

PROBLEM 1-9

Statement: Convert the template in Problem 1-7 to have and use a set of functions or subroutines that can be called from within any program in that language to solve for the cross-sectional properties of the shapes shown on the inside front cover.

Solution: See inside front cover and Mathcad file P0109.

1. Rectangle: Area $A(b, h) := b \cdot h$

Moment about x -axis $I_x(b, h) := \frac{b \cdot h^3}{12}$

Moment about y -axis $I_y(b, h) := \frac{h \cdot b^3}{12}$

2. Solid circle: Area $A(D) := \frac{\pi \cdot D^2}{4}$

Moment about x -axis $I_x(D) := \frac{\pi \cdot D^4}{64}$

Moment about y -axis $I_y(D) := \frac{\pi \cdot D^4}{64}$

3. Hollow circle: Area $A(D, d) := \frac{\pi}{4} \cdot (D^2 - d^2)$

Moment about x -axis $I_x(D, d) := \frac{\pi}{64} \cdot (D^4 - d^4)$

Moment about y -axis $I_y(D, d) := \frac{\pi}{64} \cdot (D^4 - d^4)$

4. Solid semicircle:

Area $A(D) := \frac{\pi \cdot D^2}{8}$

Moment about x -axis $I_x(R) := 0.1098 \cdot R^4$

Moment about y -axis $I_y(R) := \frac{\pi \cdot R^4}{8}$

5. Right triangle:

Area $A(b, h) := \frac{b \cdot h}{2}$

Moment about x -axis $I_x(b, h) := \frac{b \cdot h^3}{36}$

Moment about y -axis $I_y(b, h) := \frac{h \cdot b^3}{36}$