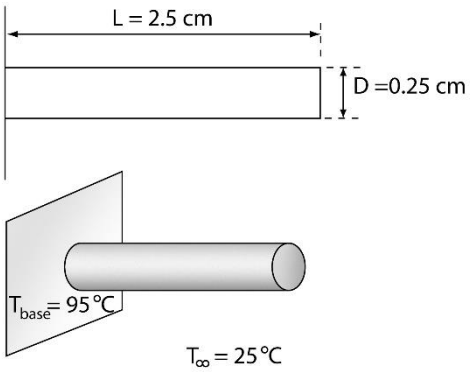
Homework #5
MECH 4175/5175: Finite Element Analysis
Fall 2020
Due 10/19/20

Instructions:
Show your work. If you use MATLAB or another software package to help you, turn in a pdf of your code and a screenshot of what you typed in, how the problem was solved, etc. You may use the code from the beam example, which is available on Canvas, as a template for completing problem #2. Upload a pdf of your work in Canvas by 11:59 p.m. on Monday, October 19.

Problem 1:

A pin with a circular cross-section is used in a heat sink to help cool a CPU. A sketch of the pin, along with dimensions and temperature information, is shown below. The pin is made of a material with a thermal conductivity (k_x) of 396 W/(m·°C). The convection coefficient (h) around the pin is 10 W/(m^2·°C). Using four linear elements, determine the temperature at five nodes and create a plot of the temperature along the pin's length.



Problem 2:

The beam pictured below is fixed at both ends and has a downward distributed load q = 1 lb/in applied to its left half. The beam has a rectangular cross-section with width = 12 in and height = 1 in. The beam has a length L = 200 in, and it has a Young's modulus E = 10^7 lb/in^2. Using two elements, determine the displacement at the point s = L/4, and then plot M(s) and V(s) along the entire length of the beam.