ME 260: Structural Optimization: Size, Shape, and Topology		
Assigned: Sep. 17, 2026	In-class quiz 11 (10 mins)	Due: Sep. 17, 2026

Name:

$$\min_{y(x)} J = \frac{\int_{x_1}^{x_2} F_1(y, y')\, dx}{\int_{x_1}^{x_2} F_2(y, y')\, dx}$$

Write the differential equation and boundary conditions to solve for $y(x)$.

Hint

For this problem, we cannot blindly write the Euler-Lagrange equations. We need to start from the first principles by writing Gateaux variation = 0, followed by integration by parts, and then applying the fundamental lemma.

So, start with

$$\delta J = \frac{d}{d\epsilon}\{J(y + \epsilon h\}\Big|_{\epsilon=0} = 0$$