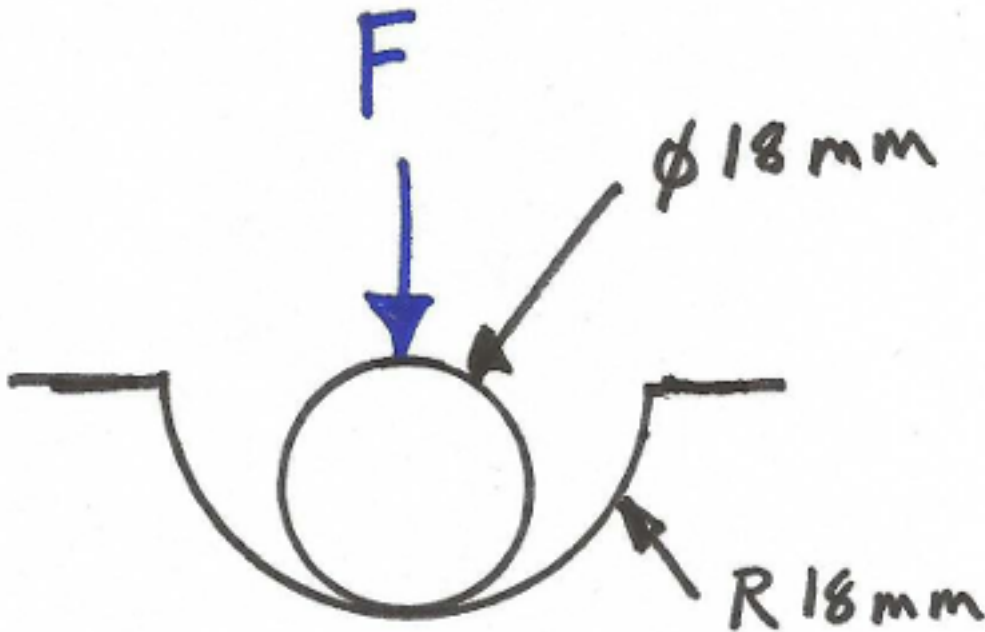


## EME 150A Fall 2016 Homework #04

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

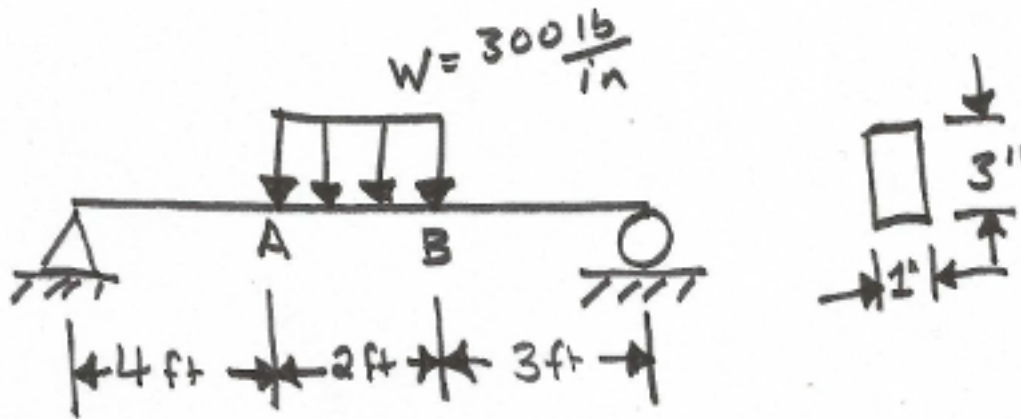
### Problem 1

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.



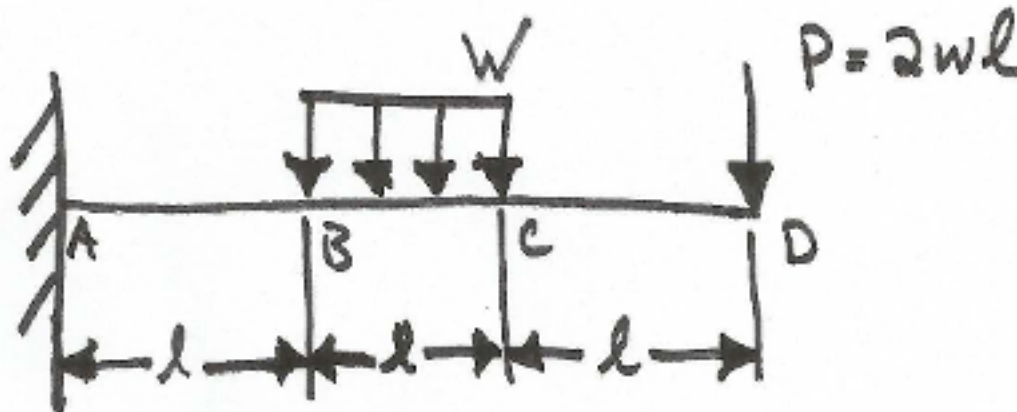
### Problem 2

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  $l = 1.2\text{m}$ ,  $E = 180\text{GPa}$ ,  $I = 0.23\text{m}^4$ ,  $w = 60 \frac{\text{kN}}{\text{m}}$ .



### 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  $\text{CO}_2$  is 350 KPa. How much thicker or thinner must the can walls be compared to a typical aluminum alloy can?