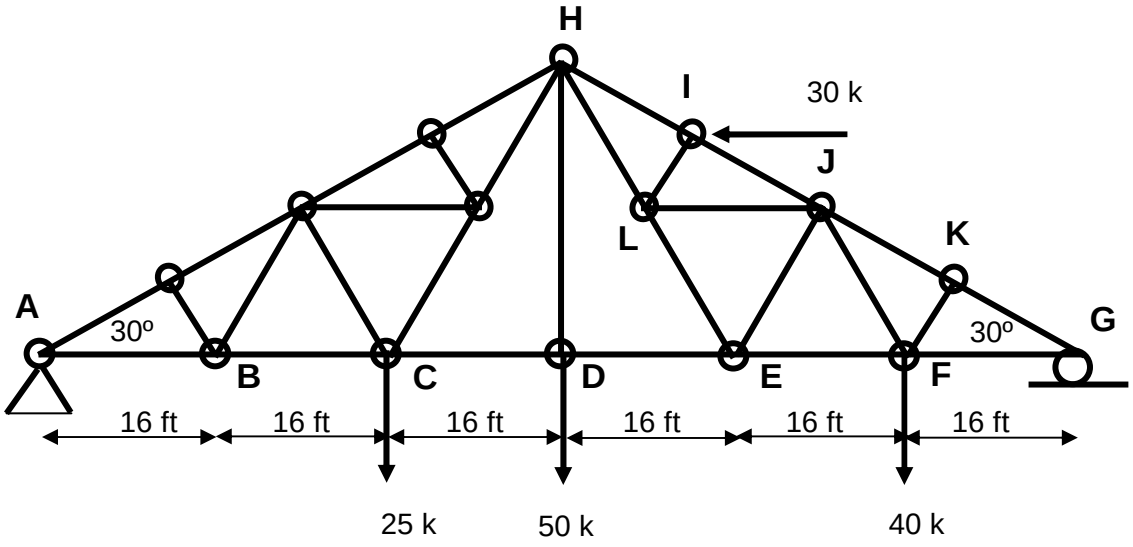
CEE 379 **Problem Set 3** **Autumn 2007**

(Due Monday, Oct. 22, in class or 4:30 PM in 233 More)

Problem 1. Consider the truss shown below.



a) For this truss, determine:

degree of external static indeterminacy _____

# of unknown member forces and reactions _____

# of independent eqns of joint equilibrium _____

degree of internal static indeterminacy _____

degree of kinematic indeterminacy _____

b) Compute the reactions at A and G, and show these on a neat drawing of the truss. On the same drawing, identify all of the zero-force members.

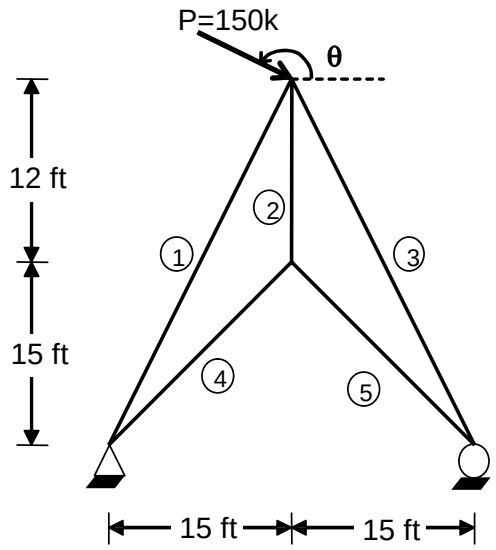
c) Draw a free-body diagram of part of the structure that will enable you to determine the axial forces in members HI, HL and DE. For each member, compute its axial force(tension or compression) using a single equation of equilibrium.

d) Using the information from b) and c), as well as additional equations of equilibrium, determine the axial forces in all of the members of the truss. Show all of these member forces on a neat drawing of the truss.

e) Assume that all of the members are to be made with steel that has a maximum allowable stress of 24 ksi (compression or tension), and all of the members are to have the same cross-sectional area

- What is the minimum cross-sectional area of steel required for the members?
- Assuming that the unit weight is 490 lbs/ft^3, what is the total weight of the resulting truss?
- How does this weight compare with the applied loads?

Problem 2. Consider the truss below with theta = 130 degrees.



a) For this truss, determine:

degree of external static indeterminacy _____

# of unknown member forces and reactions _____

# of independent eqns of joint equilibrium _____

degree of internal static indeterminacy _____

degree of kinematic indeterminacy _____

b) Determine the axial forces in all of the members of the of the truss. Show all of these member forces on a neat drawing of the truss.

Problem 3. Repeat Problem 2, part a, assuming that an additional horizontal truss member is added between the two supports.

For the modified truss, determine:

degree of external static indeterminacy _____

# of unknown member forces and reactions _____

# of independent eqns of joint equilibrium _____

degree of internal static indeterminacy _____

degree of kinematic indeterminacy _____