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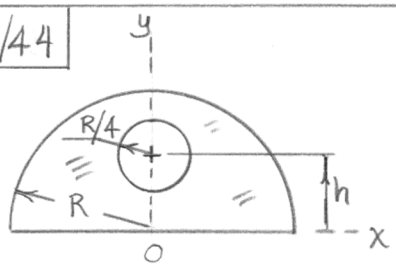

(a) $h = 0$ (One-half of hole considered)

$$I_x = \frac{\pi R^4}{8} - \frac{\pi (R/4)^4}{8} = \frac{255}{2048}\pi R^4$$

$$(0.391 R^4)$$

(b) $h = \frac{R}{2}$ (Entire hole now in play)

$$I_x = \frac{\pi R^4}{8} - \left[\frac{\pi (R/4)^4}{4} + \pi \left(\frac{R}{4}\right)^2 \left(\frac{R}{2}\right)^2\right]$$

$$= \frac{111}{1024}\pi R^4 \quad (0.341 R^4)$$