

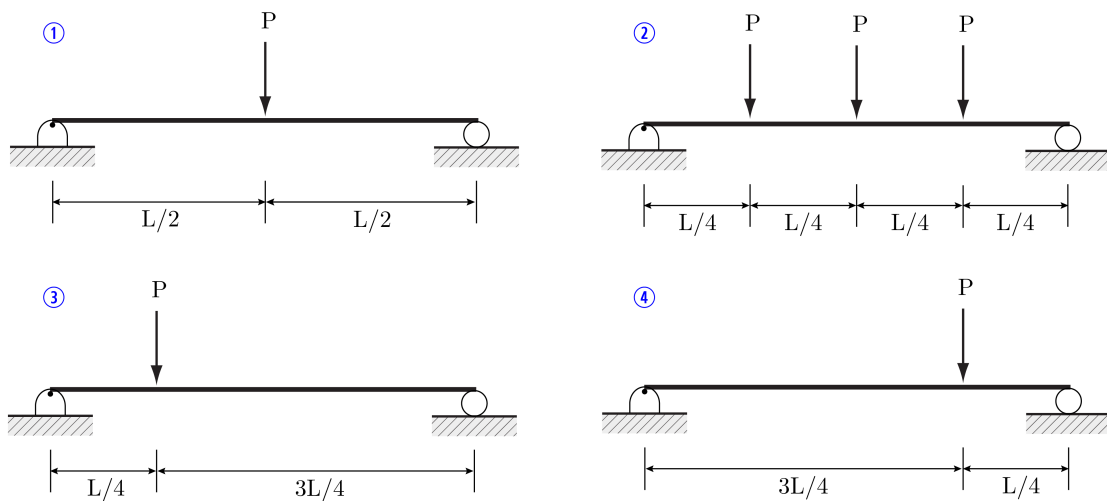
CE 325 Spring 2026 HW#3

Due Thursday, February 12, at the beginning of class

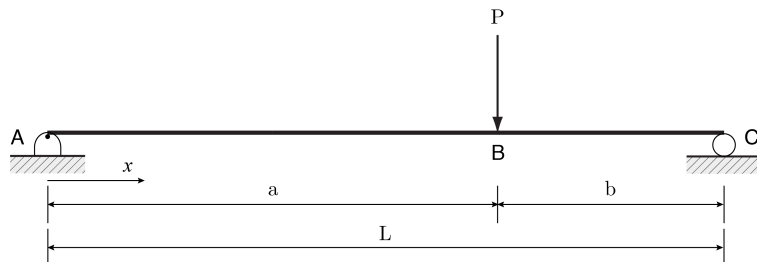
Note: This assignment utilizes a recently developed education research platform – *structural analysis integrated learning (SAIL)* – that is intended to help you develop a better “feel” for beam analysis and quickly identify/remedy calculation errors.

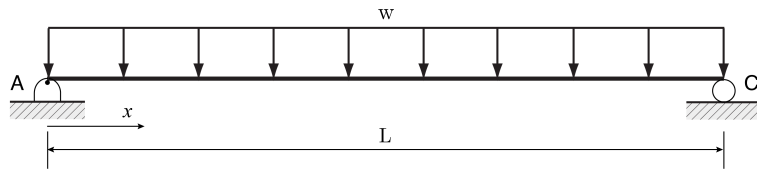
Training Exercises

For the beams below with various loading and support conditions, use the *SAIL platform* to analyze the structural response (e.g., find reactions, deflections, shear force and bending moment diagrams). Feel free to create/model your own structures as well.



1. For the **concentrated force** and **uniformly distributed load** cases shown below:
 - a. (5 pts) Using intuition developed in the *SAIL* training exercises above, try to sketch the *qualitative shear force* and **bending moment** diagrams without making any calculations.
 - b. (5 pts) Use the *SAIL platform* to verify your results in Part (a).
 - c. (5 pts) Using mechanics principles from class, determine the external reactions and draw the *quantitative shear force* and **bending moment** diagrams.
 - d. (5 pts) Comment on your findings and why/why not you found the *SAIL platform* helpful to find the reactions and construct shear/moment diagrams.

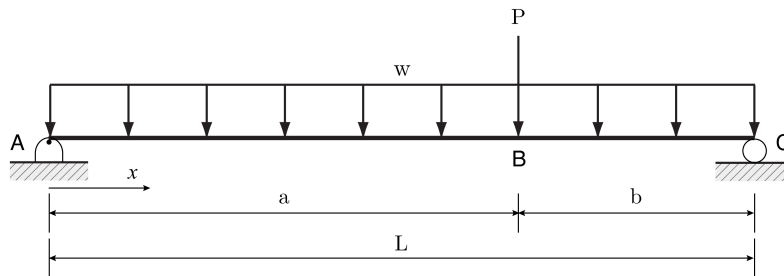




2. For the two loading scenarios in Problem 1 above:

- (5 pts) Using intuition developed in the *SAIL* training exercises above, try to sketch the *qualitative deflected shape* without making any calculations.
- (5 pts) Use the *SAIL platform* to verify your results in Part (a).
- (5 pts) Integrate the *Moment-Curvature* relation to obtain the equation(s) for the **rotation** and **deflection** as a function of x .
- (5 pts) Plot the deflected shape.
- (5 pts) Determine the locations and values of the **maximum displacement**.
- (5 pts) Comment on your findings and why/why not you found the *SAIL platform* helpful to determine the rotation and deflection behavior.

3. For the beam below with combined concentrated and uniformly distributed loads:



- (5 pts) Using knowledge and intuition developed in the prior exercises, try to sketch the *qualitative deflected shape* without making any calculations.
- (5 pts) Using the *Principle of Superposition*, determine the equation(s) for the **rotation** and **displacement** as a function of x .
- (5 pts) Find the **location** and **value** of the **maximum displacement** given:
 $P = 1000$ lbs, $w = 1$ k/ft, $a = 8$ ft., $b = 4$ ft., $E = 36e3$ ksi, $I = 12$ in.⁴
- (5 pts) Use *SAIL platform* to verify your results in Part (c).
- (5 pts) Comment on your findings and why/why not you found the *SAIL platform* helpful to determine the structural response for the compound loaded beam.