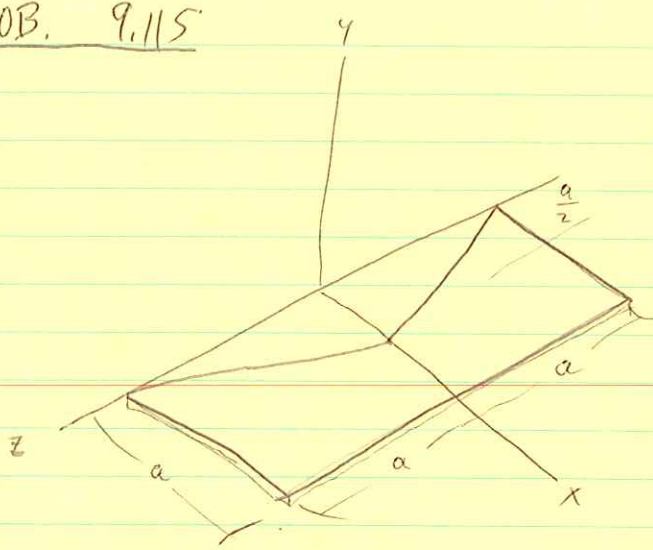
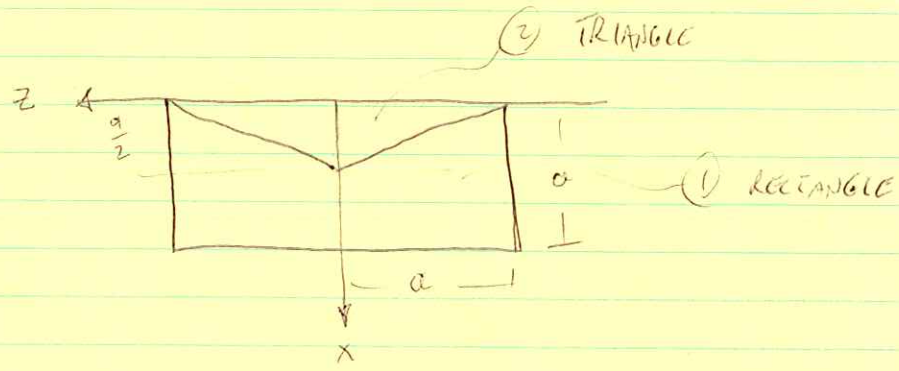


PROB. 9.115



a) X-AXIS:



AREA 1:  $M_1 = \rho t (a)(2a) = 2\rho t a^2$

$$I_{x,1} = \frac{1}{12} M_1 (2a)^2 = \frac{1}{3} M_1 a^2$$

$$= \frac{1}{3} (2\rho t a^2) a^2$$

$$I_{x,1} = \frac{2}{3} \rho t a^4$$

AREA 2:  $M_2 = -\rho t \left(\frac{a}{2}\right)(a) = -\frac{1}{2} \rho t a^2$

$$I_{x, \text{MASS}} = -2\rho t \cdot I_{x, \text{AREA}}$$

$$= -2\rho t \left[ \frac{1}{12} \left(\frac{a}{2}\right)(a)^3 \right]$$

$$I_{x, \text{MASS}} = -\frac{1}{12} \rho t a^4$$

9,115 corr.

(2)

$$I_x = I_{x,1} + I_{x,2}$$
$$= \frac{2}{3} \rho t a^4 - \frac{1}{12} \rho t a^4$$

$$I_x = \frac{7}{12} \rho t a^4$$

$$M = M_1 + M_2$$
$$= 2 \rho t a^2 - \frac{1}{2} \rho t a^2$$

$$M = \frac{3}{2} \rho t a^2$$

$$I_x = \left( \frac{3}{2} \rho t a^2 \right) \left( \frac{2}{3} \cdot \frac{7}{12} a^2 \right)$$

$$I_x = \frac{7}{18} M a^2$$

b) Y-AXIS:

$$I_y = I_{y,1} + I_{y,2}$$

$$\text{AREA 1: } M_1 = 2 \rho t a^2$$

$$I_{y,1} = \bar{I}_{y,1} + m_1 d^2$$
$$= \frac{1}{12} m_1 [(a)^2 + (2a)^2] + m_1 \left( \frac{a}{2} \right)^2$$
$$= \frac{1}{12} m_1 \cdot (5a^2) + m_1 \cdot \frac{1}{4} a^2$$

$$I_{y,1} = \frac{2}{3} m_1 a^2$$
$$= \frac{2}{3} (2 \rho t a^2) a^2$$

$$I_{y,1} = \frac{4}{3} \rho t a^4$$

9,115 cont.

AREA 2:

$$I_{y,2} = I_{x,2} + I_{z,2}$$

$$\begin{aligned} I_{x,2} &= \rho t I_{x,2, \text{AREA}} \\ &= \rho t \left[ 2 \cdot \frac{1}{12} \left( \frac{a}{2} \right) (a)^3 \right] \end{aligned}$$

$$I_{x,2} = \frac{1}{12} \rho t a^4$$

$$\begin{aligned} I_{z,2} &= \rho t I_{z,2, \text{AREA}} \\ &= \rho t \left[ \frac{1}{12} (2a) \left( \frac{a}{2} \right)^3 \right] \end{aligned}$$

$$I_{z,2} = \frac{1}{48} \rho t a^4$$

$$\begin{aligned} I_{y,2} &= I_{x,2} + I_{z,2} \\ &= \frac{1}{12} \rho t a^4 + \frac{1}{48} \rho t a^4 \end{aligned}$$

$$I_{y,2} = \frac{5}{48} \rho t a^4$$

$$\begin{aligned} I_y &= I_{y,1} - I_{y,2} \\ &= \frac{4}{3} \rho t a^4 - \frac{5}{48} \rho t a^4 \end{aligned}$$

$$I_y = \frac{59}{48} \rho t a^4$$

$$m = \frac{3}{2} \rho t a^2$$

$$I_y = \left( \frac{3}{2} \rho t a^2 \right) \left( \frac{2}{3} \cdot \frac{59}{48} a^2 \right)$$

$$I_y = \frac{59}{72} m a^2 = 0.8194 m a^2$$