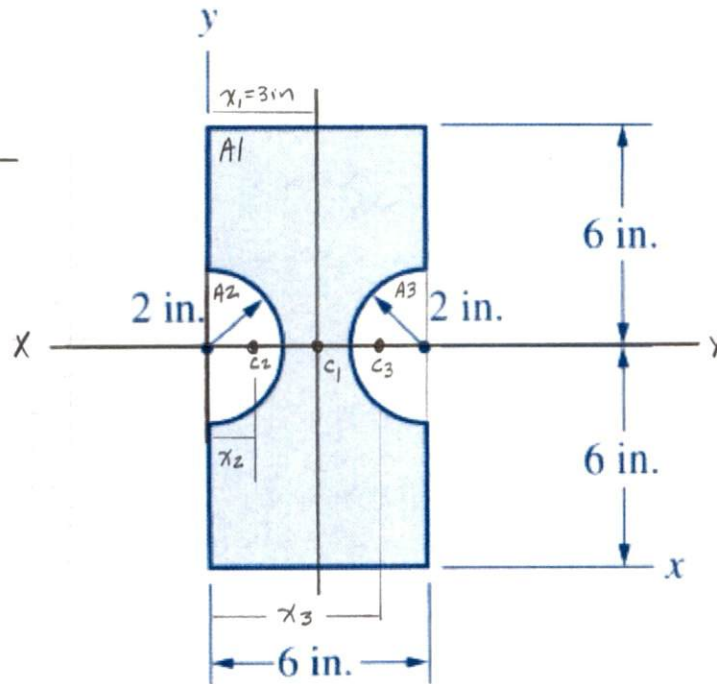


8-23. Refer to Fig. P8-22. Determine the moment of inertia I_y of the shaded area about the y axis.
 Solution.



From Table 8-1

Rectangle,

$$\bar{I}_y = \frac{bh^3}{12}$$

Semi circle,

$$\bar{I}_y = \frac{\pi r^4}{8}$$

$$\bar{I}_y = 0.1098 r^4$$

$$x_2 = \frac{4r}{3\pi} = \frac{4(2\text{in})}{3\pi} = 0.8488 \text{ in}$$

$$x_3 = 6\text{in} - 0.8488 \text{ in} = 5.1512 \text{ in}$$

Rectangle shape

Semi circle

$$I_y = \left[\frac{12\text{in}(6\text{in})^3}{12} + 12\text{in}(6\text{in})(3\text{in})^2 \right] - \left[\frac{\pi(2\text{in})^4}{8} \right] -$$

Semi circle

$$\left[0.1098(2\text{in})^4 + \frac{\pi(2\text{in})^2}{2} (5.1512\text{in})^2 \right]$$

$$= 864 \text{ in}^4 - 6.283 \text{ in}^4 - 168.48 \text{ in}^4$$

$$= \underline{\underline{689 \text{ in}^4}}$$