

Economics 11; Weekly Assignment Sheet for Week 6 -- The Firm; Technology and Production

A. Text and workbook

1. Text: Chapters 7 & 8.

a. In Chapter 7 read only pp. 197-217 (Intro, sections 7.1 & 7.2).

b. In Chapter 8, omit nothing.

2. Study guide: Chapters 7 & 8.

a. In Chapter 7: read only pp. 67-69, all but last paragraph; do only Multiple Choice Questions 4-14 & 16-20 and Problems 1,2, 4, 7&8.

b. In Chapter 8, omit nothing.

c. NOTE: The answers given in the back of the Study Guide to the following questions are wrong either in whole or in part (thus it is left to you, at least for now, to find the right answers!): p. 73, #7; p. 76, #2; p. 77, #s7,8; p. 81, #2 (What price change causes movement from 1 to 2 in answer figure on p. 207? Not clear; the “effective” price of Roundup has indeed fallen, but this is NOT the best way to demonstrate the impact!); p. 87, #6.

B. Reading(s)

None this week.

C. Puzzles

1. Suppose that you are the Pres. of Progressive Pen, Inc., which has three branch plants. The branch plants send their output of pens to you and you in turn sell them in at \$1 per pen; the price that you receive per pen is fixed -- it does not vary with the number of pens that you sell. The costs functions for plants A, B, and C, respectively, are shown below; TC designates total cost and q the volume of production.

$$TC_A = 100 + (2 / 1000) q_A^2;$$

$$TC_B = 200 + (2 / 1000) q_B^2;$$

$$TC_C = 100 + (1 / 1000) q_C^2.$$

Math Note: if $TC = a + b q^2$, then $AC = (a/q) + b q$, and $MC = (2 b) q$.

a. In words: What is the condition that must be satisfied to minimize the firm's total cost of producing any given number of pens when allocating production among the plants? How does this condition differ from that which must be satisfied to maximize the firm's profits?

b. You could tell each branch plant how much to produce. What information would you want to know in order to do so? If you knew it, how much would you tell each plant to produce?

c. Suppose you didn't have the information wanted in your answer to b, but the managers of the branch plants did. Is there some information that you could communicate to the branch managers that would enable each to determine the profit maximizing level of his/her plant's output?

d. What scarce resource does the price system save? In view of your answers to b and c, is there any economic rationale for multi-plant firms?

2. Suppose that a production function exhibits diminishing marginal productivity for every input. Must it also exhibit diminishing returns to scale, or could it nonetheless have constant or even increasing returns to scale? Explain; you may find it useful to illustrate with a numerical example by filling in the following table.

Output levels associated with different input combinations

Capital input	<u>Labor input</u>		
	<u>1</u>	<u>2</u>	<u>3</u>
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____

3. Consider a textile producer who can choose among three (and only three) techniques for the production of cloth. Factor input requirements per square meter of cloth for each technique are given below (all three techniques use the same amounts of all other inputs per unit of cloth produced):

Technique:	<u>L-intensive</u>	<u>K-intensive</u>	<u>Intermediate</u>
Capital	1	9	5
Labor	8	3	6

The producer tells you that each technique can be operated at any level of output (including non-integer values) with constant returns to scale. You are also told that several techniques can be operated simultaneously without altering the input-output coefficients of each from what they respectively are when only one technique is operated.

- a. You are to graph the capital-labor isoquants for output levels of 1 and 5 square meters of cloth respectively (careful plotting on graph paper helps a great deal).
- b. What do you conclude about the likelihood of using several techniques simultaneously?
- c. Would it ever pay to use the intermediate technique?

HINT: Rather than being smoothly curved, the isoquants are "piece-wise" linear. They are composed of three linear segments: one negatively sloped segment plus one horizontal and one vertical segment.