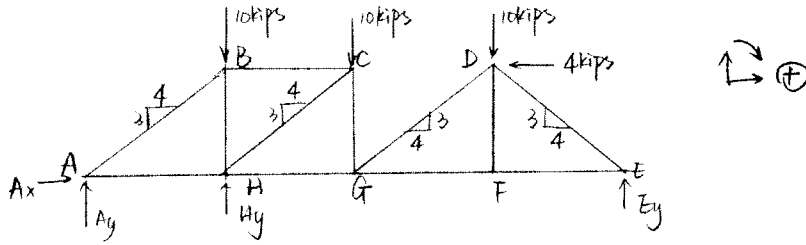


P 4.13 a) Identify the zero bars in this truss.

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b) Determine the forces in all bars of the truss, using Method of Joints. Indicate tension or compression.



The slope of various members are computed and shown on the sketch.

1) Compute the reactions of supports. Write 3 eqns of equilibrium.

$$\sum F_x = 0 \quad A_x - 4 = 0 \quad A_x = \underline{4 \text{ kips}} \quad (\rightarrow) \text{ Ans.}$$

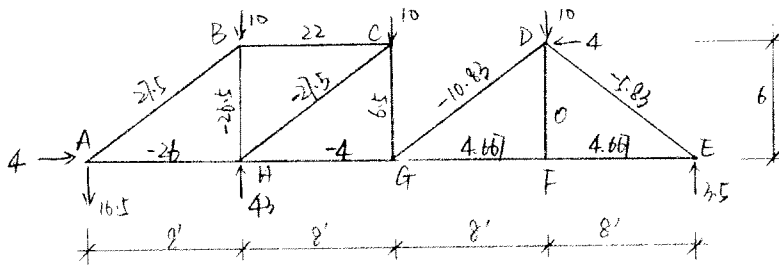
$$\sum M_A = 0 \quad -H_y \times 8 - E_y \times 32 + 10 \times 8 + 10 \times 16 + 10 \times 24 - 4 \times 6 = 0 \quad H_y = \underline{4 \text{ kips}} \quad (\uparrow) \text{ Ans.}$$

$$\sum F_y = 0 \quad A_y + H_y + E_y - 10 \times 3 = 0 \quad A_y = \underline{-16.5 \text{ kips}} \quad (\downarrow) \text{ Ans.}$$

Write 1 equation of condition:

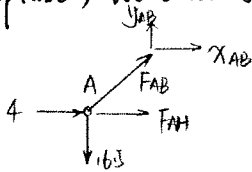
$$\sum M_G = 0 \quad 10 \times 8 - 4 \times 6 - E_y \times 16 = 0 \Rightarrow E_y = \underline{3.5 \text{ kips}} \quad (\uparrow) \text{ Ans.}$$

Then draw FBD of this truss shown below.



2) Identify zero bars, we find $F_{DF} = 0$.

We should start at a point with maximum of 2 bars, with 2 unknowns. Either Joint A or Joint E is acceptable, we choose Joint A. Assuming all of the forces are tension.

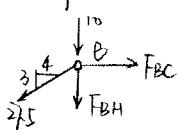


$$\sum F_y = 0 \quad F_{AB} - 16.5 = 0 \quad F_{AB} = 16.5 \text{ kips}$$

$$F_{AB} = 16.5 \times \frac{5}{3} = \underline{27.5 \text{ kips}} \quad (T) \text{ Ans.}$$

$$\sum F_x = 0 \quad 4 + F_{AH} + F_{AB} = 0 \quad F_{AH} = -4 - F_{AB} \times \frac{4}{5} = \underline{-26 \text{ kips}} \quad (C) \text{ Ans.}$$

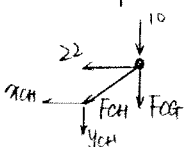
Then compute Joint B.



$$\sum F_x = 0 \quad -27.5 \times \frac{4}{5} + F_{BC} = 0 \quad F_{BC} = \underline{22 \text{ kips}} \quad (T) \text{ Ans.}$$

$$\sum F_y = 0 \quad -10 - 27.5 \times \frac{3}{5} - F_{BH} = 0 \quad F_{BH} = \underline{-26.5 \text{ kips}} \quad (C) \text{ Ans.}$$

