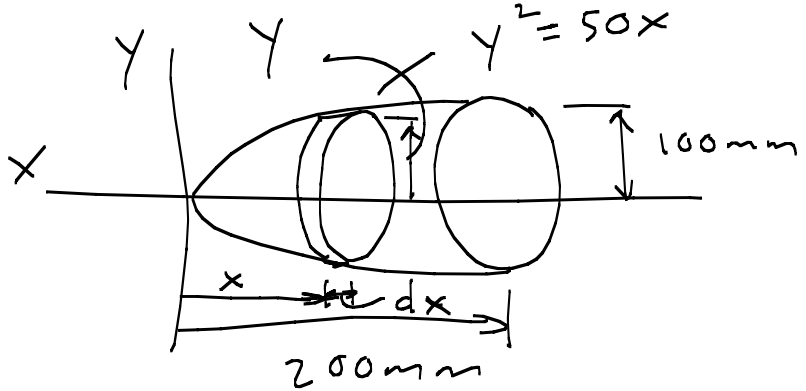
Problem 2

$\rho = 5\ Mg/m^3$

Determine: I_x



$$dm = \rho\, dV$$

$$= \rho(\pi y^2)dx$$

$$dI_x = \tfrac{1}{2}dm\,r^2 = \tfrac{1}{2}(\rho\pi y^2 dx)(y^2) = \tfrac{1}{2}\rho\pi y^4 dx$$

$$y^2 = 50x$$

$$dI_x = \tfrac{1}{2}\rho\pi(50x)^2 dx$$

$$I_x = \int_0^{200mm} \tfrac{1}{2}\rho\pi(1250x^2)dx$$

$$I_x = 3\times10^9\,\rho\pi$$

$$m = \int dm = \int_0^{200} \rho\, dV = \int_0^{200} \rho\pi y^2 dx$$

$$m = \int_0^{200} 8\pi(50x)\,dx = 1\times10^6\,8\pi$$

$$K_x = \sqrt{\frac{I_x}{m}} = \sqrt{\frac{3\times10^9\,\cancel{8\pi}}{1\times10^6\,\cancel{8\pi}}} = \boxed{54.7\,mm}$$