Chapter_04: Solutions

1. Suppose that the indivisible inputs used in the production of shirts have a cost per day of $400. To produce one shirt per day, the firm must spend a total of $5 on other inputs (labor, materials, and other capital), and the firm incurs the same additional cost for each additional shirt. Compute the average cost for 40 shirts, 100 shirts, 200 shirts, and 400 shirts. Draw the long-run average-cost curve for 40-400 shirts per day.

   Average cost of 40 shirts = (400 + 5*40)/40 = $15
   Average cost of 100 shirts = (400 + 5*100)/100 = $9
   Average cost of 200 shirts = (400 + 5*200)/200 = $7.
   Average cost of 400 shirts = (400 + 5*400)/400 = $6.
   The long-run ATC curve will be downward sloping everywhere.

2. Consider a firm with the following short-run costs:

Quantity	Variable Cost	Total Cost
1	30	90
2	50	110
3	90	150
4	140	200
5	200	260

   a. What is the firm's fixed cost?
      The firm's fixed cost is $60.

   b. Compute short-run marginal cost, short-run average variable cost, and short-run average total cost for the different quantities of output.

Quantity	MC	AVC	ATC
1	30	30	90
2	20	25	55
3	40	30	50
4	50	35	50
5	60	40	52

   c. Draw the three cost curves. Explain the relationship between the SMC curve and the SATC curve and the relationship between the SAVC curve and the SATC curve.

      The SMC curve initially decreases and then increases. Thus both average cost curves initially decrease until they meet marginal cost, and then increase.

3. Given the following relationship between labor input and the quantity produced, compute the marginal product of labor for the different input levels. Then draw the total product curve and the marginal product curve.

Labor	Output	Marginal Product
0	0	--
1	5	5
2	11	6
3	15	4
4	18	3
5	19	1

Total and marginal product curves can be drawn from the figures above. Note that these curves should not be drawn on the same graph. Marginal product first increases and then decreases, and thus, total product initially increases at an increasing rate and then increases at a decreasing rate.

4. Consider a firm that has a fixed cost of $60 per minute. Complete the following table.

Output	FC	TVC	STC	SMC	AFC	SAVC	SATC
1	**60**	10	**70**	**10**	**60**	**10**	**70**
2	**60**	18	**78**	**8**	**30**	**9**	**39**
3	**60**	30	**90**	**12**	**20**	**10**	**30**
4	**60**	45	**105**	**15**	**15**	**11.25**	**26.25**
5	**60**	65	**125**	**20**	**12**	**13**	**25**
6	**60**	70	**130**	**5**	**10**	**11.66**	**21.66**

8. Explain the difference between diseconomies of scale and diminishing returns. Based on the cost curves we've seen in this chapter, which is more pervasive?

Diseconomies of scale is a long-run concept. Diseconomies of scale occur when doubling all inputs leads to a less-than-double increase in output. This often results from coordination problems. Diminishing returns to a variable factor is a short-run concept that occurs when more variable inputs are added to a fixed input. This has nothing to do with economies of scale and is far more pervasive.

9. Suppose one firm generates 30 billion kilowatt hours of electricity, which is about three times the output of a second electricity firm. Which firm will have a higher cost per kilowatt hour? Use the information in Figure 4.6 to predict the gap between the average costs of the two firms.

The larger firm will have much lower costs, as there are large economies of scale in electricity production. Based on Figure 8.6, the smaller firm's average cost is $0.40 higher.