8-22. See Fig. P8-22. Determine the moment of inertia I_x of the shaded area about the x axis.
Solution.

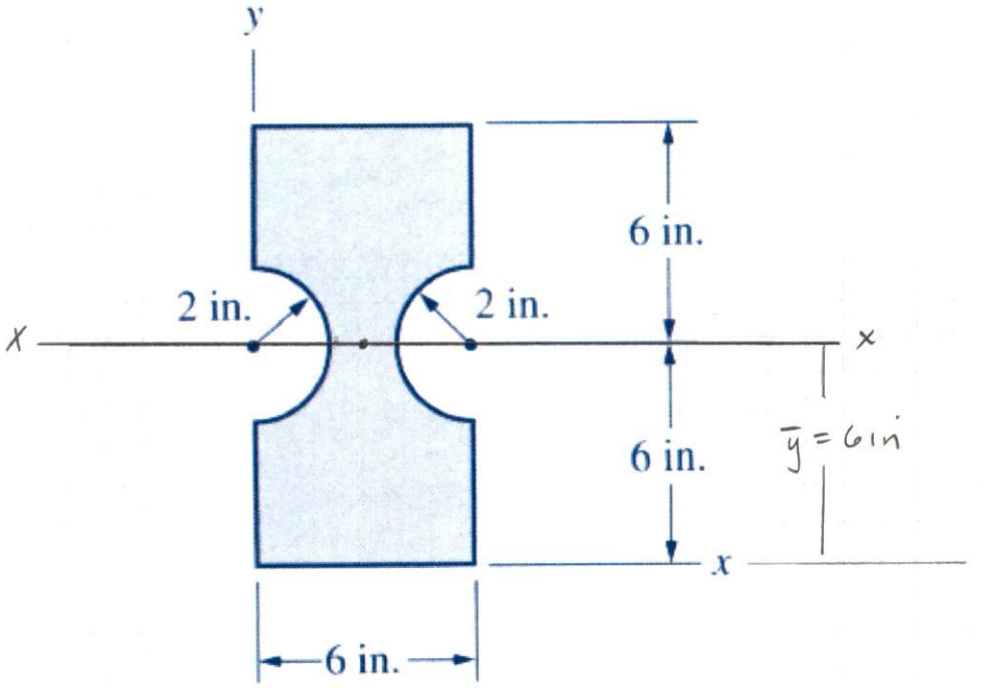


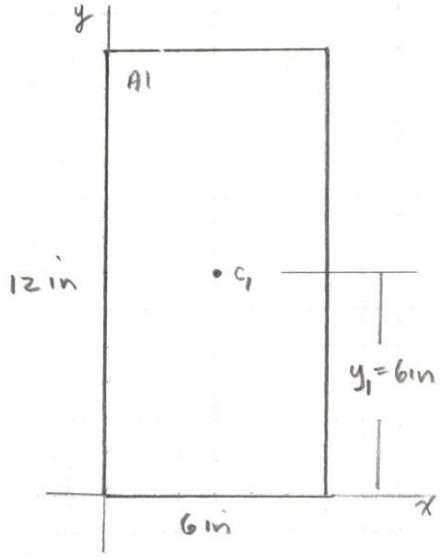
Table 8-2

Rectangle, $I = \frac{bh^3}{12}$

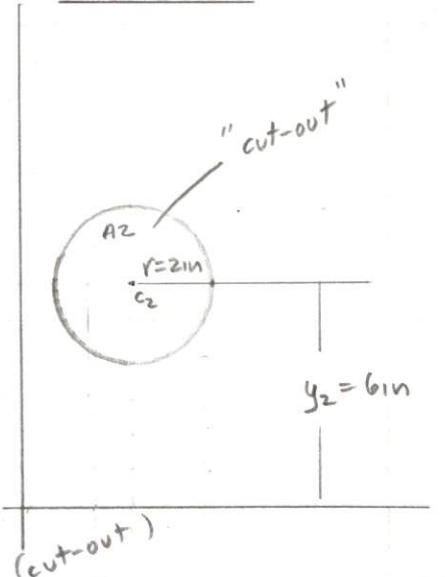
circle, $I = \frac{\pi r^4}{4}$

The area is a rectangle with a circle "cut-out"

Rectangle



circle (cut-out)



$$I_x = \left[(I_x)_1 + A_1 y_1^2\right] - \left[(I_x)_2 + A_2 y_2^2\right]$$

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

$\frac{\pi(2in)^4}{4} = 12.56$

$$= 3456\ in^4 - 465\ in^4$$

$$= 2990\ in^4$$