MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Mechanical Engineering

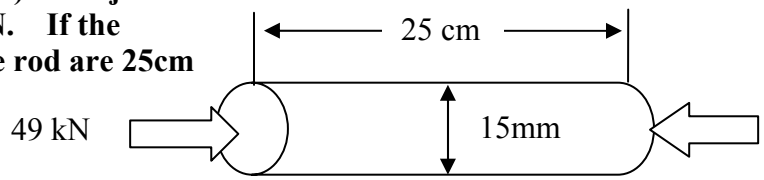
2.001 - Mechanics of Materials I
Spring, 2003

Problem Set 5

(Due in one week of its assigned date)

Use SI Units only!!

1. **A cylindrical steel rod (E=200 GPa) is subject to an axial (compressive) load of 49.0 kN. If the original length and diameter of the rod are 25cm and 15mm, respectively:**



   a. **What is the Stiffness of the rod?**

   b. **What is the Axial Stress, σ_{xx} , in the rod?**

   c. **What is the Strain, ε_{xx} , in the rod?**

   d. **Determine the final rod length under loading**

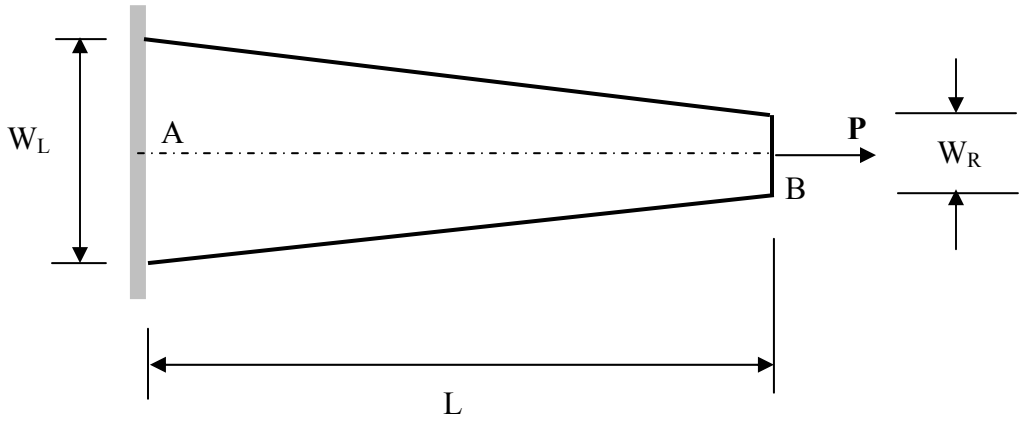
2. **An aluminum (E=70 GPa) specimen having a width of 20 mm and thickness of 5mm is subject to an axial load of 5 kN. If the axial strain is 7.14 e-4 , and the original length was 25mm:**

   a. **What is the final length of the specimen?**

   b. **What is the Axial Stress, σ_{xx}?**

   c. **What is the Stiffness?**

3. **For the given bar, with thickness‘t’ (in the direction perpendicular to the paper), and given dimensions for loading under P, find the effective stiffness k, for the deflection at the tip B. The Young’s Modulus of the bar material is E**.



4. **CDL 4.14**