Problem Set #8 Key

Sonoma State University Dr. Cuellar
Economics 305-Intermediate Microeconomic Theory

Consider a firm with the following total cost function: $TC(Q) = Q^3 - 20Q^2 + 200Q$, where output is measured in thousands.

(1) Derive the average total cost function.

$ATC(Q) = TC/Q = Q^2 - 20Q + 200$

(2) Derive the marginal cost function.

$MC(Q) = \partial TC/\partial Q = 3Q^2 - 40Q + 200$

(3) What is the average total cost of producing five thousand units of output?

$ATC(5) = \$125$

(4) What is the marginal cost of producing five thousand units of output?

$MC(5) = \$75$

(5) Given your answers to the two previous questions, what will happen to average total cost as output is marginally increased? Explain your answer.

If ATC > MC, then ATC falls as output increases.

(6) What is the average total cost of producing twenty thousand units of output?

$ATC(20) = \$200$

(7) What is the marginal cost of producing twenty thousand units of output?

$MC(20) = \$600$

(8) Given your answers to the two previous questions, what will happen to average total cost as output is marginally increased? Explain your answer.

If ATC < MC, then ATC increases as output increases.

(9) What is the capacity of this firm?

To find minimum ATC, set the derivative of ATC equal to zero and solve for Q.
$\partial ATC/\partial Q = 2Q-20 = 0$
$Q = 10$

(10) What is the average total cost of output at capacity?

$ATC(10) = \$100$