element. Then check equilibrium at node 2. Let $E = 30 \times 10^6$ psi, $A = 10$ in^2, and $I = 500$ in^4 for both elements.

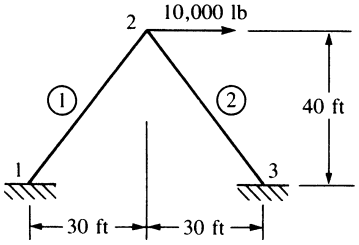

Figure P5–1

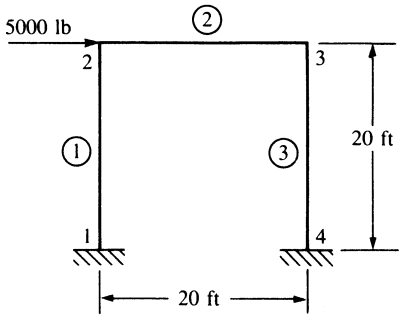

Figure P5–2

5.2 For the rigid frame shown in Figure P5–2, determine (1) the nodal displacement components and rotations, (2) the support reactions, and (3) the forces in each element. Let $E = 30 \times 10^6$ psi, $A = 10$ in^2, and $I = 200$ in^4 for all elements.

5.3 For the rigid stairway frame shown in Figure P5–3, determine (1) the displacements at node 2, (2) the support reactions, and (3) the local nodal forces acting on each element. Draw the bending moment diagram for the whole frame. Remember that the angle between elements 1 and 2 is preserved as deformation takes place; similarly for the angle between elements 2 and 3. Furthermore, owing to symmetry, $d_{2x} = -d_{3x}$, $d_{2y} = d_{3y}$, and $\phi_2 = -\phi_3$. What size A36 steel channel section would be needed to keep the allowable bending stress less than two-thirds of the yield stress? (For A36 steel, the yield stress is 36,000 psi.)

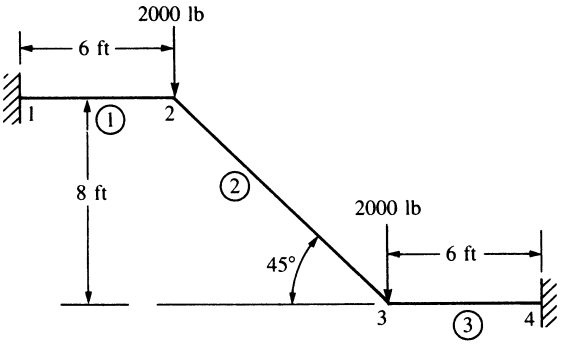

Figure P5–3