B.E. International Program

Faculty of Economics, Thammasat University

EE 320 Introductory Mathematical Economics (Section 046401)

Semester 1/2015

Quiz 2 (a) - Answers

Given the production function

$$Q(K) = 4K + 6K^2 - K^3$$

1. (*4 points*) Find the average product of capital (AP) and marginal product of capital (MP) functions.

$$AP(K) = \frac{Q(K)}{K} = 4 + 6K - K^2$$

$$MP(K) = \frac{dQ}{dK} = 4 + 12K - 3K^2$$

2. (*3 points*) Derive the slope of the AP function. Determine the range of *K* that the AP function has positive slopes.

Slope of AP = $AP'(K) = \frac{d(AP)}{dK} = 6 - 2K$

$AP'(K) > 0$ when $6 - 2K > 0 \iff K < 3$.

3. (*3 points*) Derive the second-order derivative of the production function. Determine the range of *K* that the production function is concave.

$$\frac{d^2Q}{dK^2} = Q''(K) = 12 - 6K$$

Q(K) is concave when $Q''(K) < 0 \Leftrightarrow 12 - 6K < 0 \Leftrightarrow K > 2$.