HOMEWORKS
MICRO THEORY ECON 3352
Dr. André V. Mollick

Note: Exercise numbers are based on Pindyck and Rubinfeld's *Microeconomics* 6th edition.

Quizzes may be based on these homeworks or on theoretical principles discussed in class.

PRODUCTION THEORY

CHAPTER 6

EXERCISES

2. Suppose a chair manufacturer is producing in the short run (with its existing plant and equipment). The manufacturer has observed the following levels of production corresponding to different numbers of workers:

Number of workers	*Number of chairs*
1	10
2	18
3	24
4	28
5	30
6	28
7	25

[Please note the change with respect to the original chart on the book]

a. Calculate the marginal and average product of labor for this production function.

b. Does this production function exhibit diminishing returns to labor? Explain.

c. Explain intuitively what might cause the marginal product of labor to become negative.

3. Fill in the gaps in the table below.

Quantity of Variable Input	Total Output	Marginal Product of Variable Input	Average Product of Variable Input
0	0	—	—
1	225		
2			300
3		300	
4	1140		
5		225	
6			225

CHAPTER 6

8. Do the following functions exhibit increasing, constant, or decreasing returns to scale?

a. $q = 3L + 2K$

b. $q = (2L + 2K)^{\frac{1}{2}}$

c. $q = 3LK^2$

d. $q = L^{\frac{1}{2}}K^{\frac{1}{2}}$

e. $q = 4L^{\frac{1}{2}} + 4K$

9. The production function for the personal computers of DISK, Inc., is given by

$q = 10K^{0.5}L^{0.5}$, where q is the number of computers produced per day, K is hours of machine time, and L is hours of labor input. DISK's competitor, FLOPPY, Inc., is using the production function $q = 10K^{0.6}L^{0.4}$.

a. **If both companies use the same amounts of capital and labor, which will generate more output?**

b. **Assume that capital is limited to 9 machine hours but labor is unlimited in supply. In which company is the marginal product of labor greater? Explain.**

10. In Example 6.3, wheat is produced according to the production function

$q = 100K^{0.8}L^{0.2}$.

a. **Beginning with a capital input of 4 and a labor input of 49, show that the marginal product of labor and the marginal product of capital are both decreasing.**

b. **Does this production function exhibit increasing, decreasing, or constant returns to scale?**

CHAPTER 7

QUESTIONS FOR REVIEW

1. **1. A firm pays its accountant an annual retainer of $10,000. Is this an economic cost? Why or why not?**

EXERCISES

2. a. Fill in the blanks in the following table.

Units of Output	Fixed Cost	Variable Cost	Total Cost	Marginal Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost
0			100				
1			125				
2			145				
3			157				
4			177				
5			202				
6			236				
7			270				
8			326				
9			398				
10			490				

b. Draw a graph that shows marginal cost, average variable cost, and average total cost, with cost on the vertical axis and quantity on the horizontal axis.

3. A firm has a fixed production cost of $5,000 and a constant marginal cost of production of $500 per unit produced.

a. What is the firm's total cost function? Average cost?

b. If the firm wanted to minimize the average total cost, would it choose to be very large or very small? Explain.

6. Suppose the economy takes a downturn, and that labor costs fall by 50 percent and are expected to stay at that level for a long time. Show graphically how this change in the relative price of labor and capital affects the firm's expansion path.

9. The short-run cost function of a company is given by the equation TC=200+55q, where TC is the total cost and q is the total quantity of output, both measured in thousands.

a. What is the company's fixed cost?

b. If the company produced 100,000 units of goods, what is its average variable cost?

c. What is its marginal cost *per unit* produced?

d. What is its average fixed cost?

e. Suppose the company borrows money and expands its factory. Its fixed cost rises by $50,000, but its variable cost falls to $45,000 per 1,000 units. The cost of interest (i) also enters into the equation. Each one-point increase in the interest rate raises costs by $3,000. Write the new cost equation.