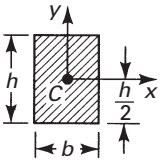
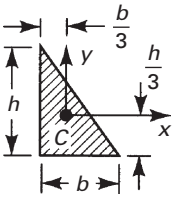
TABLE C.1. *Properties of Some Plane Areas*

1. Rectangle



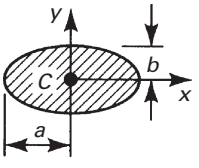
$$A = bh$$
$$I_x = \frac{bh^3}{12}$$
$$J_c = \frac{bh(b^2 + h^2)}{12}$$

2. Right triangle



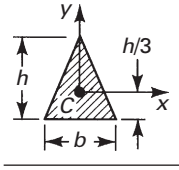
$$A = \frac{bh}{2}$$
$$I_x = \frac{bh^3}{36} \quad I_{xy} = -\frac{b^2h^2}{72}$$
$$J_c = \frac{bh(b^2 + h^2)}{36}$$

3. Ellipse



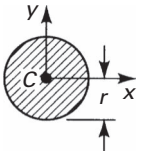
$$A = \pi ab$$
$$I_x = \frac{\pi ab^3}{4}$$
$$J_c = \frac{\pi ab(a^2 + h^2)}{4}$$

4. Isosceles triangle



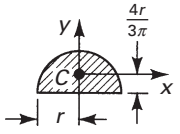
$$A = \frac{bh}{2}$$
$$I_x = \frac{bh^3}{36} \quad I_y = \frac{hb^3}{48}$$
$$J_c = \frac{bh}{144}(4h^2 + 3b^2)$$

5. Circle



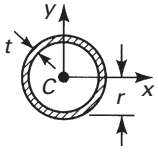
$$A = \pi r^2$$
$$I_x = \frac{\pi r^4}{4}$$
$$J_c = \frac{\pi r^4}{2}$$

6. Semicircle



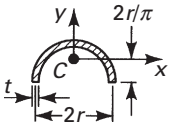
$$A = \frac{\pi r^2}{2}$$
$$I_x = 0.110r^4$$
$$I_y = \frac{\pi r^4}{8}$$

7. Thin tube



$$A = 2\pi rt$$
$$I_x = \pi r^3 t$$
$$J_c = 2\pi r^3 t$$

8. Half of thin tube



$$A = \pi rt$$
$$I_x \approx 0.095\pi r^3 t$$
$$I_y = 0.5\pi r^3 t$$

FIGURE C.1. *Plane area A with centroid C.*