# ME 345: Modeling and Simulation
1D FEM example problem

1. A polystyrene rod consisting of two cylindrical portions *AB* and *BC* is restrained at both ends and supports two 6-kip loads as shown. Knowing that E = 435 ksi, find both by hand:
   a. The displacement of point *B*.
   b. The normal stress in each portion of the rod.
   c. Comment *briefly* on why your answers above seem reasonable.
   d. Which element would fail first if the load continued to be increased?
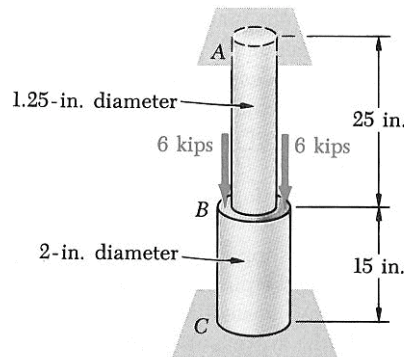
   d, Compare your results with those obtained by running the Matlab code `prob1_sol.m`. Describe briefy how the beginning of the code (down to and including the line defining the "applied forces") works.

ANSWERS:

1. **d2 = .1067 in (down)**

2. **stress in element 1 = 1856 psi (tension), stress in element 2 = -3094.3 psi (compression)**

3. **tension/compression is easy to see. The magnitudes are much more difficult to see. Originally might have thought that the thicker element would have less stress, but note that it is shorter**

4. **element 2 – it has a higher stress and higher strain, and they are both the same material**