Chapter 13

1. Johann runs a small boat factory. He can make ten boats per year and sell them for €25,000 each. It costs Johann €150,000 for the raw materials (fibreglass, wood, paint, and so on) to build the ten boats. Johann has invested €400,000 in the factory and equipment needed to produce the boats: €200,000 from his own savings and €200,000 borrowed at 10 percent interest. (Assume that Johann could have loaned his money out at 10 percent, too.) Johann can work at a competing boat factory for €70,000 per year.

a. What is the total revenue Johann can earn in a year?

Answer:
10 x €25,000 = €250,000

b. What are the explicit costs Johann incurs while producing ten boats?

Answer:
€150,000 + (€200,000 x 0.10) = €170,000

c. What are the total opportunity costs of producing ten boats (explicit and implicit)?

Answer:
€150,000 + (€400,000 x 0.10) + €70,000 = €260,000

d. What is the value of Johann's accounting profit?

Answer:
€250,000 − €170,000 = €80,000

e. What is the value of Johann's economic profit?

Answer:
€250,000 − €260,000 = −€10,000

f. Is it truly profitable for Johann to operate his boat factory? Explain.

Answer: No. Johann could make €70,000 plus 10 percent interest on his €200,000 financial capital for a total of €90,000 if he worked for the competition instead of running his own factory. His factory makes an accounting profit of only €80,000 per year so it costs him €10,000 to run his own factory (the size of the economic loss).

2. Complete the following table. It describes the production and cost of hamburgers at a roadside stand. All figures are measured per hour.

Number of Workers	Output	Marginal Product of Labour	Cost of Factory	Cost of Workers	Total Cost
0	0		€25	€0	_____
1	6	____	25	5	_____
2	11	____	25	10	_____
3	15	____	25	15	_____
4	18	____	25	20	_____
5	20	____	25	25	_____

Answer:

Number of Workers	Output	Marginal Product of Labour	Cost of Factory	Cost of Workers	Total Cost
0	0		€25	€0	€25
		6			
1	6		25	5	30
		5			
2	11		25	10	35
		4			
3	15		25	15	40
		3			
4	18		25	20	45
		2			
5	20		25	25	50

a. Plot the production function in Exhibit 1.
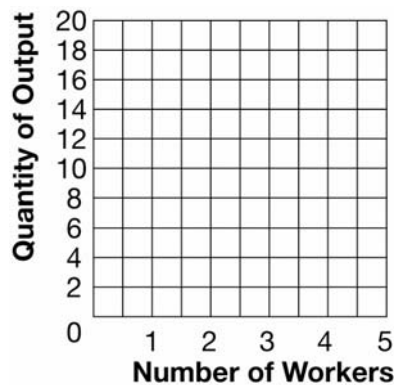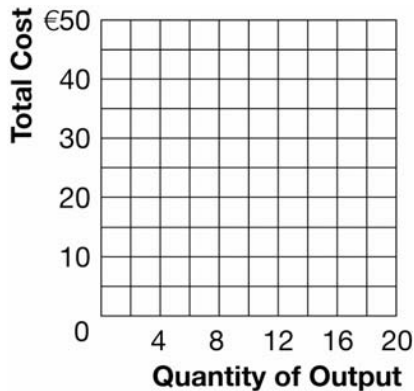

Exhibit 1

Exhibit 4

b.   What happens to the marginal product of labour as more workers are added to the production facility? Why? Use this information about the marginal product of labour to explain the slope of the production function you plotted above.

Answer: It diminishes because additional workers have to share the production equipment and the work area becomes more crowded. The slope of the production function is the change in output from a change of one unit of input, which is the marginal product of labour. Since it is diminishing, the slope of the production function gets flatter as a greater number of inputs are used.

c.   Plot the total-cost curve in Exhibit 2.

Exhibit 2

Answer: See Exhibit 5.
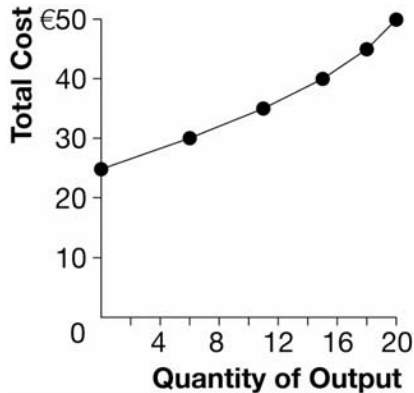
d.   Explain the shape of the total cost curve.

