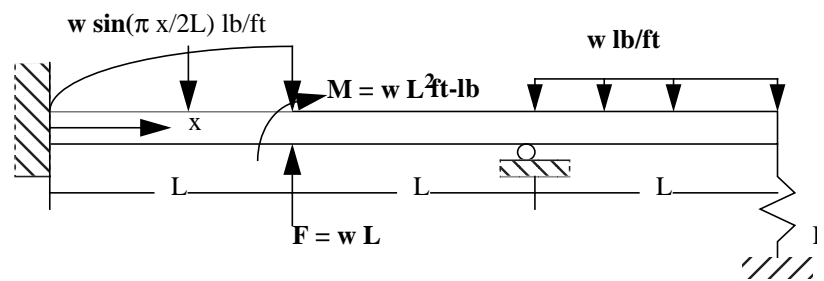
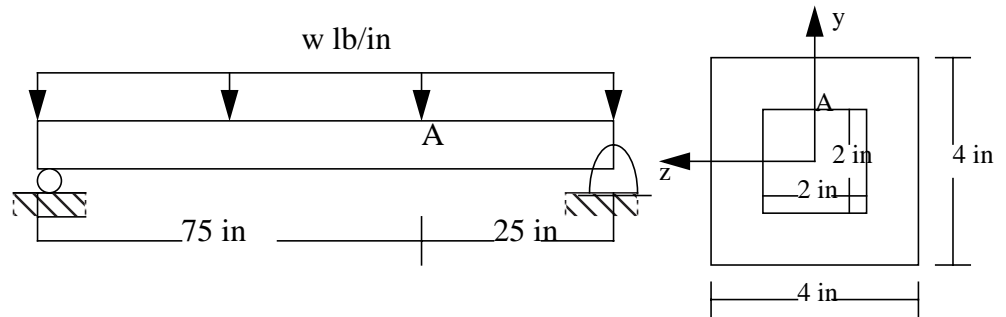


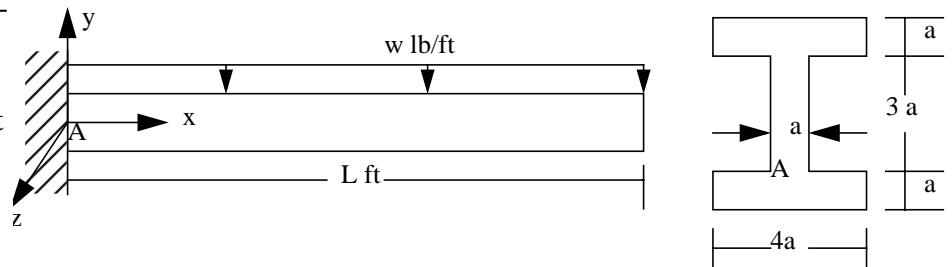
1. A linear spring with a spring constant K is attached at the right end of the beam. For the loading shown, write down the 3 fourth order differential equations and the 12 conditions necessary for solving the deflection at any point in the beam. Assume the bending rigidity EI is a constant. Number your equations and conditions. (**DO NOT INTEGRATE OR SOLVE**).



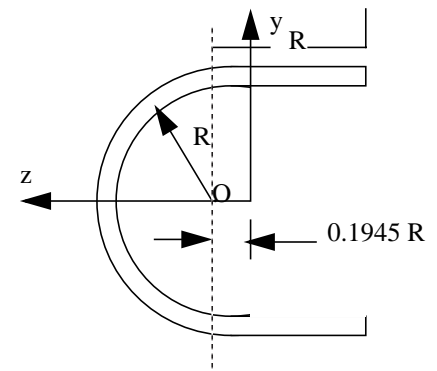
2. A uniformly loaded simply supported beam is made of elasto-plastic material that has a yield stress of 30 ksi. The beam has the hollow square cross section shown. If point A is at yield stress, determine the intensity w of the uniform load.



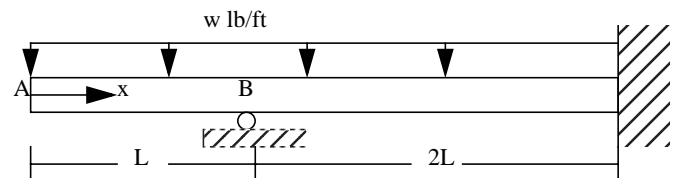
3. A cantilever beam is made from a material that has a stress-strain relation given by $\sigma = K \epsilon^{0.7}$. In terms of K , w , a , and L determine the fiber stress at point A. Point A is just above the bottom flange.



4. The thin cross section shown has a uniform thickness t . Determine the location of the shear center with respect to point O. Calculations show that $I_{yy} = 2.821 R^3 t$, $I_{zz} = 3.571 R^3 t$, and $I_{yz} = 0$.



5. Using energy methods find the reaction force at B and deflection at A.



Answers:

2. $w = 427 \text{ lb./in}$

3. $\sigma_A = 0.0233 wL^2 / a^3 \text{ (C)}$

4. $e = 1.72 R \text{ from point O.}$

5. $R_B = 17wL/8$

$v_A = -5 wL^4 / 24 E$