

Exercises 7

Supply: Inputs and Costs

Classroom exercises: Exercises 7.1 to 7.8

Home exercises: Exercises 7.9 to 7.19

Classroom exercises

Exercise 7.1 (In-term test December 2008, version C, A.1)

A florist has a daily fixed cost of €100 and pays each of their workers €50 a day. The florist's daily production schedule is shown in the following table.

Number of flower arrangements	0	5	9	12	14
Number of workers	0	1	2	3	4

- a) What is the marginal product of each of the first four workers? Explain the meaning of the values you obtained. Why does the marginal product of labour fall as the number of workers increases?
- b) What is the marginal cost for each level of the florist's production? Explain the meaning of the values you obtained. Why does the marginal cost rise as output increases?
- c) For what levels of output does the spreading effect surpass that of diminishing returns, and vice-versa? What is the minimum-cost output?

Exercise 7.2 (Exam 6-1-2014, B3)

Charles makes chairs. Presently he has fixed costs of €100 per month, and his average total cost is as shown below.

Number of chairs per month	0	5	10	15	20	25
Average total cost	–	30	21	19	18.5	20

- a) For each output level in the table find the total cost, variable cost, and average variable cost. (1 mark)
- b) Explain what marginal cost is, and find it for each output level. What is the typical reason behind the behaviour you observe in the marginal cost you calculated?
- c) Find the break-even and shut-down prices and associated output levels. Explain. (1 mark)
- d) In what output range does the diminishing returns effect outweigh the spreading effect? Explain. (1 mark)

Exercise 7.3 (In-term test 24/25-11-2008, version B, EM.11)

In a U-shaped average total cost curve, the total average cost initially decreases because:

- a. The average fixed cost initially sharply falls, which more than offsets any rise in the average variable cost.
- b. The marginal cost initially is lower than the average total cost.
- c. The spreading effect of increasing production is larger than the effect of diminishing returns.
- d. All of the above.

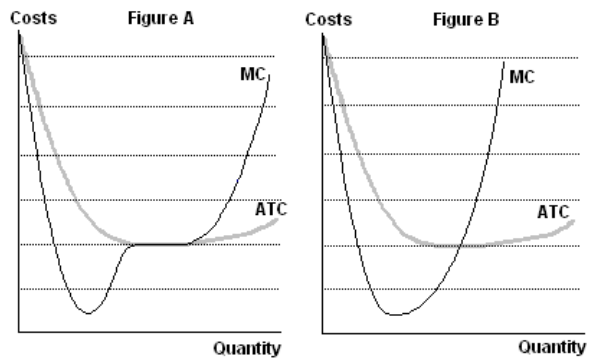
Exercise 7.4 (Midterm test 14-12-2009)

Joe prepares and serves roast beef sandwiches at his bar. The total cost of 10 sandwiches is €5. The total cost of 11 sandwiches is €6. How much is the marginal cost of the 11th sandwich?

- a) It is equal to the average total cost of 11 sandwiches.
- b) It is higher than the average total cost of 11 sandwiches.
- c) It is lower than the average total cost of 11 sandwiches.
- d) There is not enough information to compare marginal and average total costs.

Exercise 7.5 (Assignment 4, 2011-12, Q5)

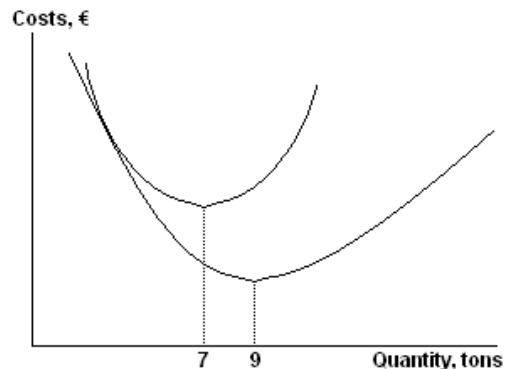
The accompanying figures show a marginal cost curve (MC) and an average total cost curve (ATC). Are they correct? (Presume that each figure is correct unless it is plainly wrong.)



- a) A is correct, but B is not.
- b) B is correct, but A is not.
- c) They are both correct.
- d) They are both wrong.

Exercise 7.6 (Assignment 4, 2011-12, Q)

The accompanying figure shows the long-run average cost curve and a short-run average total cost curve of a firm. Then the firm has:



- a) Decreasing returns to scale for an output below 7 tons; increasing returns to scale for an output above 7 tons.
- b) Increasing returns to scale for an output below 7 tons; decreasing returns to scale for an output above 7 tons.
- c) Decreasing returns to scale for an output below 9 tons; increasing returns to scale for an output above 9 tons.
- d) Increasing returns to scale for an output below 9 tons; decreasing returns to scale for an output above 9 tons.

Exercise 7.7 (Exam 25-01-2015)

When output increases, average total cost (ATC):

- a) Falls if marginal cost (MC) falls.
- b) Falls if $MC < ATC$ and increases if $MC > ATC$.
- c) None of the other options is correct.
- d) Increases if marginal cost (MC) increases.

Exercise 7.8 Textbook Problem 12 (p. 354)

Don owns a small concrete-mixing company. His fixed cost is the cost of the concrete-batching machinery and his mixer trucks. His variable cost is the cost of the sand, gravel, and other inputs for producing concrete; and his workers. He has estimated the costs shown in the accompanying table based on estimates of the number of orders the company will receive per week. Assume that Don purchased 3 trucks, expecting to produce 40 orders per week.

