

Remark: • $\int f(x)dx$ is a class of functions $F(x) + C$.

• $\int_a^b f(x)dx$ is a real number \leftarrow huge difference between the two !!

Net Change Formula

If f' is continuous on $[a, b]$, then

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

i.e. the net change is obtained by integrating the rate of change over the interval under consideration.

Ex. 9.

A concert just ended. People are leaving through the gate @ $100t + 300$ people/min. (for $0 \leq t \leq 4$)

How many people left in the first 4 mins?

Soln:

Let $f(t)$ be the no. of people walking out at t minutes.

Thus, we need $f(4) - f(0)$.

$$\begin{aligned} f(4) - f(0) &= \int_0^4 (100t + 300)dt = (50t^2 + 300t) \Big|_0^4 \\ &= 50 \times 16 + 300 \times 4 = 2000 \end{aligned}$$

Ans