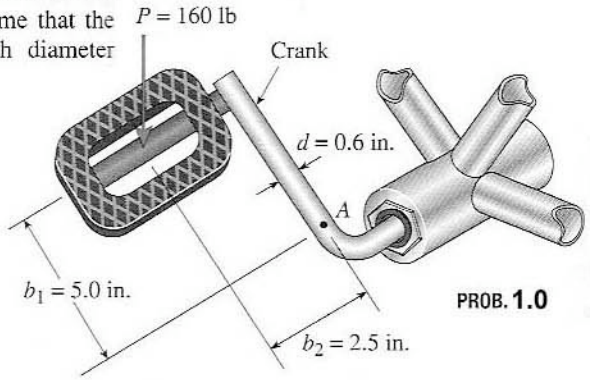
1.0 Determine the maximum tensile, compressive, and shear stresses at point A on the bicycle pedal crank shown in the figure.

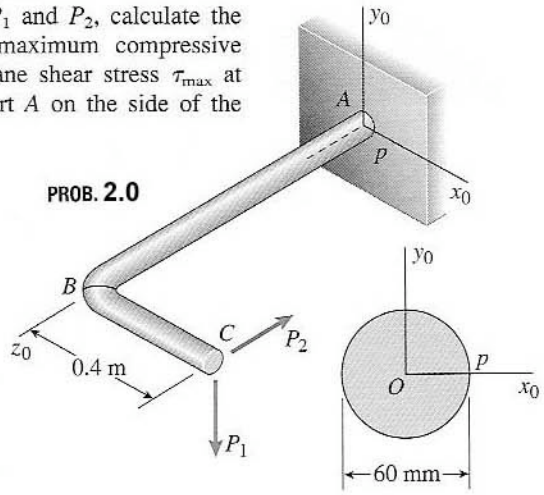
The pedal and crank are in a horizontal plane and point A is located on the top of the crank. The load $P = 160$ lb acts in the vertical direction and the distances (in the horizontal plane) between the line of action of the load and point A are $b_1 = 5.0$ in. and $b_2 = 2.5$ in. Assume that the crank has a solid circular cross section with diameter $d = 0.6$ in.



PROB. 1.0

2.0 A horizontal bracket ABC (see figure on the next page) consists of two perpendicular arms AB and BC, the latter having a length of 0.4 m. Arm AB has a solid circular cross section with diameter equal to 60 mm. At point C a load $P_1 = 2.02$ kN acts vertically and a load $P_2 = 3.07$ kN acts horizontally and parallel to arm AB.

Considering only the forces P_1 and P_2, calculate the maximum tensile stress σ_t, the maximum compressive stress σ_c, and the maximum in-plane shear stress τ_{max} at point p, which is located at support A on the side of the bracket at midheight.



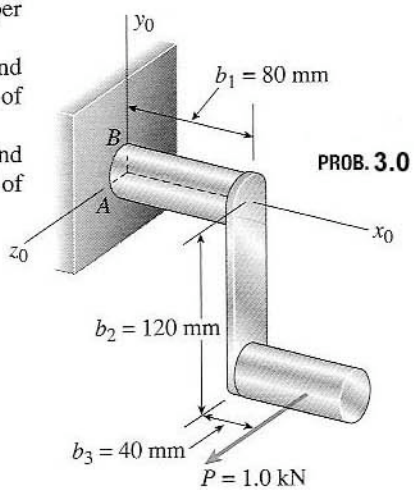
PROB. 2.0

Cross section at A

3.0 For purposes of analysis, a segment of the crankshaft in a vehicle is represented as shown in the figure. The load P equals 1.0 kN, and the dimensions are $b_1 = 80$ mm, $b_2 = 120$ mm, and $b_3 = 40$ mm. The diameter of the upper shaft is $d = 20$ mm.

(a) Determine the maximum tensile, compressive, and shear stresses at point A, which is located on the surface of the upper shaft at the z_0 axis.

(b) Determine the maximum tensile, compressive, and shear stresses at point B, which is located on the surface of the shaft at the y_0 axis.



PROB. 3.0