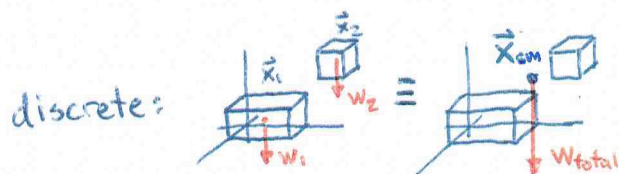


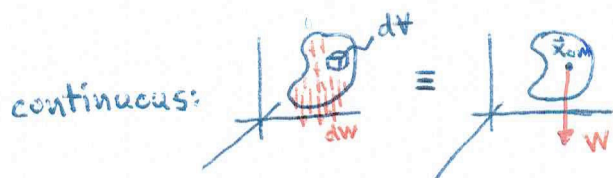
Centre of Mass ($\vec{x}_{cm}$)

assume: gravity is constant and uniform.

3 dimensional (3D):

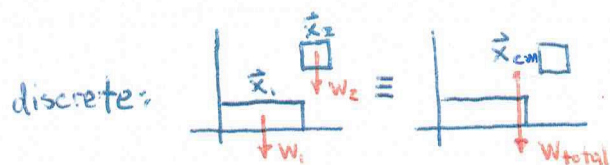


$$\vec{x}_{cm} = \frac{\sum \vec{x}_i m_i g_i}{\sum m_i g_i} = \frac{\sum \vec{x}_i m_i}{\sum m_i}$$

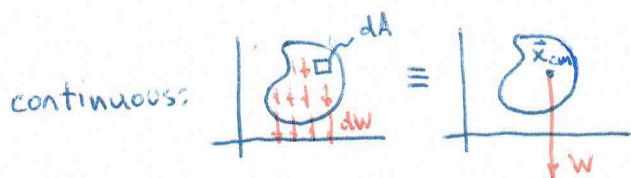


$$\vec{x}_{cm} = \frac{\int \vec{x} \rho g dV}{\int \rho g dV} = \frac{\int \vec{x} \rho dV}{\int \rho dV} \quad \text{where: } \rho = \rho(x, y, z)$$

2 dimensional (2D):

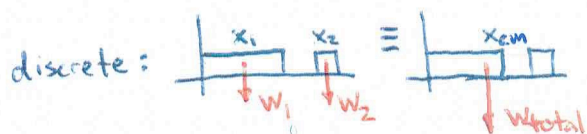


$$\vec{x}_{cm} = \frac{\sum \vec{x}_i m_i g_i}{\sum m_i g_i} = \frac{\sum \vec{x}_i m_i}{\sum m_i}$$

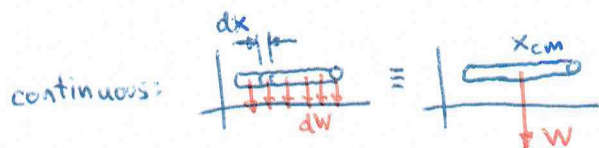


$$\vec{x}_{cm} = \frac{\int x \rho g dA}{\int \rho g dA} = \frac{\int x \rho dA}{\int \rho dA} \quad \text{where: } \rho = \rho(x, y)$$

1 dimensional (1D):



$$x_{cm} = \frac{\sum x_i m_i g_i}{\sum m_i g_i} = \frac{\sum x_i m_i}{\sum m_i}$$



$$x_{cm} = \frac{\int x \rho g dx}{\int \rho g dx} = \frac{\int x \rho dx}{\int \rho dx} \quad \text{where: } \rho = \rho(x)$$