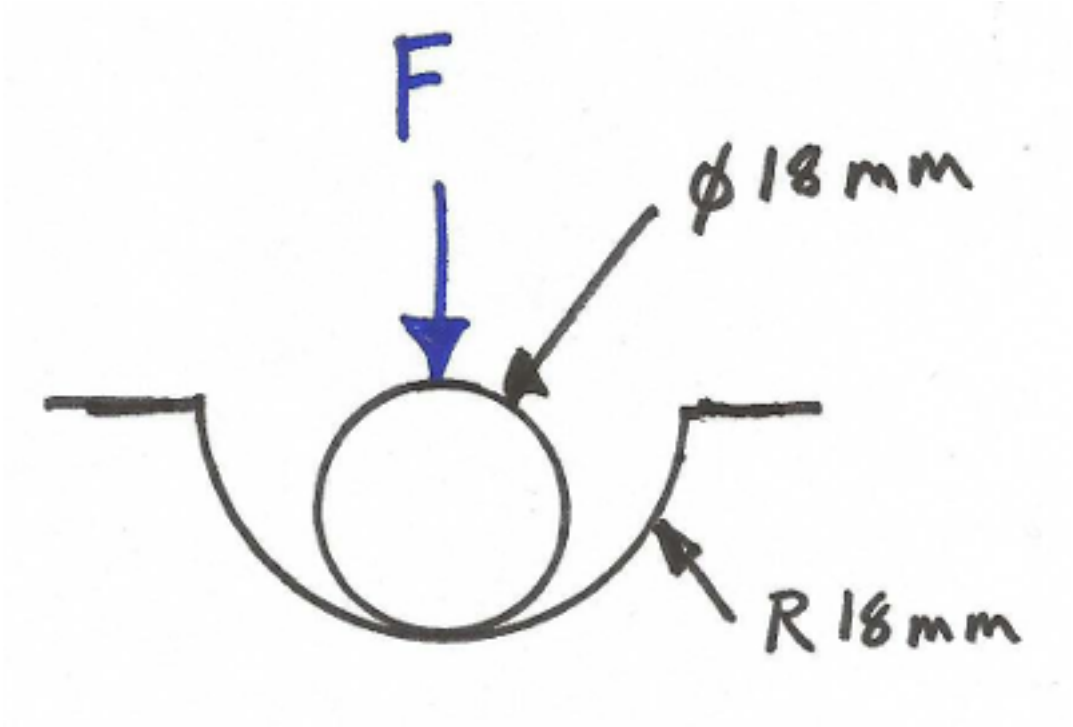
EME 150A Fall 2016 Homework #04

DUE: Monday, October 24, 2016 before class in Box B in the MAE department.

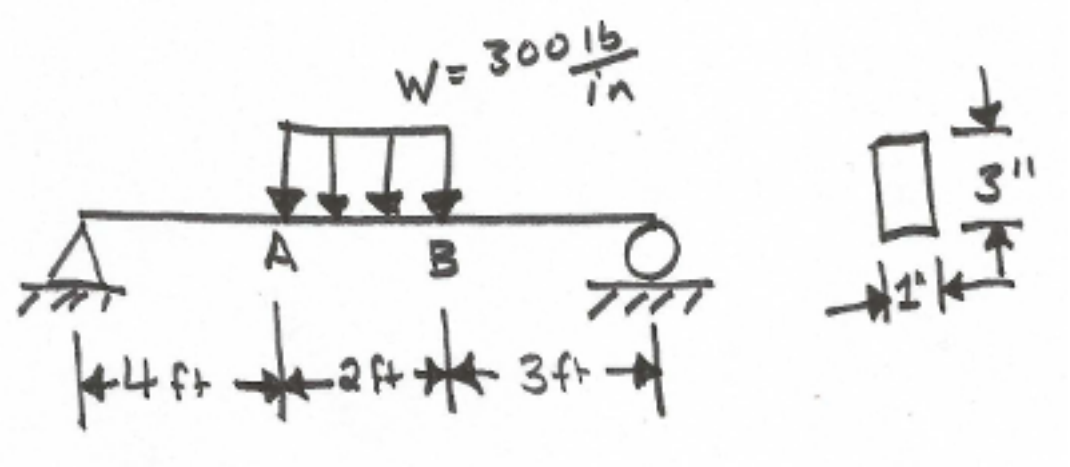
Problem 1

A small spherical ball of brass is pressed into a hemispherical depression with a force $F = 500N$. Determine the principal normal and shear stresses at the location along the z axis corresponding to the highest shear stress. The ball is made of brass and the depression is made of copper.



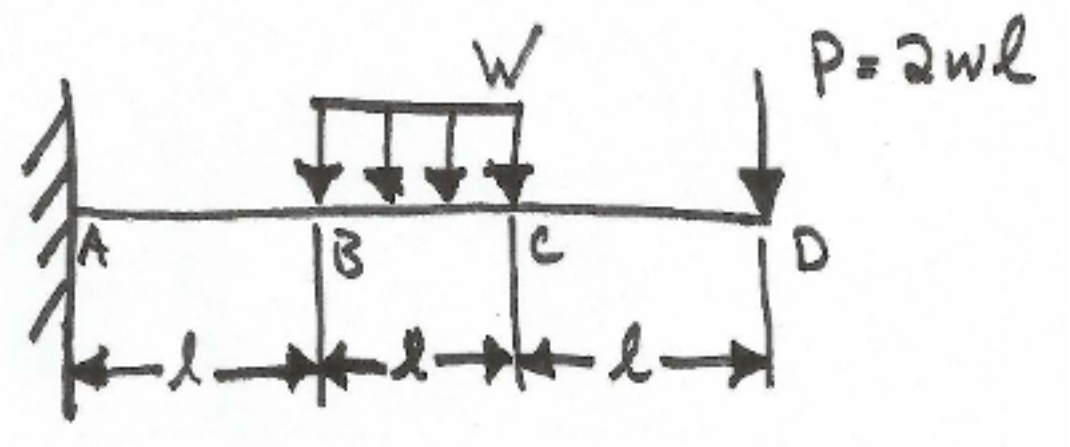
Problem 2

Find the radius of curvature of the deflected beam at points A and B. The modulus of elasticity is 10 Mpsi.



Problem 3

For the beam and loading shown, find both the slope and deflection at points C and D using two different methods. Additionally, describe the slope between points C and D. Use $l = 1.2\text{m}$, $E = 180\text{GPa}$, $I = 0.23\text{m}^2$, $w = 60\frac{\text{kN}}{\text{m}}$.



Problem 4

Beverage cans are made from tin plated steel in some parts of the world instead of an aluminum alloy. Design a can that is a typical can size using 1018 hot-rolled steel (Table A-20) such that it meets a specified design factor of 3 against yielding if the maximum pressure that can be developed in the can by the undissolved CO2 is 350 KPa. How much thicker or thinner must the can walls be compared to a typical aluminum alloy can?