

{5.1~5.5 }

5.2

$$A = (10 \text{ cm})(8 \text{ cm}) = 80 \text{ cm}^2$$

$$\bar{x} = \frac{1}{2}(10 \text{ cm}) = 5 \text{ cm}$$

$$\bar{y} = \frac{1}{2}(8 \text{ cm}) = 4 \text{ cm}$$

$$A = \frac{1}{2}(9 \text{ cm})(12 \text{ cm}) = 54 \text{ cm}^2$$

$$\bar{x} = (10 \text{ cm}) + \frac{1}{3}(9 \text{ cm}) = 13 \text{ cm}$$

$$\bar{y} = \frac{1}{3}(12 \text{ cm}) = 4 \text{ cm}$$

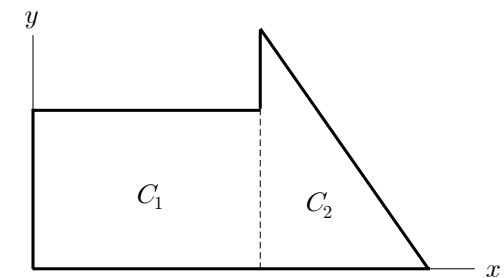
$$A = (80 \text{ cm}^2) + (54 \text{ cm}^2) = 134 \text{ cm}^2$$

$$(\bar{x}A) = (5 \text{ cm})(80 \text{ cm}^2) + (13 \text{ cm})(54 \text{ cm}^2) = 1,102 \text{ cm}^3$$

$$(\bar{y}A) = (4 \text{ cm})(80 \text{ cm}^2) + (4 \text{ cm})(54 \text{ cm}^2) = 536 \text{ cm}^3$$

$$\bar{X} = \frac{\Sigma(\bar{x}A)}{\Sigma A} = \frac{1,102 \text{ cm}^3}{134 \text{ cm}^2} = 8.224 \text{ cm}$$

$$\bar{Y} = \frac{\Sigma(\bar{y}A)}{\Sigma A} = \frac{536 \text{ cm}^3}{134 \text{ cm}^2} = 4.00 \text{ cm}$$



centroid = (8.22 cm, 4.00 cm)

5.11

$$x \quad \bar{Y} = 0$$

$$a = 6 \text{ cm.}$$

$$A = (3 \text{ cm})(3\sqrt{3} \text{ cm}) \\ = 9\sqrt{3} \text{ cm}^2 = 15.588 \text{ cm}^2$$

$$\bar{x} = \frac{2}{3}(3\sqrt{3} \text{ cm}) = 2\sqrt{3} = 3.464 \text{ cm}$$

$$a = 6 \text{ cm, } h = 9 \text{ cm}$$

$$A = (3 \text{ cm})(9 \text{ cm}) = 27 \text{ cm}^2$$

$$\bar{x} = (3\sqrt{3} \text{ cm}) + \frac{1}{3}(9 \text{ cm}) \\ = (5.196 \text{ cm}) + (3 \text{ cm}) = 8.196 \text{ cm}$$

$$r = 6 \text{ cm, } \alpha = \pi/6$$

$$A = -\frac{1}{6} \pi (6 \text{ cm})^2 = -6 \pi \text{ cm}^2 = -18.850 \text{ cm}^2$$

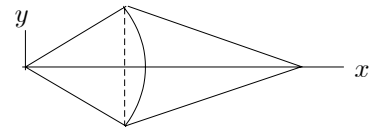
$$\bar{x} = \frac{2r \sin \alpha}{3\alpha} = \frac{2(6 \text{ cm}) \sin 30^\circ}{3(\pi/6)} = 3.819 \text{ cm} \quad [ \quad 5.8 \quad ]$$

$$A = (15.588 \text{ cm}^2) + (27 \text{ cm}^2) + (-18.850 \text{ cm}^2) = 23.738 \text{ cm}^2$$

$$(\bar{x}A) = (3.464 \text{ cm})(15.588 \text{ cm}^2) + (8.196 \text{ cm})(27 \text{ cm}^2) + (3.819 \text{ cm})(-18.850 \text{ cm}^2) \\ = 203.30 \text{ cm}^3$$

$$\bar{Y} = \frac{\Sigma(\bar{x}A)}{\Sigma A} = \frac{203.30 \text{ cm}^3}{23.738 \text{ cm}^2} = 8.564 \text{ cm}$$

centroid = (8.56 cm, 0)



5.26

$$M_B = 0$$

$$\bar{X} = 0$$

$$(\bar{x}L) = 0$$

$$L = \pi (150 \text{ mm})$$

$$\bar{x} = -\frac{2}{\pi}(150 \text{ mm}) = -\frac{1}{\pi}(300 \text{ mm})$$

$$L = 200 \text{ mm}$$

$$\bar{x} = \frac{1}{2}(200 \text{ mm}) = 100 \text{ mm}$$

$$L = 150 \text{ mm}$$

$$\bar{x} = (200 \text{ mm}) - \frac{1}{2}(150 \text{ mm}) \cos\theta = 200 - 75 \cos\theta \quad (\text{mm})$$

$$(\bar{x}L) = -\frac{1}{\pi}(300 \text{ mm}) \pi (150 \text{ mm}) + (100 \text{ mm})(200 \text{ mm})$$

$$+ [200 - 75 \cos\theta \quad (\text{mm})](150 \text{ mm}) = 0$$

$$\cos\theta = \frac{1}{75} [-(300 \text{ mm}) + (100 \text{ mm})(200 \text{ mm}) \frac{1}{150 \text{ mm}} + (200 \text{ mm})]$$

$$= 0.4444$$

$$\theta = \cos^{-1}0.4444 = 63.6^\circ$$

