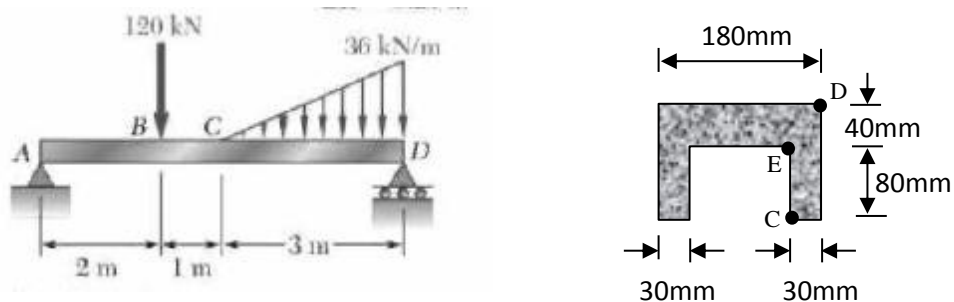


Exam 2
April 11, 2013
90 minutes

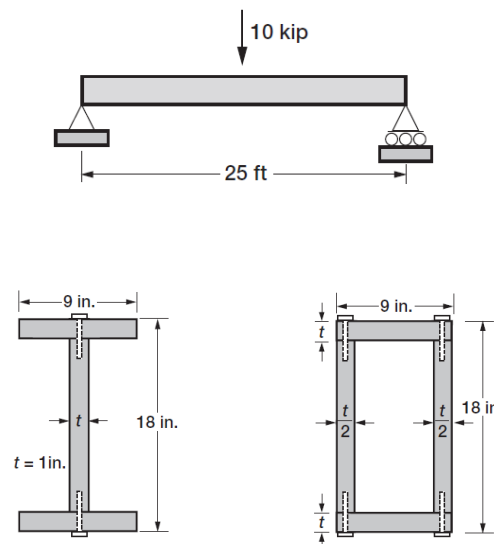
Problem 1 (40 Points)

For the beam shown below:

- Derive the equations and draw the shear and moment diagrams
- Calculate the maximum shearing stress
- Calculate the maximum tensile and maximum compressive stresses

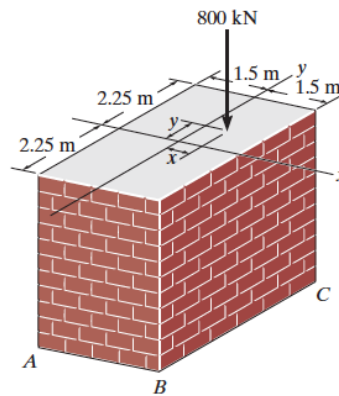
**Problem 2 (20 Points)**

A 25 ft long simply supported beam subject to a load ($P = 10 \text{ kip}$) at the center span is shown below. Calculate the resistance of the screws assuming 3 inch spacing for the two built up sections shown in the figure.



Problem 3 (20 Points)

The column shown below is subject to an 800kN eccentric load. If $x=0.25m$ and $y=0.5$ determine the normal stress at each corner A, B, C, D (not shown). Neglect the weight of the pier.

**Problem 4 (20 Points)**

A 10 ft long cantilever beam having the cross-section shown below is made of wood ($E_w=1900 \text{ Ksi}$) reinforced with steel straps ($E_s=29000 \text{ Ksi}$) at its top and bottom. Determine the maximum point load that could be applied at the free end if the allowable steel stress is $\sigma_s = 28 \text{ Ksi}$ and the allowable wood stress is $\sigma_w = 1.5 \text{ Ksi}$.

