

Intermediate Microeconomics

EC303
Problem 6

A firm, producing xebecs (good X) is faced with a Cobb-Douglas production function of the form;

$$Q = AL^\alpha K^\beta,$$

The parameters have been estimated so that $A = 4$, $\alpha = .5$ and $\beta = .5$. ($Q = 4L^{.5}K^{.5}$)

Using the "Cobb-Douglas Module" (http://www.boisestate.edu/econ/lreynol/web/excel/Cobb_Douglas.xls) OR "Cobb-Douglas Calculator" (http://www.boisestate.edu/econ/lreynol/web/excel/Cobb_Calculator.xls), answer the following questions.

- Given $Q = 4L^{.5}K^{.5}$ and the price of labour (P_L) equal to \$6 and the price of capital (P_K) equal to \$3, what is the output when labour is 8 units ($L = 8$) and capital is 8 units ($K = 8$)?
 - Output = _____ units
 - What is the cost of that output? _____
 - What is the cost per unit? _____
- If both labour and capital are doubled, what would the output be?
 - Output = _____ units
 - What is the cost of that output? _____
 - What is the cost per unit? _____
- Is this increasing, decreasing or constant returns to scale?
 - _____
- What is the output if $L = 4$ and $K = 8$?
 - Output = _____ units
- What is the output if L is doubled to 8 units and K doubled to 16?
 - Output = _____ units
- In question 5, are there increasing or decreasing returns?
 - _____
- Change the value of α to .6. ($Q = 4L^{.6}K^{.5}$). What is the output when $L = 4$ and $K = 8$?
 - Output = _____ units
 - What is the cost of that output? _____
 - What is the cost per unit? _____
- Using the production function, $Q = 4L^{.6}K^{.5}$, What is the output when labour is double to 8 and K to 16?
 - Output = _____ units
 - What is the cost of that output? _____
 - What is the cost per unit? _____
- Compare the cost per units when inputs are doubled for $Q = 4L^{.5}K^{.5}$ with the cost per unit when $Q = 4L^{.6}K^{.5}$. What is meant by constant returns and increasing returns?
- What is an example of a production function where there are decreasing returns?
(Use $Q = 4L^{.4}K^{.3}$ to see if it has decreasing returns. What happens to output when inputs are doubled? What happens to the average cost?)