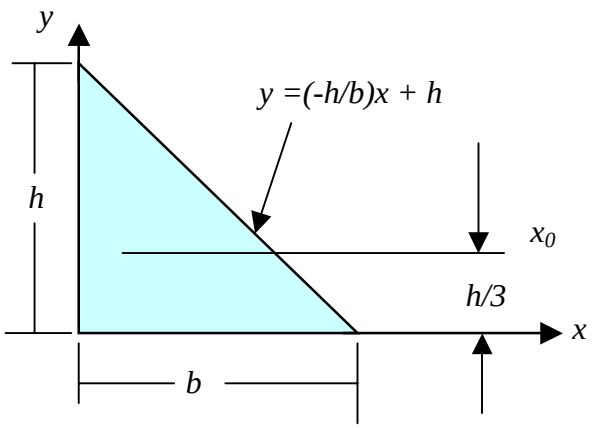
AREA MOMENT OF INERTIA

Problem 2:

Determine the moment of inertia of the trianglular area about the base x-axis. Use the parallel axis transfer theorem to determine I_{xo} from I_x.



Solution:

Choosing to use double integration and integrating with respect to x first yields:

$dA = dxdy$

$$I_x = \int_A y^2 dA$$

when $y = -\frac{h}{b}x + h$ then $x = \frac{b}{h}(h - y)$

$$I_x = \int_0^h \int_0^{\frac{b}{h}(h-y)} y^2 dxdy = \int_0^h y^2 \left(\frac{b}{h}(h-y)\right) dy = \frac{1}{12}bh^3$$

$$I_x = \frac{1}{12}bh^3$$

The moment of inertia about the centroidal x_0 axis is determined using the parallel axis transfer theorem:

$$I_x = I_{xo} + Ad_x^2$$

$$\frac{1}{12}bh^3 = I_{xo} + \frac{1}{2}bh\left(\frac{h}{3}\right)^2$$

$$I_{xo} = \frac{1}{36}bh^3$$