Homework #7

Problem 4.5-25  A beam of length \( L \) is being designed to support a uniform load of intensity \( q \) (see figure). If the supports of the beam are placed at the ends, creating a simple beam, the maximum bending moment in the beam is \( qL^3/8 \). However, if the supports of the beam are moved symmetrically toward the middle of the beam (as pictured), the maximum bending moment is reduced.

Determine the distance \( a \) between the supports so that the maximum bending moment in the beam has the smallest possible numerical value.

Draw the shear-force and bending-moment diagrams for this condition.

Problem 4.5-28  The shear-force diagram for a simple beam is shown in the figure.

Determine the loading on the beam and draw the bending-moment diagram, assuming that no couples act as loads on the beam.

Problem 4.5-27  The compound beam \( ABCDE \) shown in the figure consists of two beams (\( AD \) and \( DE \)) joined by a hinged connection at \( D \). The hinge can transmit a shear force but not a bending moment. A force \( P \) acts upward at \( A \) and a uniform load of intensity \( q \) acts downward on beam \( DE \).

Draw the shear-force and bending-moment diagrams for this compound beam.