ME 323: Mechanics of Materials	Homework Set 6
Fall 2023	Due: Friday, October 13

Problem 6.1 (10 points)

A beam BH is loaded as shown in Fig. 6.1 (a) and its cross-section is shown in Fig. 6.1 (b). For this beam:

(a) Draw the shear force diagram.

(b) Draw the bending moment diagram.

(c) Determine the location of the neutral plane (d) and the second moment of area about the neutral axis z.

(d) Determine the magnitude of the maximum compressive stress and maximum tensile stress.

Take the dimension a = 2 cm in Fig. 6.1 (b).

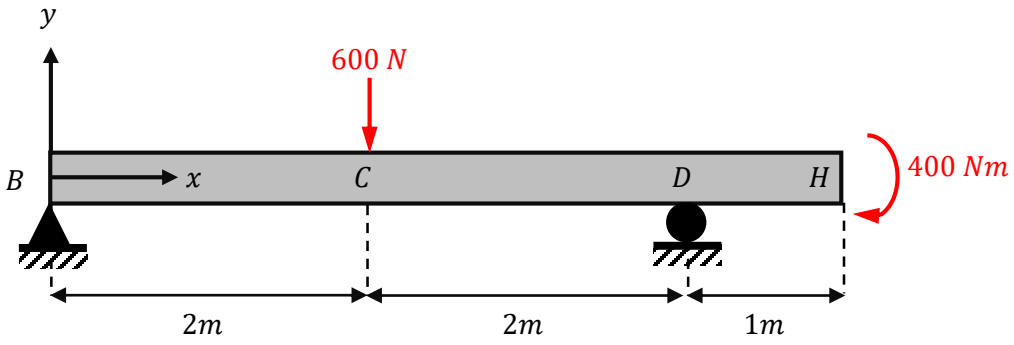


Fig. 6.1 (a)

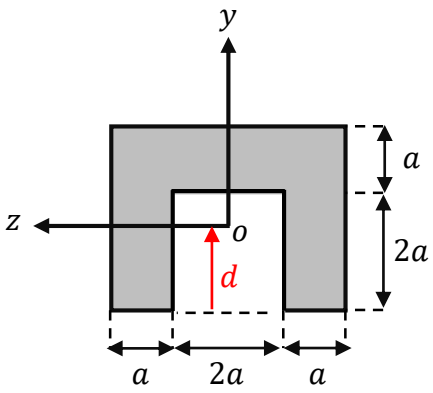


Fig. 6.1 (b)

Problem 6.2 (10 points)

A cantilever beam AB supports a distributed load as shown in following figure. The beam is made up of a material with elastic modulus E and has a cross-sectional second area moment I.

(a) Determine expressions for the slope $\theta(x)$ of the cantilever beam over $0 \leq x \leq L$.

(b) Determine expressions for the deflection curve $v(x)$ over $0 \leq x \leq L$.

(c) Determine the slope, θ_A, and the deflection, δ_A, at end A.

Note: Determine the expressions in terms of parameters defined in the problem statement (L, w_0, I, and E).

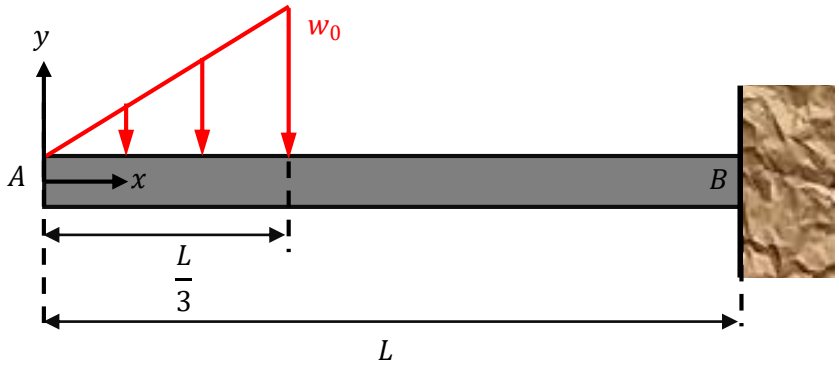


Fig. 6.2

Problem 6.3 (10 points)

The beam shown below has Young's modulus *E* and cross-sectional second area moment *I*. Determine the reaction forces and moments at ends B and G using the second-order integration method.

