

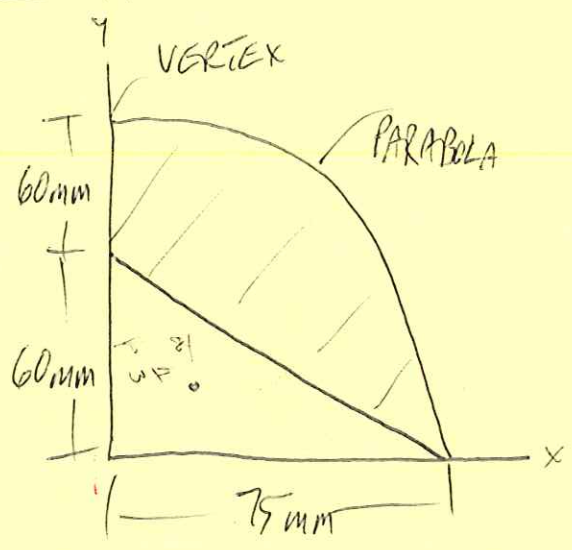
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RETURN TO DR. THOMAS

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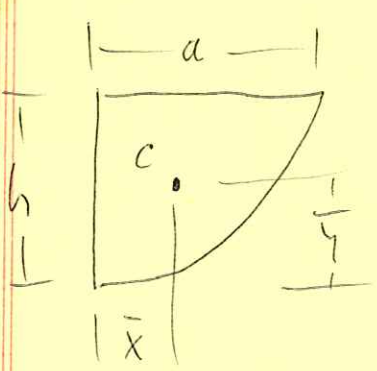
HOMEWORK #5 SOLUTIONS 5.14, 5.23, 5.47, 5.129

PROB. 5.14

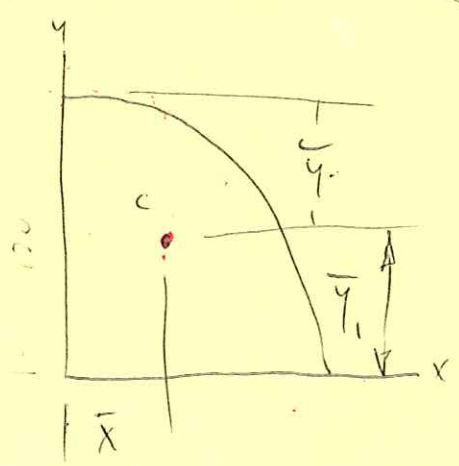


FIND CENTROID.

SEMI-PARABOLIC AREA:



$$\bar{x} = \frac{3a}{8} \quad \bar{y} = \frac{3h}{5} \quad A = \frac{2ah}{3}$$



$$h = 120 \text{ mm}$$

$$a = 75 \text{ mm}$$

$$\bar{x}_1 = \frac{3(75)}{8} = 28.1 \text{ mm}$$

PROB. 5.14

$$\bar{y} = \frac{3(120)}{5} = 72 \text{ mm}$$

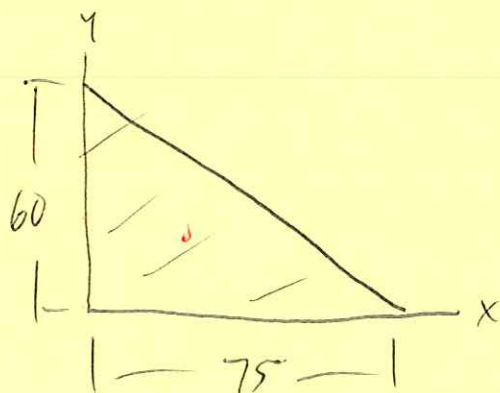
$$\bar{y}_1 = 120 - 72 = 48 \text{ mm}$$

$$A_1 = \frac{2(75)(120)}{3} = 6000 \text{ mm}^2$$

$$\bar{x}_1 A_1 = (25.1)(6000) = 1.69 \times 10^5 \text{ mm}^3$$

$$\bar{y}_1 A_1 = (48)(6000) = 2.88 \times 10^5 \text{ mm}^3$$

TRIANGULAR AREA:



$$\bar{x}_2 = \frac{75}{3} = 25 \text{ mm}$$

$$\bar{y}_2 = \frac{60}{3} = 20 \text{ mm}$$

$$A_2 = \frac{1}{2}bh = \frac{1}{2}(60)(75) = 2250 \text{ mm}^2$$

PROB. 5.14

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$$\bar{x}_2 A_2 = (25)(-2250) = -5.63 \times 10^4 \text{ mm}^3$$

$$\bar{y}_2 A_2 = (20)(-2250) = -4.5 \times 10^4 \text{ mm}^3$$

$$\bar{x} = \frac{\sum \bar{x}_i A_i}{\sum A_i} = \frac{(1.09 \times 10^5) + (-5.63 \times 10^4)}{(6000) + (-2250)} = 30.1 \text{ mm}$$

$$\bar{y} = \frac{\sum \bar{y}_i A_i}{\sum A_i} = \frac{(2.88 \times 10^5) + (-4.5 \times 10^4)}{(6000) + (-2250)} = 64.8 \text{ mm}$$

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