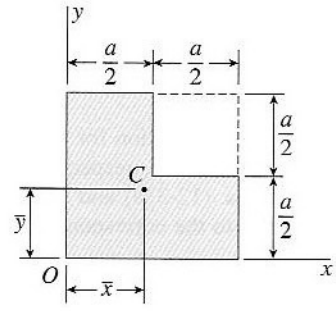
Quiz 5

1. One quarter of a square of side a is removed (see figure).

(a) What are the coordinates $\bar{x}$ and $\bar{y}$ of the centroid C of the remaining area?

(b) Determine the moment of inertia I_c with respect to an axis through the centroid C and parallel to the x axis.

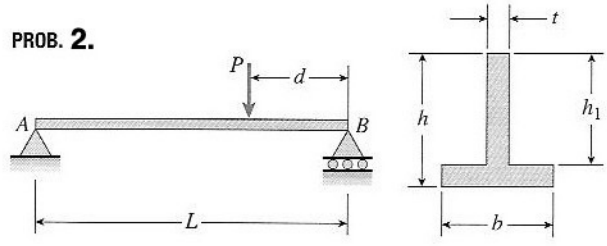
PROB. 1.



2. Determine the maximum tensile stress σ_t and maximum compressive stress σ_c due to the load P acting on the simple beam AB (see figure).

Data are as follows: $P = 5.4$ kN, $L = 3.0$ m, $d = 1.2$ m, $b = 75$ mm, $t = 25$ mm, $h = 100$ mm, and $h_1 = 75$ mm.

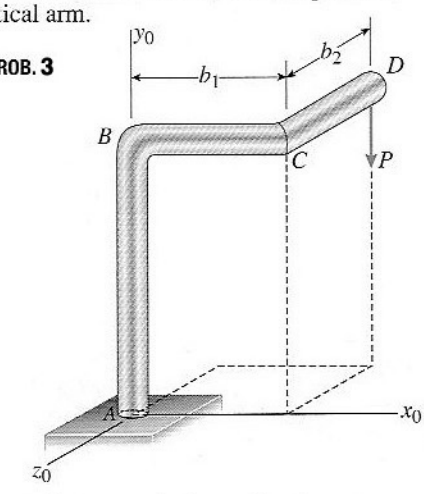
PROB. 2.



3. A bracket $ABCD$ having a hollow circular cross section consists of a vertical arm AB, a horizontal arm BC parallel to the x_0 axis, and a horizontal arm CD parallel to the z_0 axis (see figure). The arms BC and CD have lengths $b_1 = 3.2$ ft and $b_2 = 2.4$ ft, respectively. The outer and inner diameters of the bracket are $d_2 = 8.0$ in. and $d_1 = 7.0$ in. A vertical load $P = 1500$ lb acts at point D.

(a) Determine the maximum tensile and compressive stresses in the vertical arm.

PROB. 3



(b) Determine normal stresses in the y-direction at section A for points E, F, G, and H as shown on the next page where a template is provided.

