

Section 26.4: Centroids

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11:08 AM

recall from physics:

Centre of mass (\bar{x}, \bar{y}) of an object composed of many smaller objects:

$$\bar{x} = \frac{m_1 x_1 + m_2 x_2 + m_3 x_3 + \dots}{m_1 + m_2 + m_3 + \dots}$$

$$= \frac{\sum m_i x_i}{\sum m_i} \quad \leftarrow \text{denom is just total mass}$$

Calculus idea:

$$\bar{x} = \frac{\int_m x_e dm}{\int_m dm}$$


general case

\bar{x} = Centre of mass of the entire object

x_e = centre of mass for each little bit of mass dm

two special cases:

object of uniform density ρ

$$\bar{x} = \frac{\int_v x_e dV}{\int_v dV}$$

object of uniform thickness t and of uniform density ρ

$$\bar{x} = \frac{\int_A x_e dA}{\int_A dA}$$