Answer:
The total cost curve begins at €25 because this represents the fixed costs. As output rises the total cost curve gets steeper as the quantity produced rises due to the diminishing marginal product of labour. That is, in order to produce additional equal increments of output the firm must employ ever greater amounts of inputs and costs rise at an increasing rate.

3.   The information below is for Bastien's blue jeans manufacturing plant. All data is per hour. Complete the table. Note the following abbreviations: FC (fixed cost), VC (variable cost), TC (total cost), AFC (average fixed cost), AVC (average variable cost), ATC (average total cost), MC (marginal cost).

Quantity	FC	VC	TC	AFC	AVC	ATC	MC
0	€16	€0	___	___	___	___	
1	16	18	___	___	___	___	___
2	16	31	___	___	___	___	___
3	16	41	___	___	___	___	___
4	16	49	___	___	___	___	___
5	16	59	___	___	___	___	___
6	16	72	___	___	___	___	___
7	16	90	___	___	___	___	___
8	16	114	___	___	___	___	___
9	16	145	___	___	___	___	___
10	16	184	___	___	___	___	___

Quantity	FC	VC	TC	AFC	AVC	ATC	MC
0	€16	€0	€16				
							€18
1	16	18	34	€16.00	€18.00	€34.00	
							13
2	16	31	47	8.00	15.50	23.50	
							10
3	16	41	57	5.33	13.67	19.00	
							8
4	16	49	65	4.00	12.25	16.25	
							10
5	16	59	75	3.20	11.80	15.00	
							13
6	16	72	88	2.67	12.00	14.67	
							18
7	16	90	106	2.29	12.86	15.14	
							24
8	16	114	130	2.00	14.25	16.25	
							31
9	16	145	161	1.78	16.11	17.88	
							39
10	16	184	200	1.60	18.40	20.00	

Plot AFC, AVC, ATC, and MC in Exhibit 3.

Exhibit 3
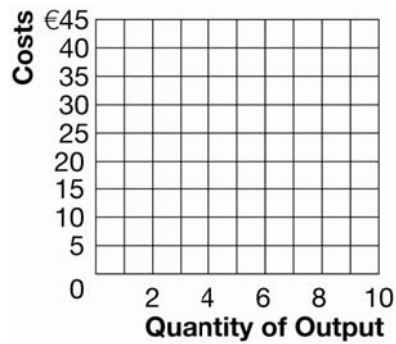
Answer: See Exhibit 6.
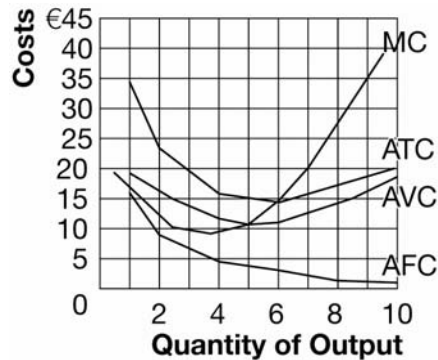
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b.   Explain the shape of each of the curves you plotted in part (a) above.

Answer: *AFC* declines as the quantity goes up because fixed cost is spread across a greater number of units. *MC* declines for the first four units due to an increasing marginal product of the variable input. *MC* rises thereafter due to decreasing marginal product. *AVC* is U-shaped for the same reason as *MC*. *ATC* declines due to falling *AFC* and increasing marginal product. *ATC* rises at higher levels of production due to decreasing marginal product.

c.   Explain the relationship between ATC and MC.

Answer:
When *MC* is below *ATC, ATC* must be declining. When *MC* is above *ATC, ATC* must be rising. Therefore, *MC* crosses *ATC* at the minimum of *ATC*.

d.   Explain the relationship between ATC, AFC, and AVC.

Answer: *AFC* plus *AVC* equals *ATC*.

e.   What is Bastien's efficient scale? How do you find the efficient scale? Explain.

Answer:
Six pairs of blue jeans. Efficient scale is the output that minimizes *ATC*. It is also the place where *MC* crosses the average total cost curve.