MA205

Board Sheet - 30 August 2007, Indef Integrals and Net Change, Lesson 9

Some info to help you understand Indefinite Integrals

Definitions

- **Definite Integral** $\int_a^b f(x)dx$ Results in a **Number**.
- **Indefinite Integral** $\int f(x)dx$ Results in a **Function Plus C**. I.E. $F(x) + C$.
- **Definition:** The integral of a rate of change is the net change:

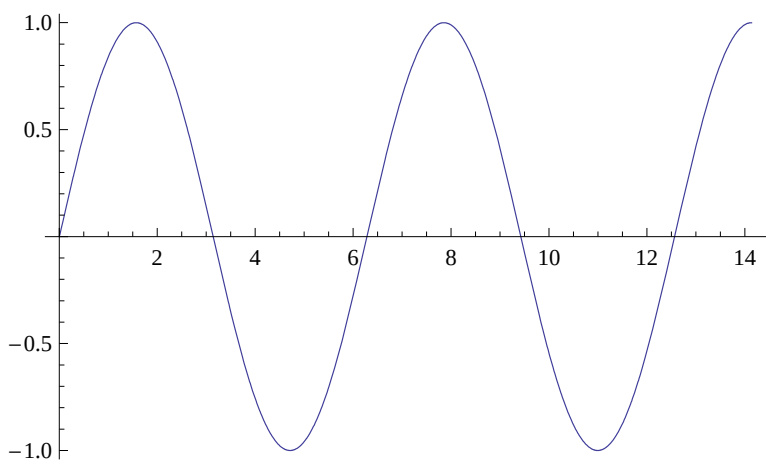
$$\int_a^b F'(x)dx = F(b) - F(a)$$

- This principle can be applied to all rates of change
  - Volume of water flowing out of a reservoir or bucket
  - Concentration of a chemical reaction
  - Mass of a rod measured from one side to the other when looking for density
  - Rate of growth of a population
  - Cost of producing units of an item
  - projectile motion like the velocity of a car

Displacement vs. Total Distance

- **Displacement:**

$$\int_{t_1}^{t_4} v(t)dt = s(t_4) - s(t_1)$$

- **Total Distance:**

$$\int_{t_1}^{t_4} |v(t)|dt = \int_{t_1}^{t_2} |v(t)|dt + \int_{t_2}^{t_3} |v(t)|dt + \int_{t_3}^{t_4} |v(t)|dt$$