1. For the beam and loading shown, determine the equation of the elastic curve in the interval 0<x<L. Assume $EI$ is constant. (15 points)
2. A beam is loaded and supported as shown.
   a. Determine the magnitude of the reactions at A and C. (10 points)
   b. (optional) Draw the shear force and bending moment diagrams for the beam. (5 points EXTRA CREDIT)
3. For the stress element shown,
   a. Determine the normal stress $\sigma_n$ and the shear stress $\tau_{nt}$ acting on plane a-a. Include the proper sign when reporting your answers for $\sigma_n$ and $\tau_{nt}$. (10 points)
   b. Compute the magnitude of the maximum in-plane shear stress. (5 points)

(note: In the interest of keeping the test from being overly long, you do not have to draw the rotated element or sketch the stresses acting on the element for parts a and b of this question)
4. At a point on a structure, strain readings were measured using the rectangular rosette shown. The gage readings were:
   \[ \varepsilon_A = +300 \, \mu\varepsilon \]
   \[ \varepsilon_B = -400 \, \mu\varepsilon \]
   \[ \varepsilon_C = +500 \, \mu\varepsilon \]

   a. Determine the strains \( \varepsilon_x \), \( \varepsilon_y \), and \( \gamma_{xy} \). (5 points)
   b. Determine the normal strain \( \varepsilon_n \) acting in the \( n \) direction shown on the sketch. (5 points)