Quiz5 Prob. 3b template

$d_1 = 7\,in$

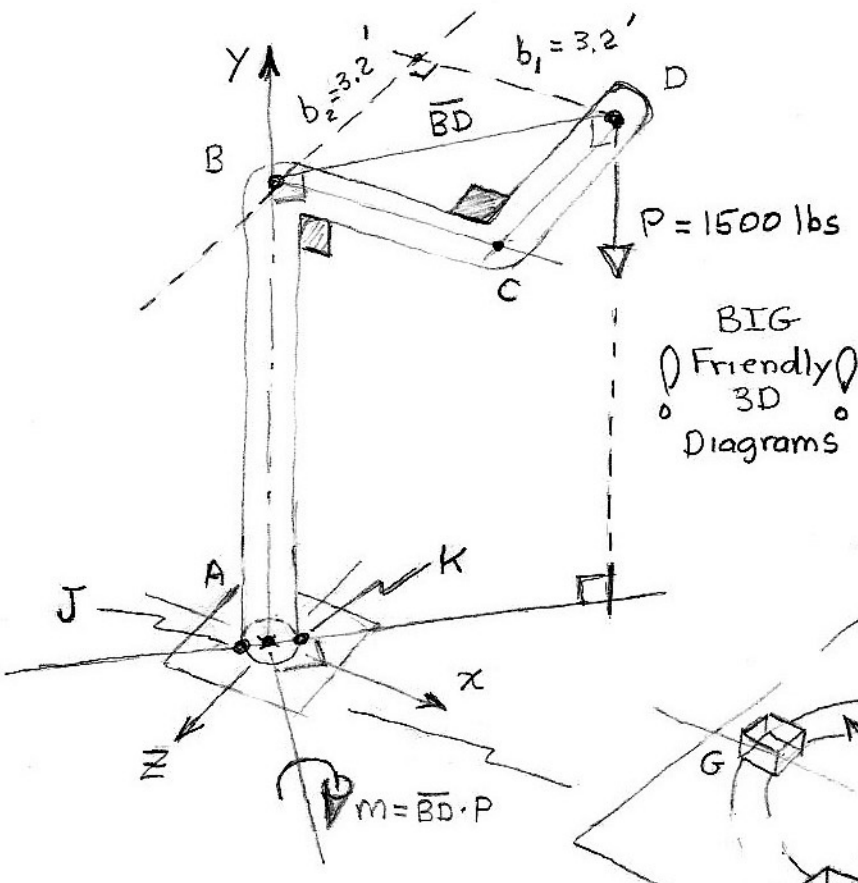
$d_2 = 8\,in \quad r = d_2/2 = 4\,in$

$A = \pi/4\,(d_2^2 - d_1^2) = 11.781\,in^2$

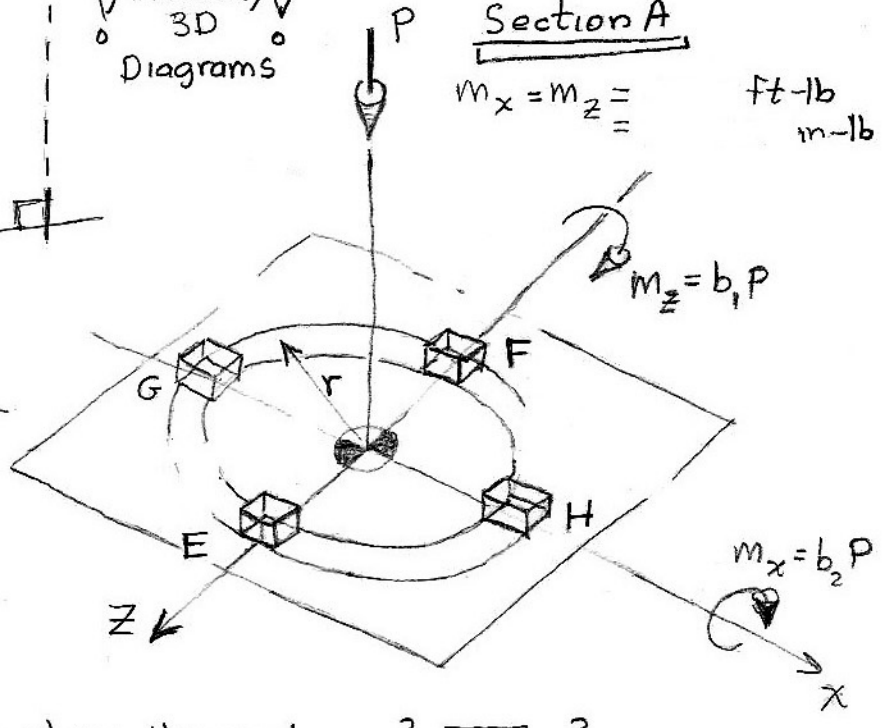
$I = \frac{\pi}{64}(d_2^4 - d_1^4) = 82.203\,in^4$

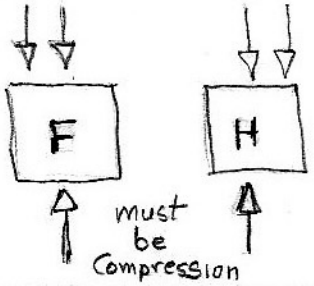
$\overline{BD} = \sqrt{b_1^2 + b_2^2} = \sqrt{16} = 4' = 48''$

$m =$ in-lb

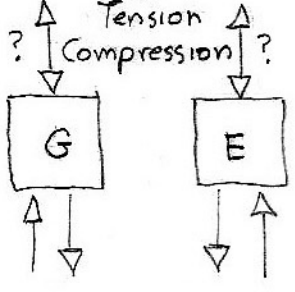


BIG Friendly 3D Diagrams





Check numbers to determine IF Tension Compression



No shear Uniaxial (Tension/compression?)

E: σ =

F: σ =

G: σ =

H: σ =

⇒	E: +	psi
⇒	F: -	psi
⇒	G: +	psi
⇒	H: -	psi

Maximum Stress Occur at J and K

Tension:

Compression: