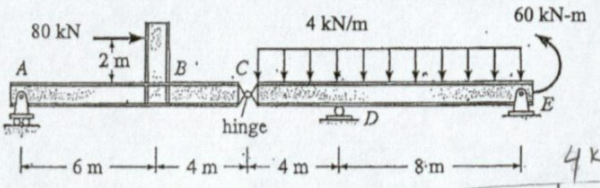
Solution)

University of Maryland
ENCE353: Introduction to Structural Analysis

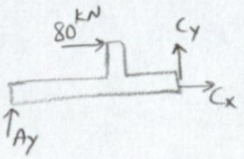
Fall 2016

In-Class Problem #2

a) Determine the reactions at all the supports and the force transmitted through hinge C.



ABC:



$\xrightarrow{+} \Sigma F_x = 0 \Rightarrow 80 + C_x = 0$

$\Rightarrow C_x = -80\ kN \leftarrow$

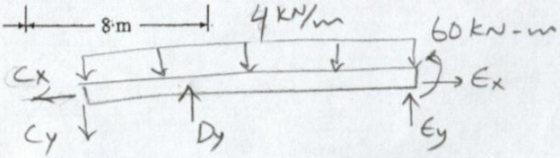
$\circlearrowleft \Sigma M_C = 0 \Rightarrow -A_y \times 10\ m - 80\ kN \times 2\ m = 0$

$\Rightarrow A_y = -16\ kN \downarrow$

$+\uparrow \Sigma F_y = 0 \Rightarrow A_y + C_y = 0$

$\Rightarrow C_y = 16\ kN \uparrow$

CDE:



$\xrightarrow{+} \Sigma F_x = 0 \Rightarrow -C_x + E_x = 0 \Rightarrow E_x = -80\ kN$

$+\circlearrowleft \Sigma M_E = 0 \Rightarrow C_y \times 12\ m - D_y \times 8\ m + 4\ \frac{kN}{m} \times 12\ m \times 6\ m + 60 = 0$

$\Rightarrow D_y = 67.5\ kN$

$+\uparrow \Sigma F_y = 0 \Rightarrow -C_y + D_y + E_y - 8\ \frac{kN}{m} \times 12\ m = 0$

$\Rightarrow -16\ kN + 67.5\ kN + E_y = 0 \Rightarrow E_y = -3.5\ kN$

b) Determine and list all zero-force members found in the truss shown below.

AB
AM
BM
ML
CL
DE
EF
JF
JG
JH
IH