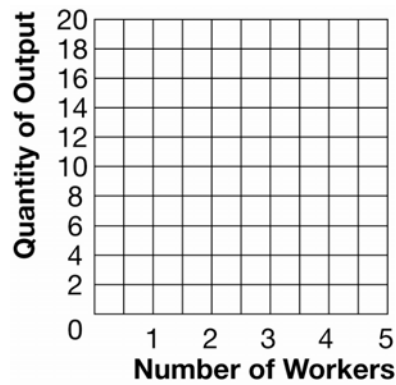# Chapter 13

1. Joe runs a small boat factory. He can make ten boats per year and sell them for €25,000 each. It costs Joe €150,000 for the raw materials (fibreglass, wood, paint, and so on) to build the ten boats. Joe 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 Joe could have loaned his money out at 10 percent, too.) Joe can work at a competing boat factory for €70,000 per year.

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

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

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

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

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

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

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	_____

a.   Plot the production function in Exhibit 1.

Exhibit 1

Quantity of Output (y-axis: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20)
Number of Workers (x-axis: 1, 2, 3, 4, 5)

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.

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

Exhibit 2

Total Cost (y-axis: 0, 10, 20, 30, 40, €50)
**Quantity of Output** (x-axis: 4, 8, 12, 16, 20)
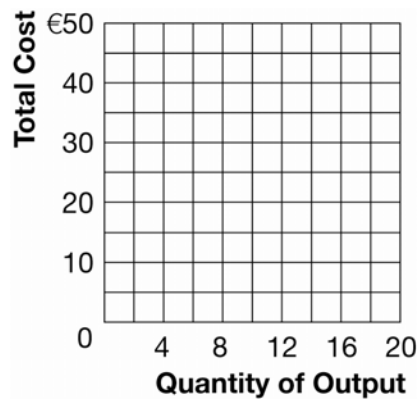
d.   Explain the shape of the total cost curve.

3. The information below is for Bob'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	_____	_____	_____	_____	_____

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

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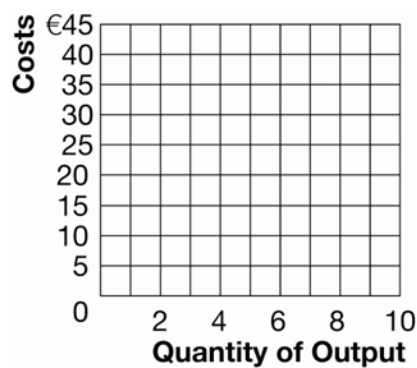
b. Explain the shape of each of the curves you plotted in part (a) above.

c. Explain the relationship between ATC and MC.

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

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