5.4 - Properties of Definite Integrals

$$\int_a^b [f(x)+g(x)] = \int_a^b f(x)dx + \int_a^b g(x)dx$$

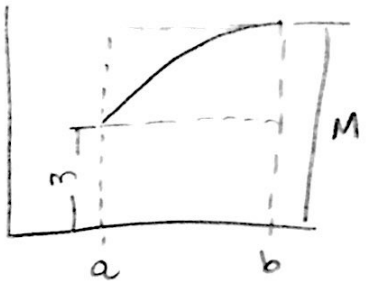
$$\int_a^b Kf(x)dx = K\int_a^b f(x)dx$$

$$\int_a^c f(x)dx = \int_a^b f(x)dx + \int_b^c f(x)dx$$

Bounds of an Integral

$$m(b-a) \leq \int_a^b f(x)dx \leq M(b-a)$$

m: absolute min; M: absolute max



Mean Value Theorem for Integrals

$$\int_a^b f(x)dx = f(u)(b-a)$$

u is between b & a

ex:

$$\int_2^6 x^2\,dx = f(u)(6-2) = 4u^2$$

$$\int_2^6 x^2dx = \left[\frac{x^3}{3}\right]_2^6 = \frac{1}{3}(216-8) = \frac{208}{3}$$

$$\frac{208}{3} = 4u^2 \qquad u = \sqrt{\frac{52}{3}}$$

1) find integral w/ u
2) solve integral
3) set equal
4) solve for u

Average Value

$$\bar{y} = \frac{1}{b-a}\int_a^b f(x)dx$$