Assignment 2
AI1110: Probability and Random Variables

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The marginal cost function of x units of a product is given by MC = $3x^2 - 10x + 3$. The cost of producing one unit is ₹7. Find the total cost function and average cost function.
Solution:
Let us denote marginal cost function by M(x), cost function by C(x) and average cost function by A(x).

Symbol	Formula	Definition
M(x)	$3x^2 - 10x + 3$	Additional cost per unit when units are incremented
C(x)	$\int M(x)\,dx$	Total expenses in terms of units
A(x)	$\frac{C(x)}{x}$	It is cost per unit

TABLE I

Given,

$$M(x) = 3x^2 - 10x + 3 \tag{1}$$
$$\implies C(x) = \int (3x^2 - 10x + 3).\,dx \tag{2}$$
$$\therefore C(x) = x^3 - 5x^2 + 3x + k \tag{3}$$

Where k is the constant of integration.
Also given C(1) = 7

$$\implies 7 = 1 - 5 + 3 + k \tag{4}$$
$$\therefore k = 8 \tag{5}$$

Hence,

$$C(x) = x^3 - 5x^2 + 3x + 8 \tag{6}$$
$$A(x) = \frac{C(x)}{x} = x^2 - 5x + 3 + \frac{8}{x} \tag{7}$$