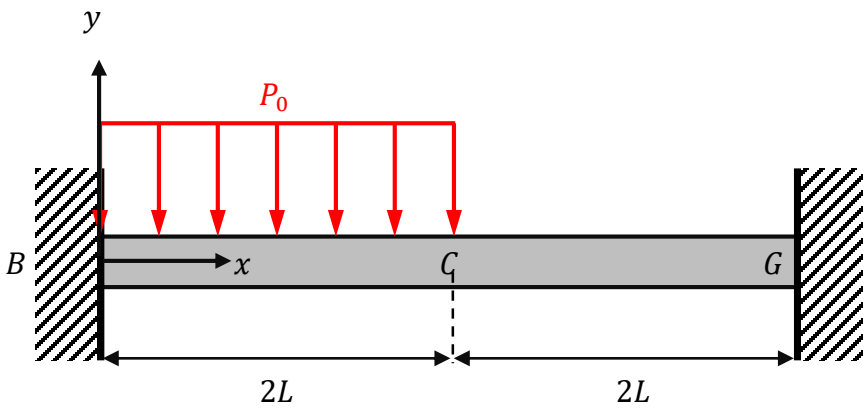
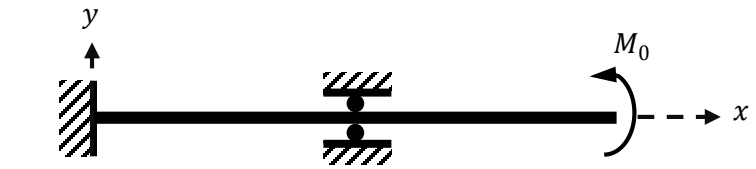


Fig. 6.3

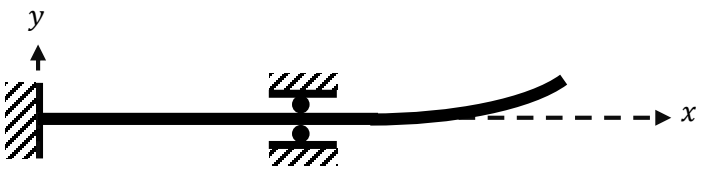
Problem 6.4 (Conceptual) (5 points)

Identify the schematic that represents the deflection curve of the following beams (each 2.5 points):

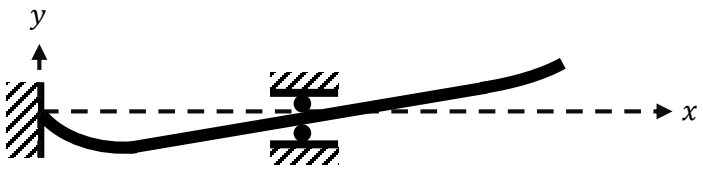
Beam (A)



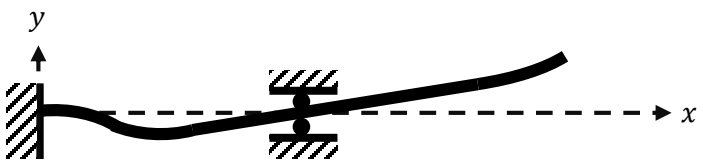
(a)



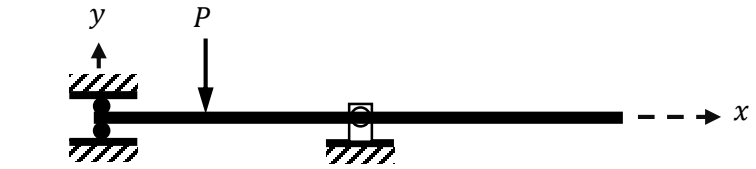
(b)



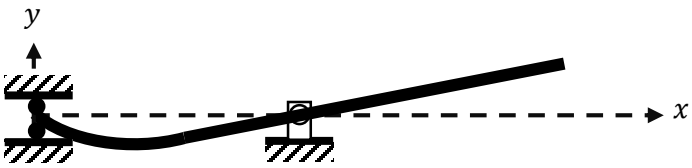
(c)



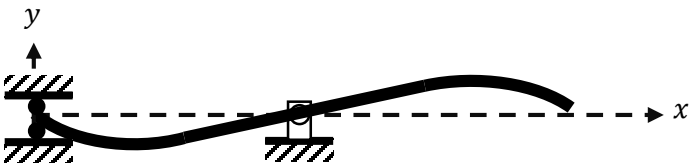
Beam (B)



(a)



(b)



(c)