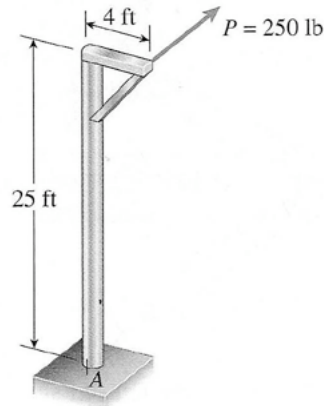


Quiz 9

1. A post having a hollow circular cross section supports a horizontal load $P = 250$ lb acting at the end of an arm that is 4 ft long (see figure on the next page). The height of the post is 25 ft, and its section modulus is $S = 10$ in.³

(a) Calculate the maximum tensile stress σ_{\max} and maximum in-plane shear stress τ_{\max} at point A due to the load P . Point A is located on the “front” of the post, that is, at the point where the tensile stress due to bending alone is a maximum.

(b) If the maximum tensile stress and maximum in-plane shear stress at point A are limited to 16,000 psi and 6,000 psi, respectively, what is the largest permissible value of the load P ?



2. A sign is supported by a pole of hollow circular cross section, as shown in the figure. The outer and inner diameters of the pole are 10.0 in. and 8.0 in., respectively. The pole is 40 ft high and weighs 3.8 k. The sign has dimensions 6 ft \times 3 ft and weighs 400 lb. Note that its center of gravity is 41 in. from the axis of the pole. The wind pressure against the sign is 30 lb/ft².

(a) Determine the stresses acting on a stress element at point A, which is on the outer surface of the pole at the “front” of the pole, that is, the part of the pole nearest to the viewer.

(b) Determine the maximum tensile, compressive, and shear stresses at point A.

