Homework No. 1: Structural Engineering and Design Loads

A two-dimensional (2D) building frame is shown in the following figures. The dead loads, live loads, roof loads, snow loads, and wind loads acting on the frame have been determined using the ASCE 7-98 Standards, and are shown in the Figures. The roof load is found to be equal to the snow loads for this frame. Assume that all the column sections are W12 x 50, all the beam sections are W14 x 68, and all the truss members are W6 x 20.

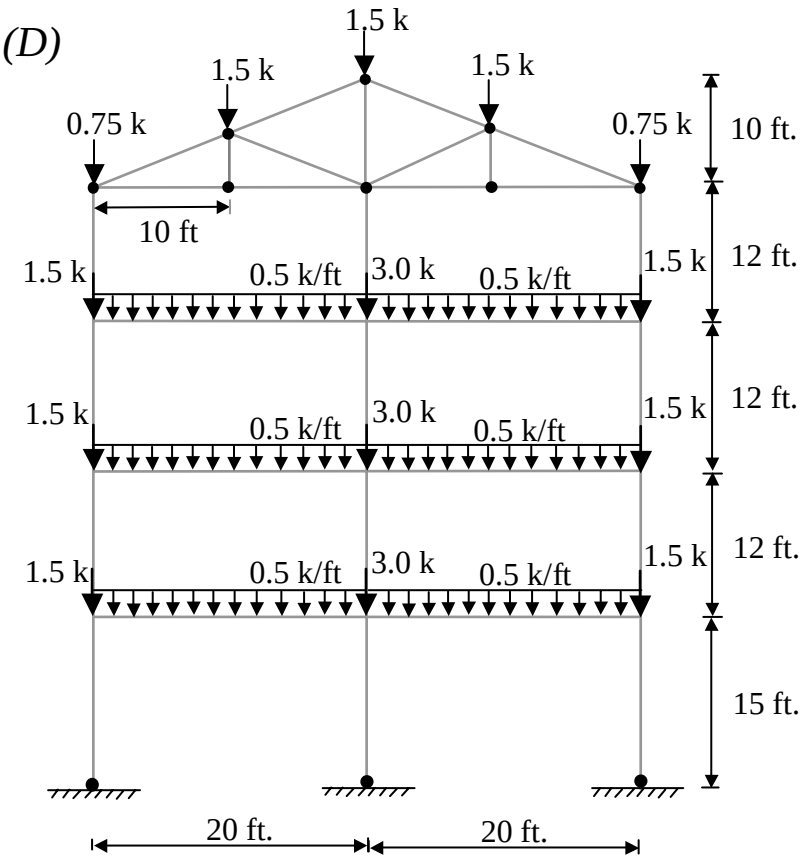
Conduct linear elastic analysis of the frame for the following load combinations:

- $1.2D + 1.6L + 0.5(L_r \text{ or } S)$
- $0.9D \pm 1.3W$
- $1.2D + 0.5L + 0.5(L_r \text{ or } S) + 1.3W$

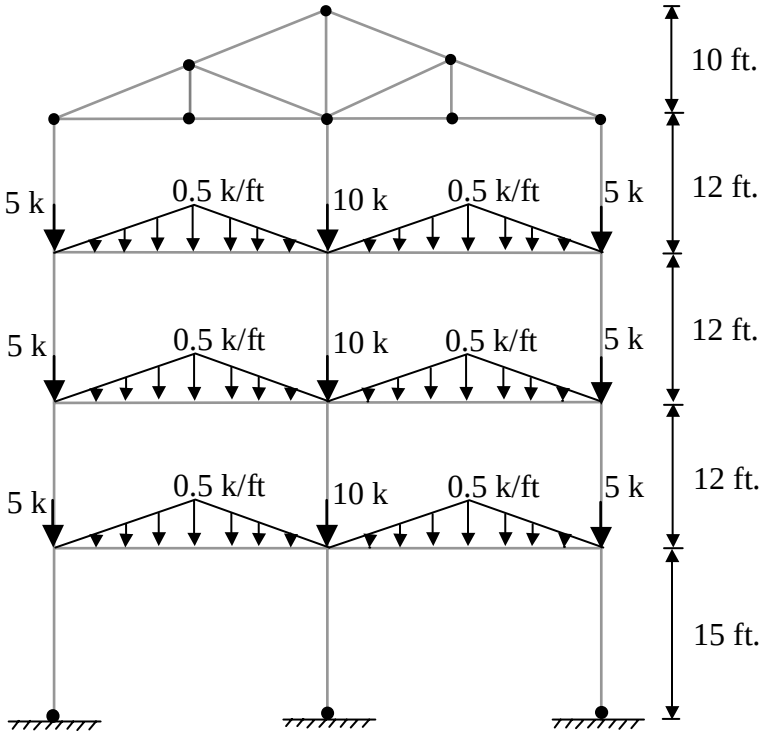
Determine the design forces, i.e., the tension force, compression force, shear force, and bending moment (positive and negative), for the fifteen members indicated in Figure 3 for the given load combinations. Tabulate your answers as follows:

Mem.	Load Combination	Design Forces				
		Tension	Compression	Shear	Pos. Moment	Neg. Moment

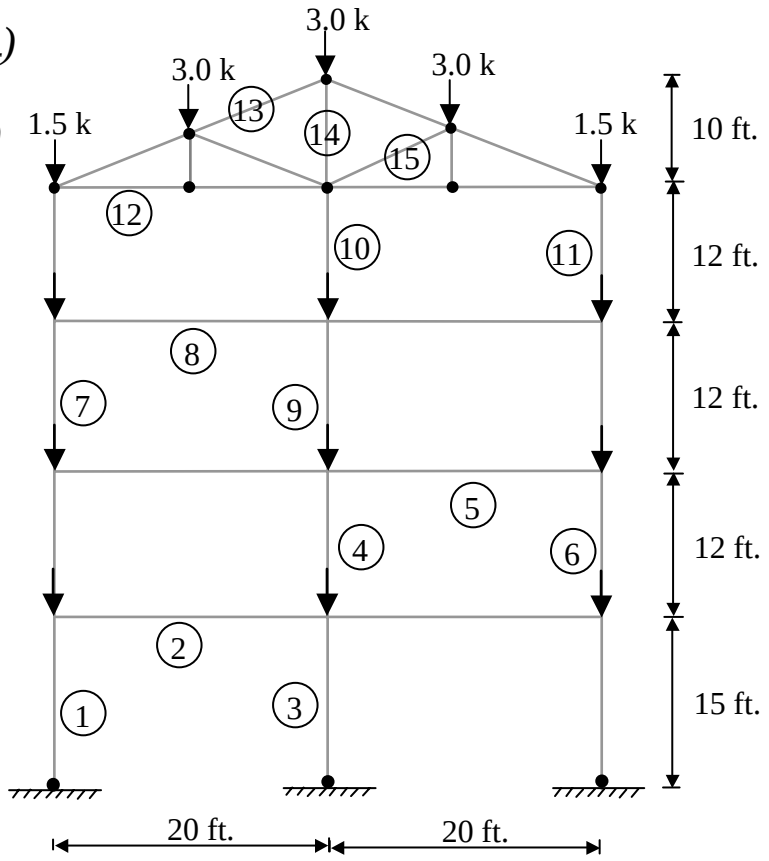
Dead Load (D)



Live Load (L)



Roof Load (L_r)
=
Snow Load (S)



Wind Load (W)