

AI1110 Assignment2

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ICSE class 12 paper 2018:

QUESTION 19(A)

Given the total cost function for x units of a commodity as:

$$c(x) = \frac{1}{3}x^3 + 3x^2 - 16x + 2$$

Find:

- (i) Marginal cost function
- (ii) Average cost function

SOLUTION

- (i) Marginal cost is the change in total cost that arises when the quantity produced is changed by one unit.

Marginal cost function is the derivative of total cost function $C(x)$.

To find the marginal cost(M.C),derive the total cost function to find $C'(x)$ or $\frac{dC}{dx}$.

Given,

$$C(x) = \frac{1}{3}x^3 + 3x^2 - 16x + 2 \quad (1)$$

On differentiating,

$$M.C(x) = \frac{d}{dx}[C(x)] \quad (2)$$

$$= \frac{d}{dx}\left[\frac{1}{3}x^3 + 3x^2 - 16x + 2\right] \quad (3)$$

$$= \frac{1}{3}(3x^2) + 3(2x) - 16(1) + 0 \quad (4)$$

$$= x^2 + 6x - 16 \quad (5)$$

Therefore the Marginal cost function is,

$$M.C(x) = x^2 + 6x - 16$$

- (ii) Average cost function is ratio of total cost of items to the number of items or Quantity,

$$A.C = \frac{C(x)}{Q} \quad (6)$$

Here Q is the quantity produced which is x units.

$$A.C(x) = \frac{C(x)}{x} \quad (7)$$

$$= \frac{\frac{1}{3}x^3 + 3x^2 - 16x + 2}{x} \quad (8)$$

$$= \frac{1}{3}x^2 + 3x - 16 + \frac{2}{x} \quad (9)$$

Therefore the Average cost function is,

$$A.C(x) = \frac{1}{3}x^2 + 3x - 16 + \frac{2}{x}$$