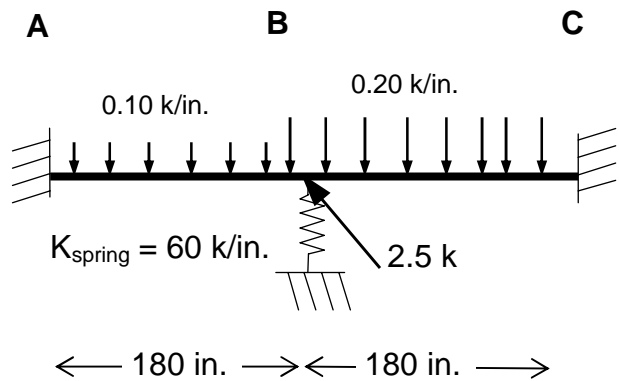


(Due Nov. 30 in class or Dec. 3rd, 4:30 PM in 233 More)

You can work in groups of 2-4 to complete this assignment. Turn in only one assignment per group. Write the names of all members of the group on this sheet.

- Names:**
1. _____
 2. _____
 3. _____
 4. _____

The frame and spring structure shown is subjected to a uniform load of 0.10 k/in. on frame member AB, a uniform load of 0.20 k/in. on member BC, and a point load at point B. The point load is orientated at 45 degrees from horizontal. For both frame members AB and BC, the elastic modulus, $E = 29,000$ ksi, the area, $A = 15$ in.² and the moment of inertia, $I = 850$ in.⁴



In this assignment, you will use the direct stiffness method discussed in class to determine the displacements and rotations at the free degrees of freedom, as well the axial force, shear and moment diagrams for the frame members.

Problem 1. Identify the free degree of freedoms for the structure.

Problem 2. Compute the member force-deformation matrices for each member (k). You only need to compute the terms that will be used later in the problem.

Problem 3. Compute the K_{11} matrix for the structure.

Problem 4. Compute the vector of loads at the free degrees of freedom (Q_k), and well as the vector of fixed-end forces at the free degrees of freedom (Q_{01}).

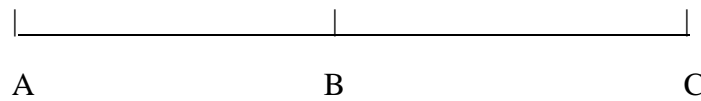
Problem 5. Compute the displacements and rotations of the free degrees of freedom.

Problem 6. For these displacements and rotations (as well as the fixed-end forces), compute the frame member end forces.

Problem 7.

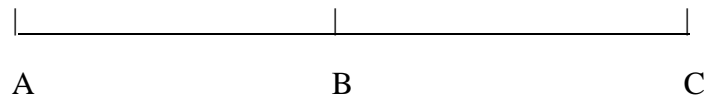
- a) On the drawing below, plot the **axial force diagram** for the structure. Indicate the magnitude of the maximum axial force in each frame member.

Axial Force
Diagram



- b) On the drawing below, plot the **shear force diagram** for the structure. Indicate the magnitude of the maximum and minimum shear force each frame member.

Shear Force
Diagram



- c) On the drawing below, plot the **bending moment diagram** for the structure. Indicate the magnitude of the maximum positive and negative bending moments each frame member.

Bending Moment
Diagram

