TAM 202

Homework-based exam

Tues. Dec. 10, 2002

10 AM - 4 PM.

This exam is for students who think they can do all the homework but fear getting a grade of less than C- in this class.

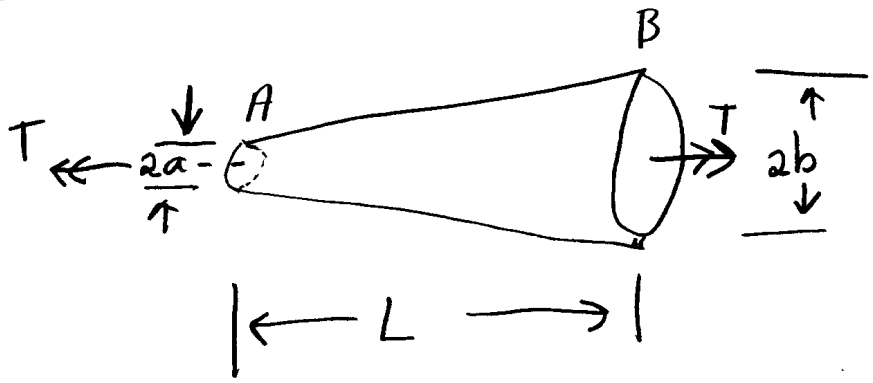
If you are not in this group please do not turn in the exam for grading.

Thank you.

- Andy Ruina

1. (based on 6.3.4-10)

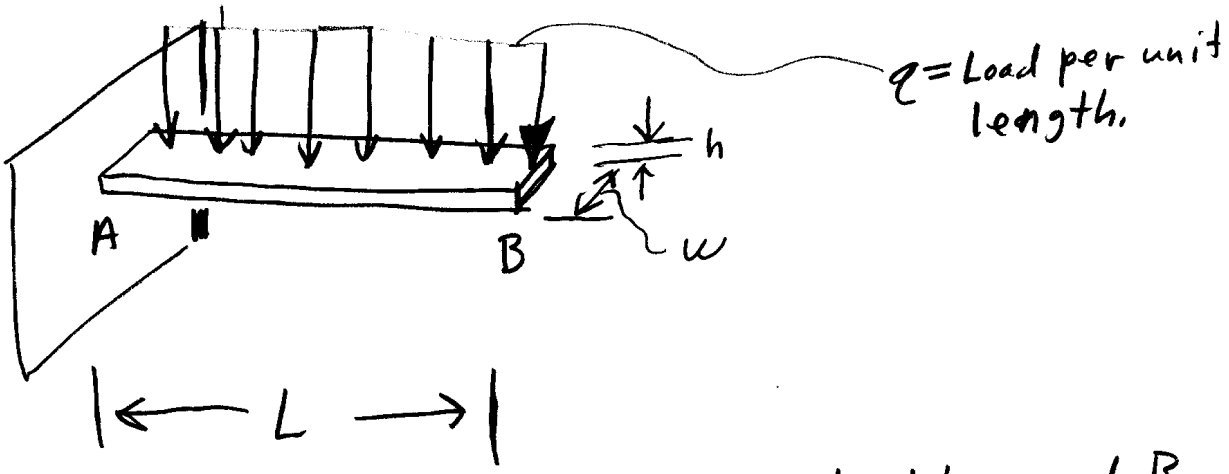
Name: _____



Solid shaft
Conical shape.

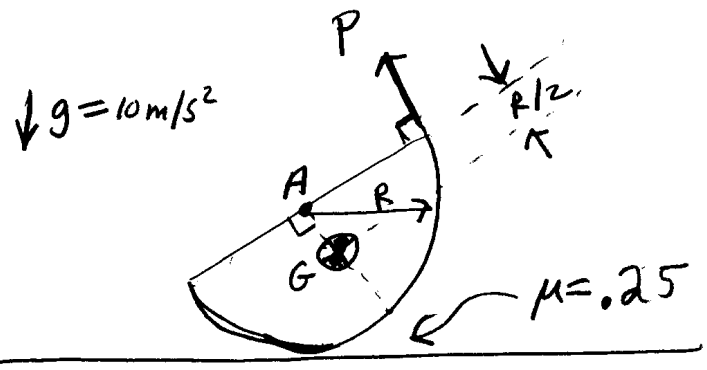
In terms of a, b, L, G & T find the rotation of end B relative to A.

2. (based on 6.9.3-6) Name: _____



Given that the deflection at the end B is δ what is E? (answer in terms of L, w, h, q & δ).

3. (based on Meriam 6.131) Name: _____



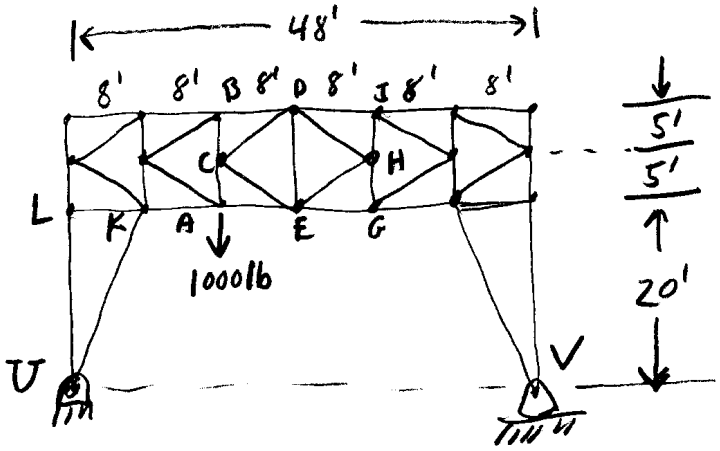
R = 1 m
R/2 = 0.5 m
m = 10 kg

Mass is distributed in a half cylinder so that distance AG = R/2 (this simplifies the problem slightly).
What is biggest P possible with no slip?

