

Review Units for integral

$$\int_a^b f(x) dx \text{ has units equal to} \\ (\text{Units of } f) \times (\text{Units of } x)$$

New The Fundamental Theorem of Calculus

Let $F'(t)$ be the derivative of F

$$\text{Then } \int_a^b F'(t) dt = F(b) - F(a)$$

(Integral of a rate of change between a and b is the total change between a and b)

(Technicality: $F'(t)$ needs to be continuous)

Application: Marginal Cost and Change in total cost.

$C'(q)$ is the marginal cost

$$\int_a^b C'(q) dq = C(b) - C(a)$$

is the cost to increase production from a units to b units.

$C(0)$ is the fixed cost

$$C(b) = C(0) + \int_0^b C'(q) dq$$

total cost

Fixed cost

this is called the total variable cost

The total variable cost is the total increase in cost between a production of 0 and a production of b units

One note: bad form to write

$$C(b) = C(0) + \int_0^b C'(a) da$$

same variable

that's why we use b (I'm stopping about this though)