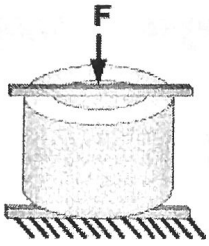
Part B) (12 points)

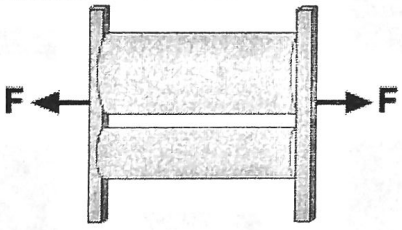
By modeling materials and considering the relationships between deformations, one can predict internal forces for statically indeterminate systems. For each of the situations depicted below, provide an equation relating the deformations of the components that can be used to solve for the internal forces. **The only symbols in your equations should be deltas, δ, with various subscripts.**

i) Your equation should relate the deformation of the interior cylinder to the deformation of the exterior tube. The bar on top is rigid and remains horizontal.



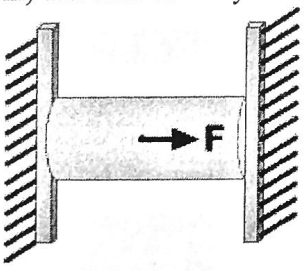
$\delta_{interior} = \delta_{exterior}$

ii) Your equation should relate the deformation of the cylinder on top to the deformation of the cylinder on the bottom. The ends of the cylinders are fixed to the rigid bars, which remain vertical.



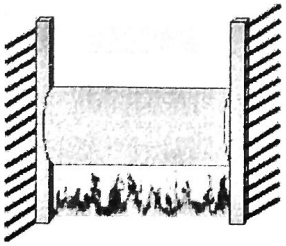
$\delta_{top} = \delta_{bottom}$

iii) The ends of the cylinder are fixed to the two vertical walls.



$\delta_{total} = 0$ or $\delta_{left} + \delta_{right} = 0$

iv) Your equation should relate the deformation of the cylinder due to the change in temperature to the deformation of the cylinder due to the forces applied by the walls.



$\delta_{thermal} + \delta_{force} = 0$

image from: http://www.tmkpackers.co.nz/uploads/products/TMK_Flames_Lamp_Oil.JPG