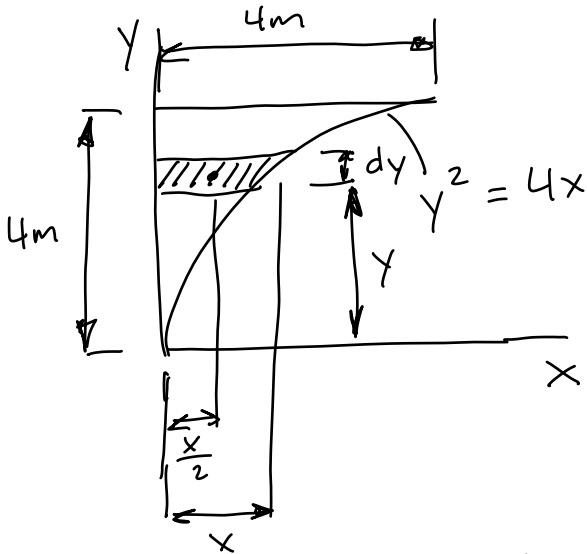
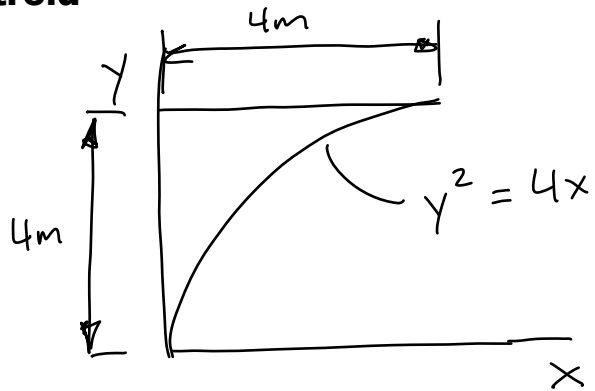


## Centroid

**Problem Statement:** Determine the centroid.



$$\begin{aligned} \tilde{x} &= x/2 \\ \tilde{y} &= y \\ dA &= x dy \end{aligned}$$

$$y^2 = 4x \quad x = \frac{y^2}{4}$$

$$\begin{aligned} \int \tilde{x} dA &= \int_0^4 \frac{x}{2} x dy = \int_0^4 \frac{1}{2} x^2 dy \\ &= \int_0^4 \frac{1}{2} \left(\frac{y^2}{4}\right)^2 dy = \frac{1}{32} \int_0^4 y^4 dy = \frac{1}{32} \left(\frac{1}{5} y^5\right) \Big|_0^4 \end{aligned}$$

$$\boxed{\int \tilde{x} dA = 6.4 \text{ m}^3}$$

$$\begin{aligned} \int \tilde{y} dA &= \int_0^4 y x dy = \int_0^4 y \left(\frac{y^2}{4}\right) dy = \frac{1}{4} \int_0^4 y^3 dy \\ &= \frac{1}{4} \left(\frac{1}{4} y^4\right) \Big|_0^4 \end{aligned}$$

$$\boxed{\int_0^4 \tilde{y} dA = 16 \text{ m}^3}$$

$$\int dA = \int_0^4 x dy = \int_0^4 \frac{y^2}{4} dy = \frac{1}{4} \left(\frac{1}{3} y^3\right) \Big|_0^4 = 5.33 \text{ m}^2$$

$$\boxed{\bar{x} = \frac{6.4 \text{ m}^3}{5.33 \text{ m}^2} = 1.2 \text{ m} \quad \bar{y} = \frac{16 \text{ m}^3}{5.33 \text{ m}^2} = 3 \text{ m}}$$