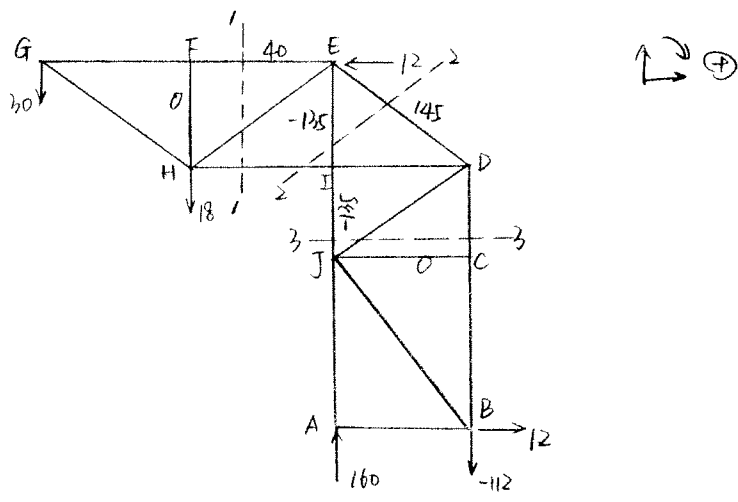
Then compute Joint C.



$$\sum F_x = 0 \quad -22 - F_{CH} = 0 \quad F_{CH} = -22 \text{ kips}$$

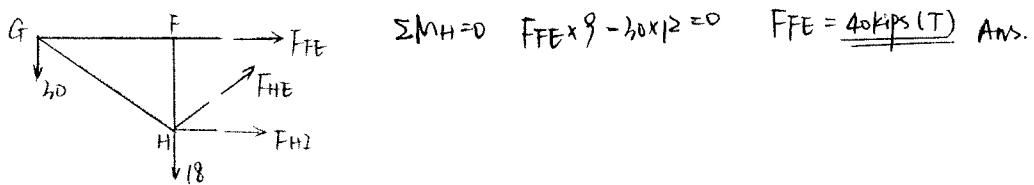
$$F_{CH} = F_{CF} \times \frac{5}{4} = \underline{-27.5 \text{ kips}} \quad (C) \text{ Ans.}$$

$$\sum F_y = 0 \quad -10 - F_{CF} - F_{CG} = 0 \quad F_{CF} = -10 - F_{CH} \times \frac{3}{5} = -10 - (-27.5) \times \frac{3}{5} = \underline{6.5 \text{ kips}} \quad (T) \text{ Ans.}$$

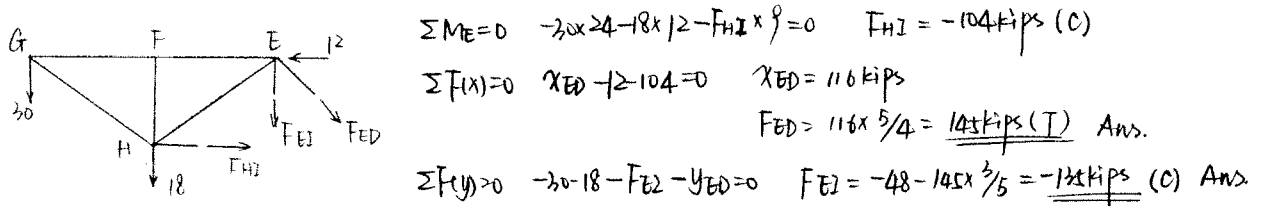


2) Identify zero bars FH and CJ.

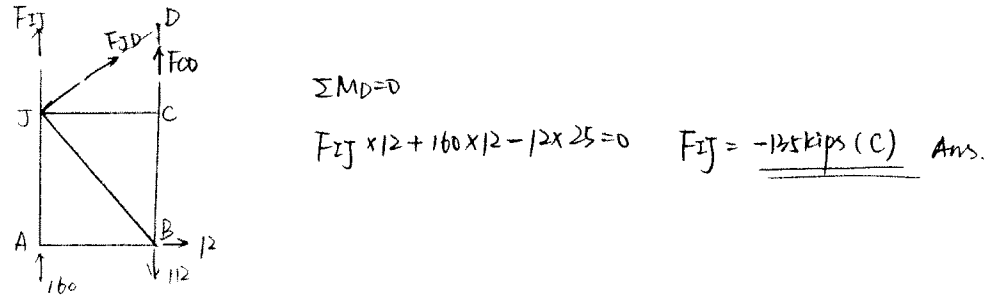
To compute bar forces of EF, pass section 1-1 through the truss, cutting the FBD shown below.



To compute bar forces FED, FEJ, pass section 2-2 through the truss cutting the FBD shown below.



To compute bar force FIJ, pass section 3-3 through the truss, cutting FBD shown below.



P. 438 Determine the forces in all bars using Method of Joints and Method of Sections. Indicate if tension or compression.

