P(x) are related and their relationship will be coded into your computational stress analysis tool (i.e. your 1D finite element code). Using Ltot and the information provided about loading, you can determine a minimum number of nodes needed to carry out a 1D analysis, as well as where those nodes should be located. Including increasingly more nodes at locations in-between the locations of the minimum required nodes represents mesh refinement. Fun! With P(x) and the nodal locations defined, you can populate all the nodal forces. With E(x), A(x) and all the nodal locations, you can come up with all the element stiffness values. You know how to build your global K. Then solve for displacements, stresses, etc. I’ll help … honest! But you have to develop questions and drive the conversation!

So, what do you need to turn in? Each team must submit a stress analysis and design optimization final report for Aunt Ada to read and evaluate. In the report, your team must address the following topics:

* Explain to Aunt Ada the model and optimization parameters (she was fairly specific but not entirely … if you have 4000 ft2 over two stories, how is the square footage distributed?).
* Verify for Aunt Ada that your final design is indeed safe based on her requests.
* Verify for Aunt Ada that your final design is also optimized (you may use similar material for this bullet as you used in the preceding bullet).
* Wow Aunt Ada with any design benefits that you want to call out (did you deviate from her specs … if so, why); impress her with added insight about your design and its implicit broader thinking.

In addition, each team will be required to submit their computational tool to a dropbox on our Course Site. If it is not obvious how to “run” a team’s code, detailed instructions for doing so should also be uploaded.

There is no limit on the number of figures you include in your report and words on figures and in figure captions will not count toward the prescribed word total. Text in the body of the report should be no more than 1100 words. Proposal reports outside the prescribed word count will have points deducted. ***All team members will share the same grade on the response.***