

Assignment No. 4
Microeconomics I (Prof. Alberto Iozzi)

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Please return your answers by the beginning of the fourth practice (05/12/2019 – Thursday).

Exercise 1

Let $f(z)$ be a *constant elasticity of substitution* production function of the form

$$f(z) = (\alpha \cdot z_1^\rho + (1 - \alpha) \cdot z_2^\rho)^{1/\rho} \quad (1)$$

1. Compute the *Marginal Rate of Technical Substitution*;
2. compute the elasticity of substitution σ_{ij} , $i \neq j$;
 - (a) What happens when $\rho \rightarrow 0$?
 - (b) What happens when $\rho \rightarrow \infty$?
 - (c) What happens when $\rho \rightarrow 1$?
3. let now be $f(m)$ a production function of the form

$$f(m) = m_1^\alpha \cdot m_2^{1-\alpha} \quad (2)$$

- (a) Compute the *Marginal Rate of Technical Substitution*;
 - (b) compute the elasticity of substitution σ_{ij} , $i \neq j$;
 - (c) compare it with that of point 2.(a).
4. discuss the cases of points 2.(b) & 2.(c). \square

Exercise 2

1. Let $f(z)$ be a *Linear* production function of the form

$$f(z) = \delta z_1 + \psi z_2 \quad (3)$$

- (a) Find the equation for the isoquant when $q = \bar{q}$;
 - (b) compute the *Cost function* $c(w, q)$.
2. let $f(x)$ be a *Leontief* production function of the form

$$f(x) = \min \left\{ \frac{x_1}{\delta}; \frac{x_2}{\psi} \right\} \quad (4)$$

- (a) Sketch a graph of the isoquants;
 - (b) compute the *Cost function* $c(w, q)$.
3. let $f(c)$ be a *Cobb-Douglas* production function of the form

$$f(c) = c_1^\delta c_2^\psi \quad (5)$$

- (a) Find the equation for the isoquant when $q = \bar{q}$;
- (b) compute the *Cost function* $c(w, q)$. \square

Exercise 3

Let $f(K, L)$ be a production function of the form

$$f(K, L) = 100K^{\frac{1}{4}}L^{\frac{1}{2}} \quad (6)$$

- 1. Derive the demand for L and for K that maximises firm's profits. \square

Exercise 4

Let $f(z)$ be a *Leontief* production function of the form

$$f(z) = \min \{ z_1; z_2 \}^\beta \quad (7)$$

- 1. Assuming that the price of output and all costs of inputs are strictly positive, calculate the profit maximising demand & supply functions;
- 2. compute the profit function;
- 3. discuss possible restrictions on β . \square

References

- Mas-Colell, A., Whinston, M. D., & Green, J. R. (1995). *Microeconomic theory*. Oxford University Press.
 - Chapter 5: **Production**.
- Cowell, F. (2018). *Microeconomics: principles and analysis*. Oxford University Press.
 - Chapter 2: **The firm**.