



# B.E. International Program

Faculty of Economics, Thammasat University



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EE 320 Introductory Mathematical Economics (Section 046401)

Semester 1/2015

## Quiz 2 (b)

Given the cost function

$$C(Q) = 18Q - 12Q^2 + Q^3$$

1. (4 points) Find the average cost (AC) and marginal cost (MC) functions.

$$AC(Q) = \frac{C(Q)}{Q} = 18 - 12Q + Q^2$$

$$MC(Q) = \frac{dC}{dQ} = 18 - 24Q + 3Q^2$$

2. (3 points) Derive the slope of the AC function. Determine the range of  $Q$  that the AC function has positive slopes.

$$\text{Slope of AC} = AC'(Q) = \frac{d(AC)}{dQ} = -12 + 2Q$$

$$AC'(Q) > 0 \text{ when } -12 + 2Q > 0 \Leftrightarrow Q > 6.$$

3. (3 points) Derive the second-order derivative of the cost function. Determine the range of  $Q$  that the cost function is convex.

$$\frac{d^2C}{dQ^2} = C''(Q) = -24 + 6Q$$

$$C(Q) \text{ is convex when } C''(Q) > 0 \Leftrightarrow -24 + 6Q > 0 \Leftrightarrow Q > 4.$$