Homework Problems

5.3 Three vertical forces are applied to act on a cantilever beam as shown. Determine (*a*) their resultant force **R**, (*b*) the abscissa $\bar{x}$ of the point *C* through which the resultant force **R** acts.

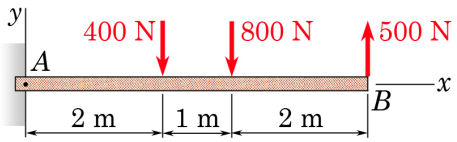

Fig. P5.3

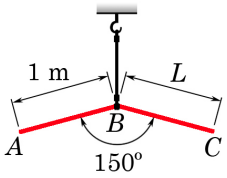

Fig. P5.9

5.9 A bent rod *ABC* is suspended by a wire at *B* as shown. Determine the length *L* for which the portion *AB* of the bent rod is horizontal.

5.13 A rod is bent into a shape as shown. If its mass density is $\rho_L = 1$ kg/m, determine the reactions at the supports.

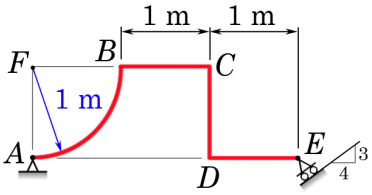

Fig. P5.13

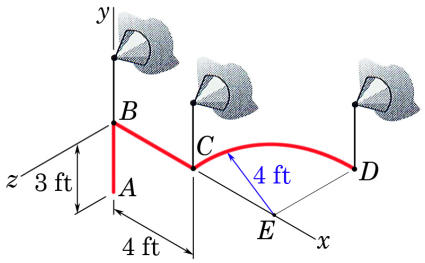

Fig. P5.15

5.15 The rigid body shown has a weight density $\gamma_L = 20$ lb/ft. Determine the reactions at the supports.

5.18 Determine by integration the centroid $C(\bar{x}, \bar{y})$ of the shaded area shown.

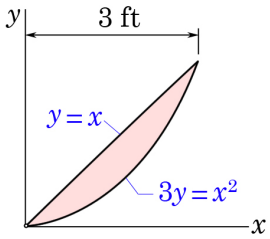

Fig. P5.18

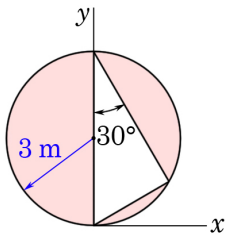

Fig. P5.23

5.23 Locate the centroid $C(\bar{x}, \bar{y})$ of the shaded composite area shown.

5.34 A beam carrying a nonlinearly distributed load is supported by a hinge at *A* and a roller on an inline at *B* as shown. Determine the reactions at *A* and *B*.

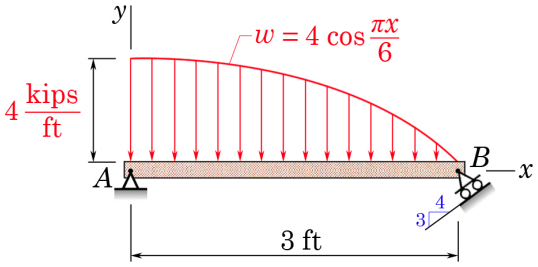

Fig. P5.34

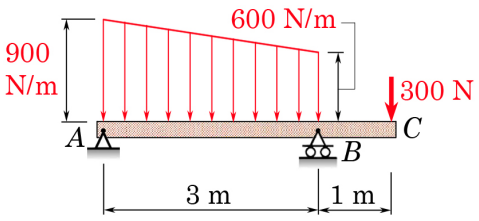

Fig. P5.36

5.36 A beam carrying a trapezoidal distributed load and a concentrated force is shown. Determine the reactions at *A* and *B*.

5.64 For the area shown, determine (*a*) the moment of inertia I_x, (*b*) the radius of gyration k_x. (*Hint:* Choose a horizontal first-order dA to write dI_x for integration.)

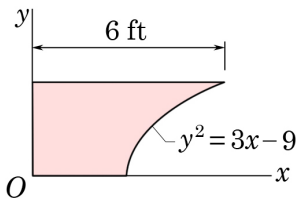

Fig. P5.64

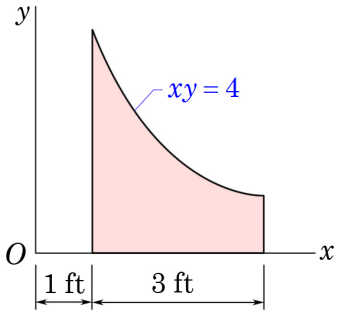

Fig. P5.69

5.69 For the area shown, determine (*a*) the moment of inertia I_y, (*b*) the radius of gyration k_y.

5.85 To increase the strength of a W 8 × 21 rolled-steel section, a channel section C 6 × 13 is fastened to one side of its flange as shown. Determine the centroidal moments of inertia $\bar{I}_x$ and $\bar{I}_y$ and polar moment of inertia $\bar{J}_C$ of the composite section.

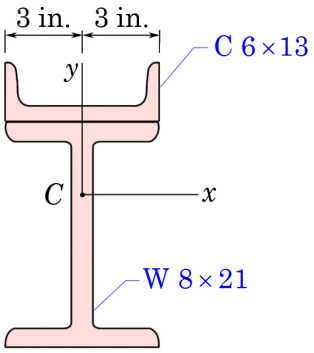

Fig. P5.85

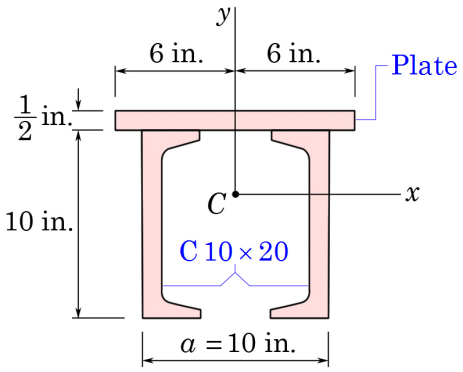

Fig. P5.88

5.88 If $a \neq 10$ in. in the composite section with centroid located at C as shown, determine the distance a for which $\bar{I}_x = \bar{I}_y$.