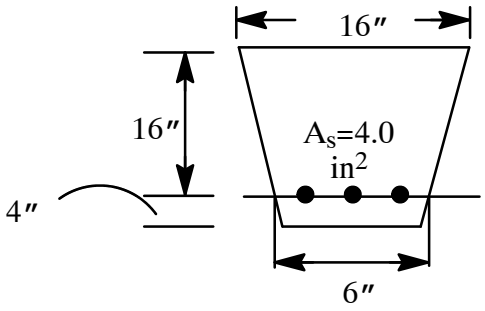
A. Determine whether the reinforcement area meets the ACI requirement for maximum area allowed and then calculate the ultimate moment for the section shown below.

f'_c = 4 ksi
f_y = 60 ksi

Answer:
M_u = 2950 in-kips



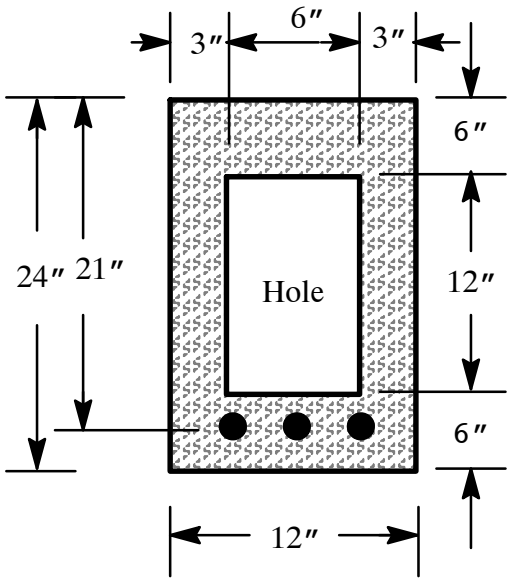
B. a 6″ by 12″ hole is located in the center of a reinforced concrete cross section to reduce the weight of the beam. Determine the nominal flexural capacity of the member if the beam is subjected to positive moment.

f_c' = 3.5 *ksi*

f_y = 60 *ksi*

3-#10 bars

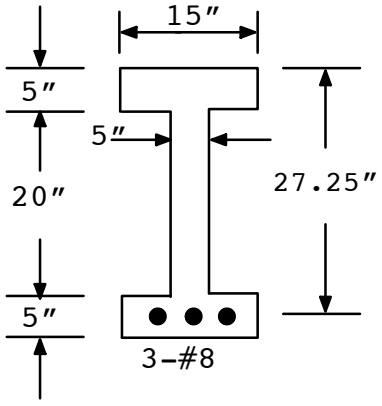
Answer: <u>4049 in-kips</u>



C. (a) Determine balanced steel *As* for thr symmetrical cross section shown below to be on the borderline of Tension and Transition.
(b) What is the maximum area of the steel permitted in the cross section by the ACI code?
(c) Determine the nominal flexural capacity of the member if the beam is subjected to positive moment.

f'_c = 4.0 ksi
f_y = 60 ksi

Answer:
A_{sb} = *in^2*
$A_{s,max}$ =
M_n = *?*



D. For the beam cross-section of the accompanying figure, assuming 3000 psi concrete and 60,000 psi steel, and the clear cover from the bottom (tension face) to the centroid of bars = 2 in., compute the following:

(a) Compare the given tension reinforcement with the maximum permitted by the ACI code. Use basic principles starting with balanced strain condition.

(b) Using basic principles with the Whitney rectangular stress distribution compute the nominal moment strength M_n for the cross section.