UNIVERSITY OF CALIFORNIA BERKELEY Structural Engineering,
Department of Civil Engineering Mechanics and Materials
Summer 2016 Professor: S. Govindjee

CE W30 / ME W85
Midterm Exam 2
July 28, 2016
1.5 hours (download to upload)
No late exams will be accepted

Open Resource Exam

No Collaboration Permitted

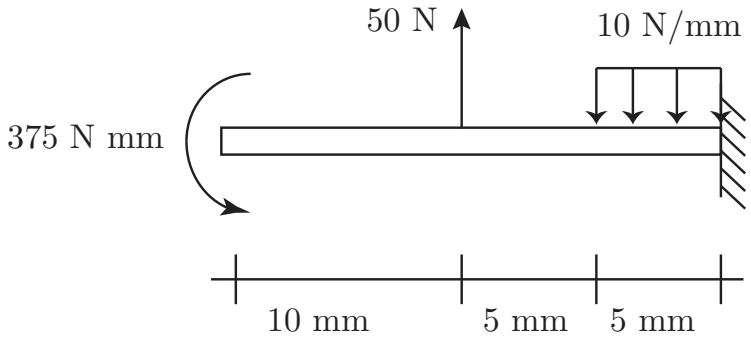
Problem	Score
#1	/50
#2	/30
#3	/20
Total	/100

Name

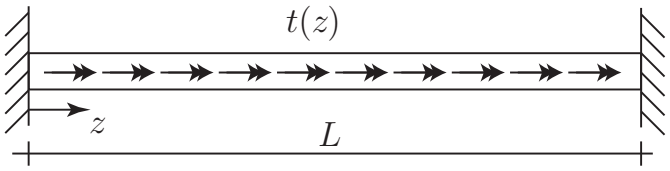
SID

Attach this cover-page to your upload

1. Accurately draw the moment and shear diagrams for the beam shown. Label the critical points of your diagrams – the locations and values of major features of the curves, including end-point values. *For full credit you will need to draw neatly and accurately.*



2. A linear elastic, solid, circular, torsion bar is subjected to a distributed load $t(z) = t_o \cdot \left[1 + \left(\frac{z}{L}\right)^2\right]$. Find the required value of the constant t_o, such that the rotation at $z = 3L/4$ equals $\delta\frac{R}{L}$, where δ is a given constant, L is the bar length, and R is the radius of the bar. Assume the shear modulus is constant.



3. You are constructing a robot and need a 200 mm $\times$ 10 mm bar to complete the construction. Unfortunately all you have left are two 100 mm $\times$ 10 mm Aluminum bars and each has had a 10 mm diameter hole drilled out of one end. You decide to glue two of the two bars together with epoxy, resulting in a 200 mm long bar with a 10 mm diameter epoxy plug in the middle. The Aluminum-Epoxy interface will fail if the stress normal to the interface exceeds $\sigma_{\max} = 10$ N/mm^2 or if the stress tangential to the interface exceeds $\tau_{\max} = 4$ N/mm^2. Find the largest force P that your bar can support. Assume that the pieces are all 2 mm thick.