

HW Questions: Chapter 7 “The Production Process: The Behavior of Profit-Maximizing Firms”

4. The following table gives total output or total product as a function of labor units used.

Labor	Total Output
0	0
1	5
2	9
3	12
4	14
5	15

- Define diminishing returns.
- Does the table indicate a situation of diminishing returns? Explain your answer.

5. Suppose that widgets can be produced using two different production techniques, A and B. The following table provides the total input requirements for each of five different total output levels.

	Q = 1		Q = 2		Q = 3		Q = 4		Q = 5	
Tech.	K	L	K	L	K	L	K	L	K	L
A	2	5	1	10	5	14	6	18	8	20
B	5	2	8	3	11	4	14	5	16	6

- Assuming that the price of labor (P_L) is \$1 and the price of capital (P_K) is \$2, calculate the total cost of production for each of the five levels of output using the optimal (least-cost) technology at each level.
- How many labor hours (units of labor) would be employed at each level of output? How many machine hours (units of capital)?
- Graph total cost of production as a function of output. (Put cost on the Y-axis and output, q , on the X-axis.) Again assume that the optimal technology is used.
- Repeat a. through c. under the assumption that the price of labor (P_L) rises from \$1 to \$3 while the price of capital (P_K) remains at \$2.

11. During the early phases of industrialization, the number of people engaged in agriculture usually drops sharply, even as agricultural output is growing. Given what you know about production technology and production functions, explain this seeming inconsistency.

12. The number of repairs produced by a computer repair shop depends on the number of workers as follows:

Number of Workers	Number of Repairs
0	0
1	8
2	20
3	35
4	45
5	52
6	57
7	60

Assume that all inputs (office space, telephone, and utilities) other than labor are fixed in the short run.

- Add two additional columns to the table and enter the marginal product and average product for each number of workers.
- Over what range of labor input are there increasing returns to labor? Diminishing returns to labor? Negative returns to labor?
- Over what range of labor input is marginal product greater than average product? What is happening to average product as employment increase over this range?
- Over what range of labor input is marginal product smaller than average product? What is happening to average product as employment increases over this range?

15. A firm can use three different production technologies, with capital and labor requirements at each level of output as follows:

Daily Output	Technology 1		Technology 2		Technology 3	
	K	L	K	L	K	L
100	3	7	4	5	5	4
150	3	10	4	7	5	5
200	4	11	5	8	6	6
250	5	13	6	10	7	8

- Suppose the firm is operating in a high-wage country, where capital cost is \$100 per unit per day and labor cost is \$80 per worker per day. For each level of output, which technology is cheapest?
- Now suppose the firm is operating in a low-wage country, where capital cost is \$100 per unit per day but labor cost is only \$40 per unit per day. For each level of output, which technology is cheapest?
- Suppose the firm moves from a high-wage to a low-wage country but its level of output remains constant at 200 units per day. How will its total employment change?