IFEEK特別演習IIA: 2018年度

Problem Set 2: Producer Theory

Q1. Explain following terms:

(a) Average product

(b) Marginal product

(c) Decreasing returns to scale

(d) Constant returns to scale

(e) Increasing returns to scale

(f) Law of diminishing returns

(g) Isocost line

(h) Iso-quant

(i) Marginal rate of technical substitution

(j) Long run

(k) Short run

Q2. Draw iso-quants for the following production function:

(a) $Y = K^{\alpha}L^{1-\alpha}$, $0 < \alpha < 1$.

(b) $Y = aK + bL$, $a, b > 0$.

(c) $Y = \ln(1 + K)(1 + L)$. (Hint: $e^{\ln x} = x$)

(d) $Y = \min\{K, L\}$.

Q3. Consider the Cobb-Douglas production function in Q2(a).

(a) Show that it exhibits constant returns to scale.

(b) Show that the average product of labor is a function of K/L only.

(c) Draw a diagram with K and L on the vertical and horizontal axes and identify the cost-minimizing input combination for a given output level $\bar{Y}$. How does it change as $\bar{Y}$ increases?

Q4. Suppose that the total cost function is given by $TC(Y) = 10 + 10Y$ where Y is the level of output.

(a) Identify the fixed cost and draw the fixed cost curve in a diagram with Y on the horizontal axis.

(b) Derive the marginal cost $MC(Y)$ and draw it in the diagram.

(c) Identify the total variable cost $TVC(Y)$ and draw it in the diagram.

(d) Derive the average (total) cost $AC(Y)$ and draw it in the diagram.

(e) Derive the average variable cost $AVC(Y)$ and draw it in the diagram.

(f) Derive the average fixed cost $AFC(Y)$ and draw it in the diagram.

Q5. Redo Q4 for $TC(Y) = 10 + 10Y^2$.

Q6. Answer the following questions.

(a) What is the relationship between the long run and the short run?

(b) How can the long-run AC curve be derived? What does it show?