Quantity of trucks	FC	Variable cost		
		20 orders	40 orders	60 orders
2	\$6 000	\$2 000	\$5 000	\$12 000
3	\$7 000	\$1 800	\$3 800	\$10 800
4	\$8 000	\$1 200	\$3 600	\$8 400

- Suppose that, in the short run, business declines to 20 orders per week. What is Don's average total cost per order in the short run? What will his average total cost per order in the short run be if his business booms to 60 orders per week?
- What is Don's long-run average total cost for 20 orders per week? Explain why his short-run average total cost of producing 20 orders per week when the number of trucks is fixed at 3 is greater than his long-run average total cost of producing 20 orders per week.
- Draw Don's long-run average total cost curve. Draw his short-run average total cost curve if he owns 3 trucks.

Home exercises

Exercise 7.9 Check Your Understanding 11-1, 1. b) (pg. 377);

Exercise 7.10 Check Your Understanding 11-2, (pg. 345);

Exercise 7.11 Problems 2. (pg. 353).

Exercise 7.12 (Final exam 06-09-2007, A2)

The table below shows the marginal cost of the world's largest passenger plane.

Number of airplanes	1	2	3	4	5	6	7	8
Marginal cost (millions of Euros)	100	90	85	80	85	90	140	200

- If fixed costs are 200 million euros, calculate the average total cost of the airplanes.
- Draw the marginal and total average cost curves.
- Succinctly explain the following facts:
 - Marginal cost is decreasing for low output levels;
 - The average total cost curve is U-shaped.
 - The marginal cost curve intersects the average total cost curve at its minimum.

Exercise 7.13 (In-term test December 2008, E 2)

The table below shows some of a chocolate producer's short-run costs.

Output <i>Q</i>	Total cost, <i>TC</i>	Fixed costs <i>FC</i>	Variable costs <i>VC</i>	Average total cost <i>AC</i>	Average variable cost <i>AVC</i>	Average fixed cost <i>AFC</i>	Marginal cost <i>MC</i>
0	32						
1							18
2			40				
3	116						
4							50
5					40		

- Complete the table. Explain your results.
- What are the spreading effect and diminishing returns (to the variable input) effect? For what output levels is the former stronger than the latter?

Exercise 7.14 (Exercise 10, 2008-09)

A shoe manufacturer operates with the production function $Q(K,L) = (KL)^{0.5}$, where K is the amount of capital, and L the amount of labour.

- What is the average and marginal products of labour when $K = 4$?
- Based on the results you obtained in part a) would you expect the average product of labour to increase or decrease when the amount of labour increases from 4 to 5?
- According to the results you obtained in part a) when the manufacturer employs $L=4$ is the marginal cost lower than, higher than or the same as the average variable cost?

Exercise 7.15 (Assignment 2 19-11-2012)

Which of the following is true of the short run?

- The average total cost is equal to the sum of the fixed cost and variable cost.
- The short-run marginal cost is equal to the change in the variable cost arising from the production of an extra unit output.
- The average fixed cost is equal to the fixed cost, as this does not change in the short run.
- The average variable cost is equal to the difference between the total and fixed cost.

Exercise 7.16 (Exam 09-01-2012)

Which of the following is true of the spreading effect?

- While there is a spreading effect the average cost will fall when output increases.
- The spreading effect causes the marginal cost curve to intersect the average cost curve at its minimum.
- As output increases spreading effect and diminishing returns have opposite effects on the average cost.
- None of the other alternatives is correct.

Exercise 7.17 (Exam 25-06-2014)

The table below shows a restaurant's output schedule.

Number of workers	Meals served per day
1	50
2	120
3	195
4	260

Which of the following is true of the data shown?

- The law of diminishing returns holds because the fourth worker has a lower marginal productivity than the third.
- Output increases as the number of workers increases, so the law of diminishing returns does not hold.
- We cannot tell whether the law of diminishing returns holds because we do not know the wage rate.
- None of the other alternatives are correct.

Exercise 7.18 (Exam 25-06-2015)

A tailor shop makes jackets. Labour is their only variable input. The table below shows some of their daily production and cost data.

Number of workers per day	Number of jackets made per day	Marginal product of labour (MPL)	Fixed costs (FC), euros	Total costs (TC), euros
0	0	-	75	75
1	6	6	75	150
2	11	5	75	225
3	15	4	75	300
4	18	3	75	375

- Explain the behaviour of marginal product of labour as output increases in the table above. All workers are paid the same wage. Calculate a worker's daily wage rate.
- Find the average fixed cost, the average variable cost, and the average total cost for each output level shown in the table above. Find minimum average-total-cost point.
- Explain the spreading effect and the diminishing returns effect. Explain how these affect the average total cost curve you found, namely for what output levels the spreading effect is stronger than the diminishing returns effect.

Exercise 7.19 (Exam 03-06-2015)

A tractor factory doubles the quantity of all its inputs, and as a consequence output trebles. Then the firm exhibited:

- Constant returns to scale.
- Decreasing returns to scale.
- Increasing returns to scale.
- None of the other options is correct.