

HOMEWORK NO. 3

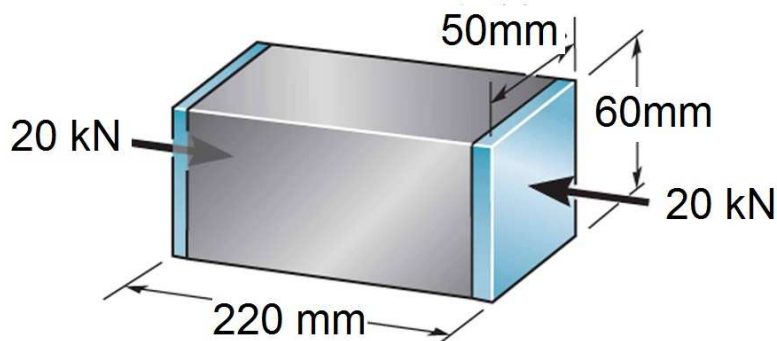
- **Textbook Sections Covered: Ch. 2 & 3 , Strain & Material Properties**
- **DUE DATE: Monday 24 September 2012**

1- Solve problem F2-2 in the textbook (p. 74) using the given revised data: angle of rotation is 0.015 degrees (instead of .02).

2- Using the strain results of Problem (1) above, determine the tension in each cable given that for each cable: cross sectional area = 20 mm^2 & $E = 20 \text{ GPa}$. (Hint : you do not need equilibrium equations in this case)

3- Using the table given in problem 3-1 in your textbook (p. 98), plot the stress-strain diagram for the material **accurately and to scale**. Use the following revised data : diameter = 180 mm (instead of 150) and the length = 350mm (instead of 300). Use the plot to determine the following properties : Modulus of Elasticity , the proportional limit, the ultimate stress , the failure stress, and the modulus of toughness.

4- The given solid block has the initial dimensions shown in the figure. Determine the final dimensions of the block , and the change in volume of the block. Given : $E = 80 \text{ GPa}$, $\nu = 0.35$. (Note : the loads are applied on rigid thin plates only to distribute the stress over the area)



5- The given solid block has a thickness of 50 mm (in the third dimension , not visible in the figure). Determine the deformation distance a shown in the figure due to the application of the load. Also determine the average **normal strain** along the diagonal AB , and the average **shear strain** at corner B. Given $G= 30 \text{ GPa}$.

