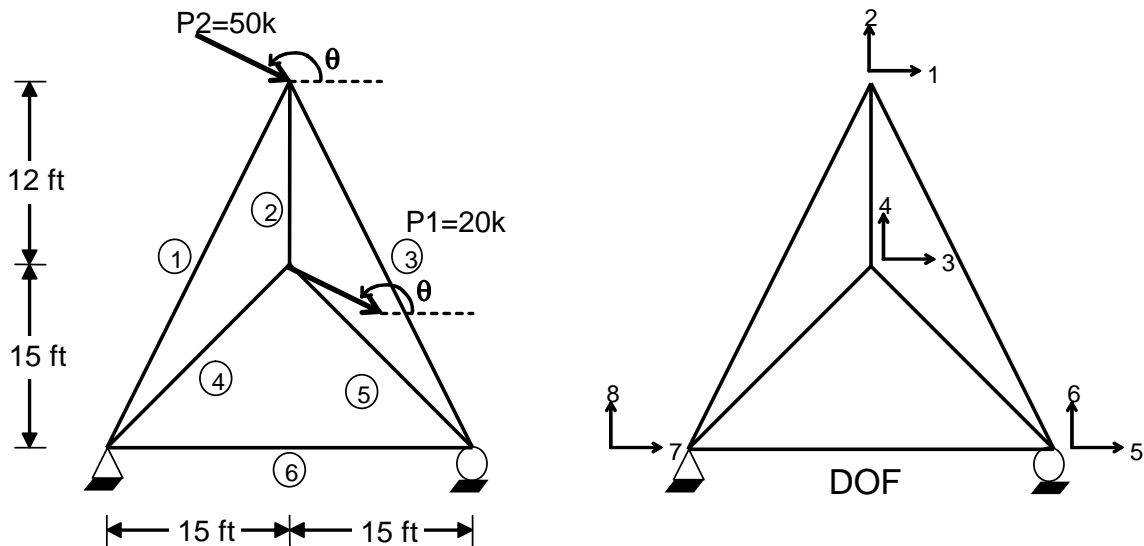


(Due Oct. 26th , 4:30 PM in 233 More)

**Problem 1.** Consider the truss shown in the figures below. For each member, the elastic modulus,  $E = 29,000$  ksi. the cross-sectional area,  $A = 8 \text{ in.}^2$  and the yield stress is 50 ksi. Use pencil and paper to solve this problem (with the exception that you can use a spreadsheet or calculator to solve the simultaneous equations).



- Compute the element stiffness matrix,  $k$ , for each of the six truss members.
- Express the equations of equilibrium at the free kinematic DOF in terms of the applied external loads, the member properties and the displacements at the free kinematic DOF. (i.e.,  $Q_k = K_{11}D_u$ )
- For  $\theta = 135$  degrees, compute the unknown joint displacements, and sketch the deflected structure.
- For  $\theta = 135$  degrees, compute the element forces at the end of each truss member. Then, show the member axial forces on a neat drawing of the structure.
- Compute the axial stress in each member. ( $\sigma = P/A$ ). Compare this value with the yield stress? Which members have yielded, if any?

### Problem 2.

Repeat (c)-(d) from Problem 1, but instead of applying loads  $P_1$  and  $P_2$  at an angle of theta, assume that both loads are applied downwards.

YOU CAN COMPARE YOUR RESULTS WITH THOSE OF OTHERS, BUT YOU SHOULD DEVELOP AND SUBMIT INDIVIDUAL SOLUTIONS.