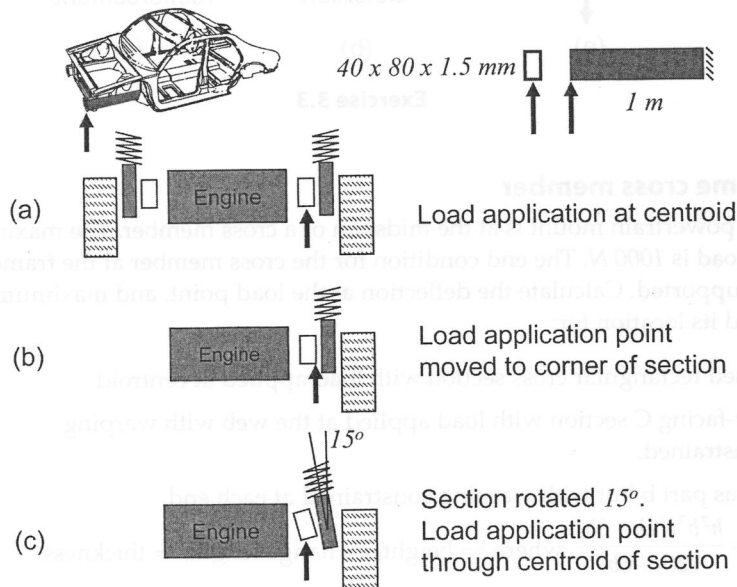


### Exercise 3.1

### 3.2 Motor compartment rail

The motor compartment rail must meet the package constraints imposed by the suspension and powertrain. These constraints often force nonsymmetrical loading and section shape. For the illustrations shown in *a*, *b*, and *c*, determine the deflection at the tip of the beam and maximum direct stress and location for a  $2000\text{-N}$  load.



### Exercise 3.2

### 3.3 Local compliance: Tie-down point

A shipping tie down is located at the center of the rocker: a rectangular section  $100\text{ mm} \times 80\text{ mm}$ ,  $1.0\text{ mm}$  thick,  $1\text{ m}$  long, and effectively simply supported at the ends, illustration a. The initial design is unreinforced, illustration b. The total deflection along the beam is the deflection of an ideal beam plus the local deflection. The local distortion is a half sine wave along the length of the beam.

- Compute the beam deflection under a unit load assuming there is no local distortion of the section.
- Compute the local deflection of the section under a unit load.