ECON2103 Microeconomics

Chapter 7 Exercises

1. Joe quits his computer programming job, where he was earning a salary of $50,000 per year, to start his own computer software business in a building that he owns and was previously renting out for $24,000 per year. In his first year of business he has the following expenses: salary paid to himself, $40,000; rent, $0; other expenses, $25,000. Find the accounting cost and the economic cost associated with Joe's computer software business.

2.

    a. Fill in the blanks in the table below.

    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.

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				

3. You manage a plant that mass-produces engines by teams of workers using assembly machines. The technology is summarized by the production function $q = 5\,KL$, where q is the number of engines per week, K is the number of assembly machines, and L is the number of labor teams. Each assembly machine rents for $r = \$10,000$ per week, and each team costs $w = \$5000$ per week. Engine costs are given by the cost of labor teams and machines, plus $2000 per engine for raw materials. Your plant has a fixed installation of 5 assembly machines as part of its design.

    a. What is the cost function for your plant—namely, how much would it cost to produce q engines? What are average and marginal costs for producing q engines? How do average costs vary with output?

    b. How many teams are required to produce 250 engines? What is the average cost per engine?

    c. You are asked to make recommendations for the design of a new production facility. What capital/labor (K/L) ratio should the new plant accommodate if it wants to minimize the total cost of producing at any level of output q?

4. Suppose that a firm's production function is $q = 10L^{\frac{1}{2}}K^{\frac{1}{2}}$. The cost of a unit of labor is $20 and the cost of a unit of capital is $80.

    a. The firm is currently producing 100 units of output and has determined that the cost-minimizing quantities of labor and capital are 20 and 5, respectively. Graphically illustrate this using isoquants and isocost lines.

    b. The firm now wants to increase output to 140 units. If capital is fixed in the short run, how much labor will the firm require? Illustrate this graphically and find the firm's new total cost.

    c. Graphically identify the cost-minimizing level of capital and labor in the long run if the firm wants to produce 140 units.

    d. If the marginal rate of technical substitution is $\dfrac{K}{L}$, find the optimal level of capital and labor required to produce the 140 units of output.