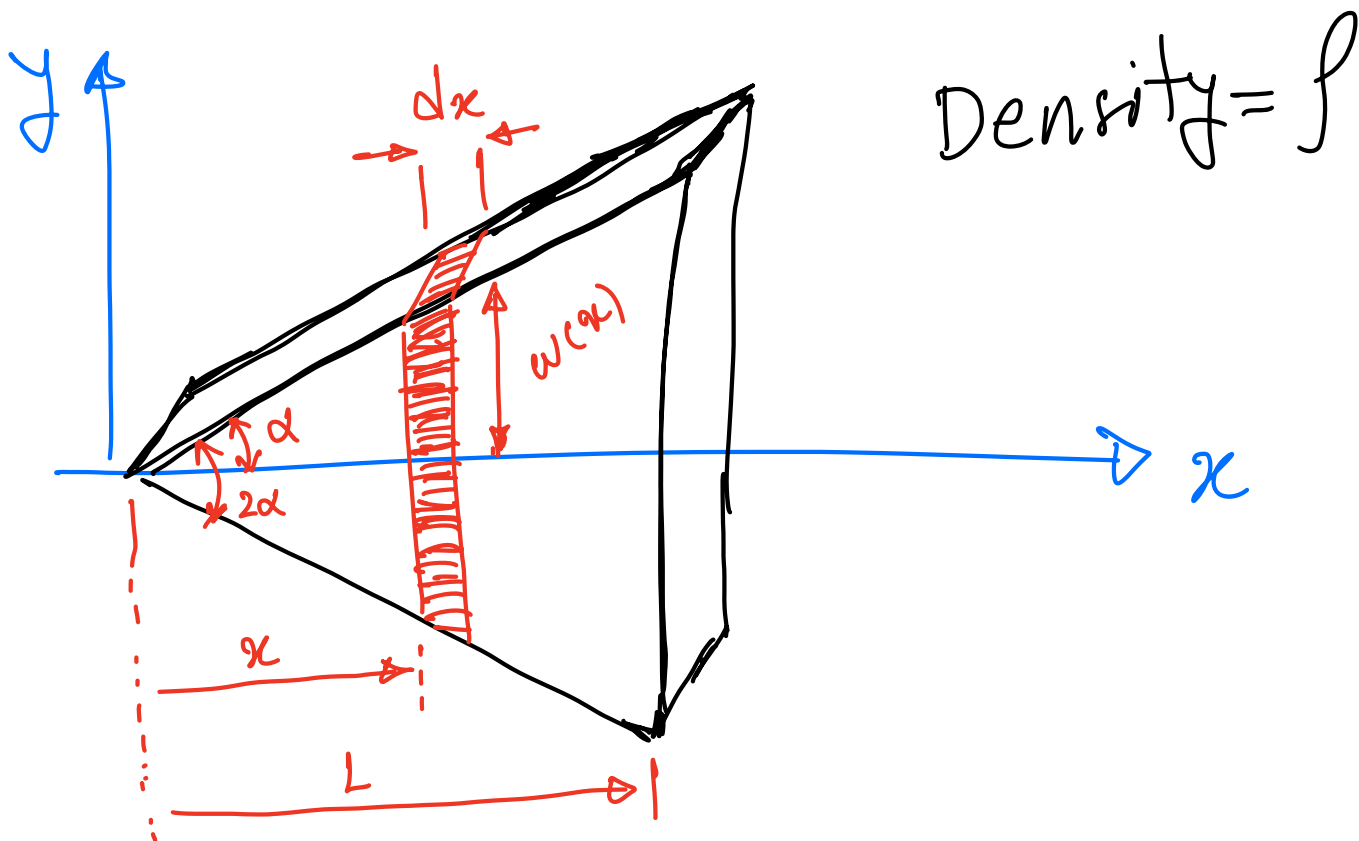


Example

Find the mass and the center of mass (C.O.M). Thickness = t .



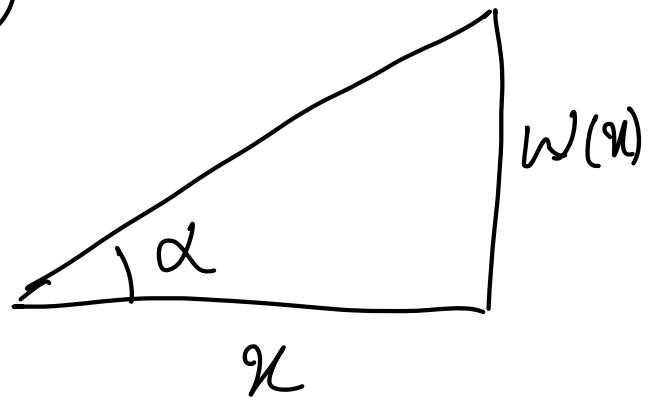
$$x_{cm} = \frac{\int x dm}{\int dm}$$

$$dm = \rho \, dx \, 2w(x) \, t$$

$$\int dm = \int \rho \cdot 2w(x) t \, dx$$

$$m_{\text{total}} = 2\rho t \int w(x) \, dx$$

$$w(x) = x \tan \alpha$$



$$m_{\text{total}} = 2\rho t \tan \alpha \int_0^L x \, dx$$

$$m_{\text{total}} = 2\rho t \tan \alpha \left. \frac{x^2}{2} \right|_0^L$$

$$m_{\text{total}} = \rho t L^2 \tan \alpha \rightarrow \int dm$$

$$\int x dm = \int x \rho 2w(x)t dx$$

$$w(x) = x \tan \alpha$$

$$\int x dm = 2\rho t \tan \alpha \int x^2 dx$$

$$\int x dm = 2\rho t \tan \alpha \left. \frac{x^3}{3} \right|_0^L$$

$$\int x dm = \frac{2}{3} \rho t L^3 \tan \alpha$$

$$x_{CM} = \frac{\int x dm}{\int dm} = \frac{\frac{2}{3} \rho t L^3 \tan \alpha}{\rho t L^2 \tan \alpha}$$

$$x_{CM} = \frac{2}{3}L$$
