

Problem Set 3

Consider a steel plate two feet by four feet and half an inch thick.

1. Let a constant moment M be applied to all four edges. What magnitude of M is required to make the midplane at the center of the plate be 1" above its corner location?
2. Let the shear couple Q_1 be applied to the two long edges. Find the moment required to be applied to one of the long edges to insure equilibrium. Find the resultant deformation if no constraint is applied to the short edges.
3. Suppose Q_1 in the previous problem to vary linearly with the coordinate along the edge. What moment is needed for equilibrium? What is the deformed shape of the plate?
4. Suppose the plate to be clamped on one of the short edges. How much will the plate sag under its own weight? (You may make such assumptions about lateral displacement on the clamped edges as are necessary to make the problem doable. Tell me what they are. If you feel clever, tell me how realistic you think they are.)