Midterm Exam 1 - Structural Analysis 1

Seoul National University

September 29th, 2025

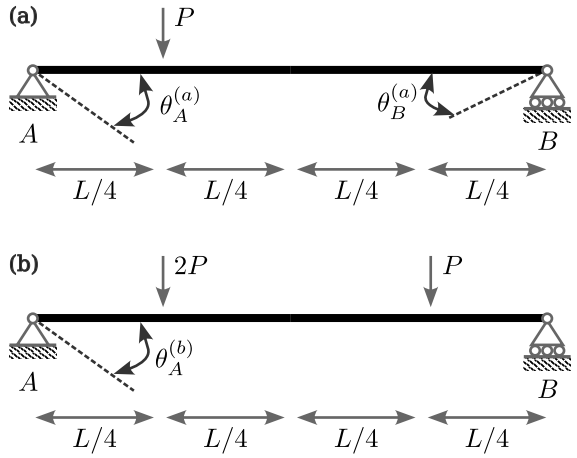
Problem 1.

1.1 Determine the reaction forces and construct the shear force and bending moment diagrams for structure (a).

1.2 Determine the reaction forces and construct the shear force and bending moment diagrams for structure (b).

1.3 Let $\theta_A^{(a)}$ and $\theta_B^{(a)}$ be the slope angles at supports A and B of structure (a). Using linear superposition, express the slope angle at support A of structure (b), $\theta_A^{(b)}$, in terms of $\theta_A^{(a)}$ and $\theta_B^{(a)}$.

All members are assumed to have the same constant flexural rigidity EI.

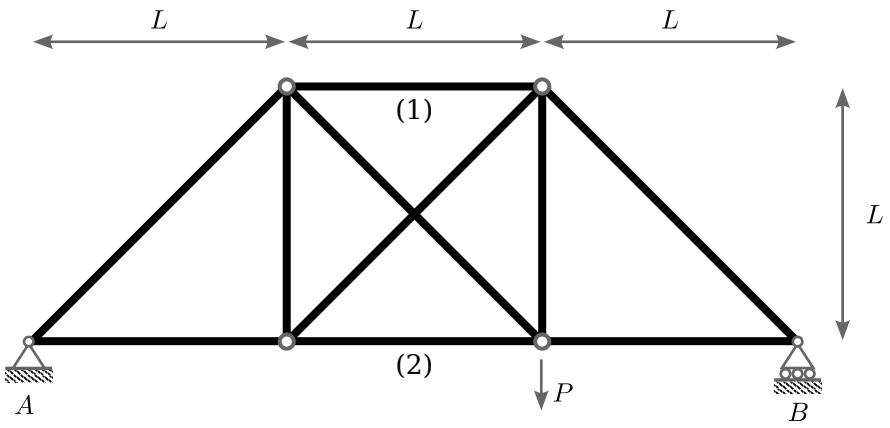


Problem 1. Structures (a) and (b).

Problem 2. Given the indeterminate structure shown below, determine the difference between the axial forces in the upper middle member (1) and the lower middle member (2), i.e., find:

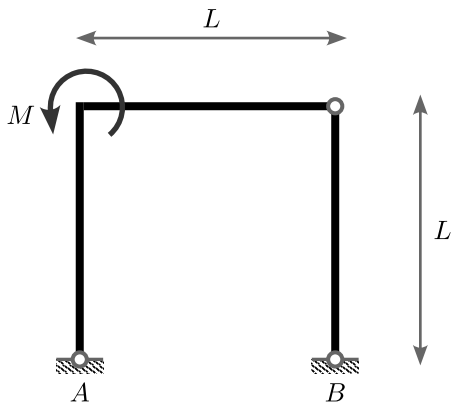
$$F^{(1)} - F^{(2)}.$$

All members have the same constant rigidity EA.



Problem 2.

Problem 3. Calculate the reaction forces, and draw the axial force, shear force, and bending moment diagrams for the structure shown below. Then, without determining exact values, sketch the displacement shape of the frame. Assume that all members are free of axial deformation.



Problem 3.