

**QUESTION 1:** A polyethylene cylinder is attached to perfectly rigid end plates on its top and bottom ends, both of which are free to move. A solid steel rod is attached to the bottom end plate but extends through a hole in the top plate and is securely fastened to a rigid nut. At the initial conditions depicted in the sketch below, there is a 0.25 mm gap between the underside of the nut and the top of the top end plate. If the temperature of the assembly is increased by 80° C, determine the following (assume that the dimensions of the end plates do not change with temperature):

- The resulting axial force in the steel rod; and
- The final length of the polyethylene cylinder.

