



Integration V: Study Guide pp: 71 – 78

Topic	Interpretation
<p>Cost Function :</p> $TC = VC + FC$ $FC = TC(0)$ <p>Example: The total Cost function of Manufacturing an item is :</p> $TC = 32q + 9q^2 - 4q^3 + 43$ <p>Find the fixed cost.</p>	<p>VC : Variable cost FC : Fixed cost FC : Design product, setup factory... VC : Labor, materials, packing shipping...</p> $FC = TC(0) = 32(0) + 9(0^2) - 4(0^3) + 43 = 43$
<p>Average Cost</p> $AC = \frac{TC}{q}$ <p>Example: the average cost function of an item is :</p> $AC = q + \frac{1}{q^2} + \frac{\ln(1+q^2)}{q}$ <p>Find the Total cost.</p>	$AC = \frac{TC}{q} \Rightarrow TC = q \times AC$ $TC = q \left(q + \frac{1}{q^2} + \frac{\ln(1+q^2)}{q} \right)$ $TC = q^2 + 1 + \ln(1+q^2)$
<p>Average Variable Cost AVC</p> $TC = VC + FC$ $\Rightarrow VC = TC - FC$ $AVC = \frac{VC}{q} = \frac{TC - FC}{q}$ <p>Example: A company's total cost function is :</p> $TC = 5q - 2q^2 + 3q^3 + 20$ <p>Its fixed cost is 20. Find the average variable cost.</p>	$AVC = \frac{VC}{q} = \frac{TC - FC}{q}$ $AVC = \frac{5q - 2q^2 + 3q^3 + 20 - 20}{q}$ $AVC = \frac{5q - 2q^2 + 3q^3}{q}$ $AVC = 5 - q + 3q^2$

<p>Marginal Cost Cost of Making one more item after q has been made.</p> $MC = TC' = \frac{d}{dq}TC$ <p>Example 1: the total cost function for producing q kilograms of Chocolate is : TC = 3.5 q + 800 Find : a.)The fixed cost ,b.)the total cost for 12 kilograms ,c.)the marginal cost per kilogram d.)the marginal cost of the 40th Kilogram.</p> <p>Example2: A firm has average variable cost</p> $q^2 + 2q + \frac{\ln(1+q^2)}{q}$ <p>and a fixed cost of 9.Find the total cost function and the marginal cost. (LSE Exam 2004)</p>	<p>TC = 3.5q + 800 a.)FC = TC(0) = 0 + 800 = 800 b.)TC(12) = 3.5(12) + 800 = 842 c.)MC = TC' = 3.5 d.)MC (40) = 3.5</p> <p>Example 2:</p> $AVC = q^2 + 2q + \frac{\ln(1+q^2)}{q} ; FC = 9$ $MC = \frac{d}{dq}TC$ $TC = VC + FC$ $TC = q(AVC) + FC$ $TC = q^3 + 2q^2 + \ln(1+q^2) + 9$ $MC = \frac{d}{dq}TC = 3q^2 + 4q + \frac{2q}{1+q^2}$
<p>TC → MC → TC MC = TC' ⇒ TC = ∫MC</p> <p>Example:A firm has marginal cost function</p> $1+e^{0.5q} + q^2$ <p>and fixed costs of 10.Find the total cost function. (LSE Exam 2004)</p>	<p>MC = 1 + e^{0.5q} + q² ; FC = 10 TC = ? TC = ∫MC = ∫(1+e^{0.5q} + q²)dq TC = q + $\frac{1}{0.5}e^{0.5q} + \frac{q^3}{3} + C$ FC= TC(0) = 10 0 + 2e⁰ + 0/3 + C = 10 2 + C = 10 ⇒ C = 8 TC = q + 2e^{0.5q} + $\frac{q^3}{3}$ + 8</p>