Contents

1 Application of Integration

There are many applications of integration. The area between curves, average values, and volumes are ones that are covered in the past section. These are more involved application problems.

1.1 Center of Mass

Center of mass can be very interesting and involved application of integrals.

To find the center of mass alongside a line, we need to refer to Archimedes' Law of Lever: where a rod will be balanced, if $m_1 d_1 = m_2 d_2$, m is the mass alongside the rod, and d is the distance between the $\bar{x}$ and the mass, where that is the center posiition.

We can write d in terms of the $\bar{x}$ and the position of the mass.

$$d_1 = \bar{x} - x_1 \tag{1}$$
$$d_2 = x_2 - \bar{x} \tag{2}$$
$$m_1(\bar{x} - x_1) = m_2(x_2 - \bar{x}) \tag{3}$$
$$m_1\bar{x} - m_1 x_1 = m_2 x_2 - m_2\bar{x} \tag{4}$$
$$m_1\bar{x} + m_2\bar{x} = m_1 x_1 + m_2 x_2 \tag{5}$$
$$\bar{x} = \frac{m_1 x_1 + m_2 x_2}{m_1 + m_2} \tag{6}$$