Ans: P= _____ N.

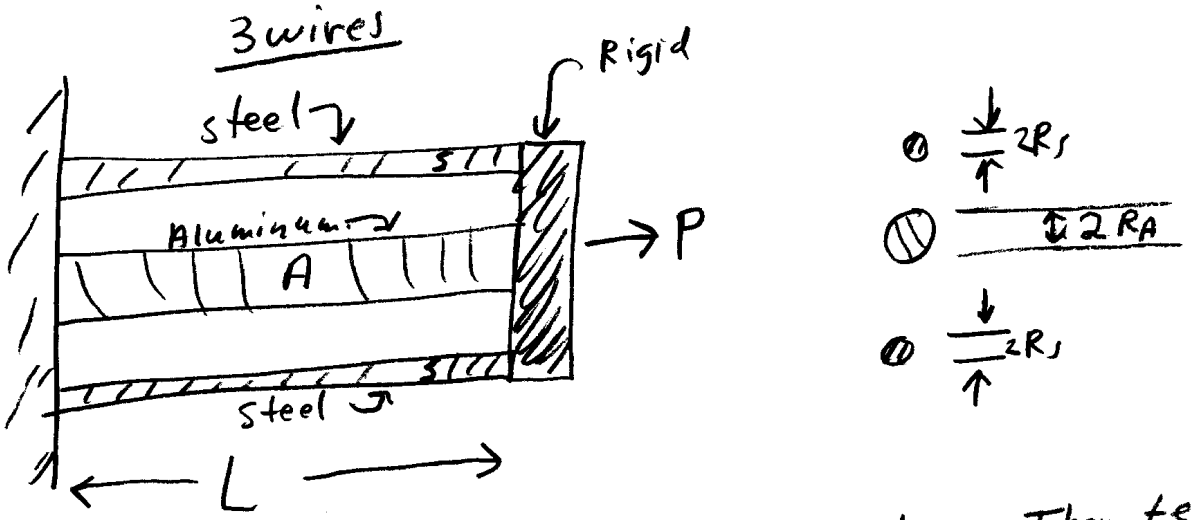
4. (based on M 4.49)

Name: _____



What is T_{KL} (tension in bar KL)?

5. (based on G 2.5-5) Name:



Stress-free at room temperature. Then temp. raised & P applied.

Given:

$\pi R_s^2 = 1\ in^2$ $\quad \alpha_s = 5 \times 10^{-6}/°F$ $\quad E_s = 30 \times 10^6\ lb/in^2$

$\pi R_A^2 = 2\ in^2$ $\quad \alpha_A = 10 \times 10^{-6}/°F$ $\quad E_A = 10 \times 10^6\ lb/in^2$

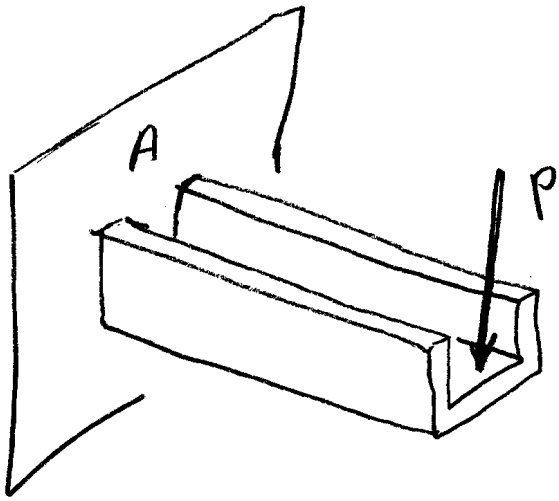
$\Delta T = 100°F$

Find P so that the load carried by the steel = 0.

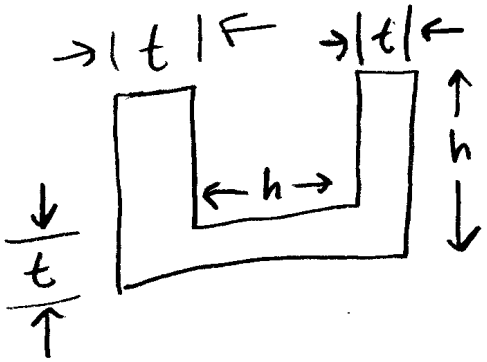
P= lb

2b (based on 5.6-16) Name: _____

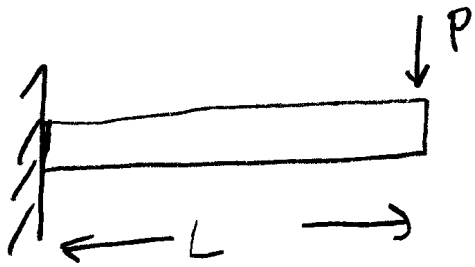
perspective



cross section



side



L = 1 m

h = 10 cm
t = 1 cm
E = 30×10^6 lb/in^2

What is the ratio of the max tension stress to the max compression stress in this beam?

ratio = _____