Instituto Superior de Economia e Gestão
UNIVERSIDADE TÉCNICA DE LISBOA

ECONOMICS I

2008/2009

EXERCISES

2ND PART

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Exercise 18 – monopoly;
Exercise 19 – oligopoly.
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Exercises

PART 3 Individuals and markets: 6. Consumer and producer surplus

9. The **demand curve** of a good is given by: $p = -Q + 9$.

a) Compute the total expenditure and the consumer surplus when the market price is 5. Represent graphically.

b) Quantify the effects on total expenditure and on consumer surplus of a decrease in market price from 5 to 4 monetary units.

PART 4 The Producer: 8. Behind the supply curve: inputs and costs; 9. Perfect competition and the supply curve

Behind the supply curve: inputs and costs

10. A firm produces shoes according to the production function $Q(K,L)=(K.L)^{1/2}$, where K and L represent capital and labour, respectively.

a) If, in the short run, K is fixed at K=4, compute the average and the marginal product of labour when L=4.

b) Given your answer to a), do you expect $PMe_{L=5}$ to be higher or lower than $PMe_{L=4}$?

c) Assuming L=4 and taking into account your answer to a), how does the marginal cost compare to the average variable cost?

d) Now suppose that the input K is variable and that $P_L=2$, $P_K=8$, and Q=2. Determine the optimal combination of inputs.

11. Two factors of production – labour (L) and capital (K) – are used in the production of a good. The long run production function is given by: Q = 2 $L^{1/2}$ $K^{1/2}$ and the total cost function is: CT = 9 L + 4 K.

a) How many units of each factor of production are needed to produce 100 units of the good?

b) Now suppose that, since the firm cannot support a total cost higher than 504, it cannot produce 100 units of output. Determine the optimal combination of K and L to be used and compute the optimal production level.

12. Let *Q* (*L, K*) = 10*LK* represent a firm's production function, where *Q* is the number of output units produced, *L* is labour, and *K* is capital. The price of an hour of labour is *w* = 4 and the price of one unit of capital is *r* = 10.

a) Compute total production, the average product, and the marginal product of labour when 6, 7, and 8 hours of labour are used, admitting that, in the short run, the number of units of capital used is fixed at $K = 24$. What can you say about the "law of decreasing returns" in this case? Explain.

b) Assuming a long run situation, find the optimal combination of factors of production to produce 400 units of output.

c) In the long run, what kind of returns to scale does this production function present? Explain.

Perfect competition and the supply curve

13. In a perfectly competitive market, in the short run, the typical firm produces a good according to the following total cost function:

$$CT = q^2 + 5$$

where *CT* is total cost and *q* is the number of units of output. There are 100 identical firms in the market.

a) Determine the supply curve of the typical firm and the market's supply curve.

b) Suppose that the market's demand is given by $Q^D = 200 - 50p$, where Q^D is quantity demanded and *p* Bemis the price of the good. Determine the equilibrium price and the equilibrium quantity.

c) On one diagram, show what would happen in case demand would increase.

14. Bob has 7 euros to spend every weekend. He usually spends this amount on pizzas and cinema tickets. The marginal utility of consuming pizzas and going to the cinema is given by $UM_P = 10 - P$ (where P is the number of pizzas) and $UM_C = 21 - 2C$ (where C is the number of cinema sessions), respectively. Pizzas and cinema tickets cost exactly the same: 1 euro. Compute the number of pizzas and cinema tickets bought each weekend.

15. A consumer has a monthly budget of 900 euros to consume *X* and *Y*, whose market prices are: $p_x = 5$ m.u./u.*X* and $p_y = 10$ m.u./u.*Y*. The consumer's utility function is given by: $U(X,Y) = X^2.Y$.

a) Find the consumer's optimal monthly combination of X and Y and the corresponding maximal utility level.

b) Suppose that X's market price increases to $p_x = 6{,}25$. Knowing that nothing else changed, determine the optimal monthly combination after the price change. Is the consumer on the same indifference curve? Explain.

16. Let a consumer's utility function be given by:

$$U(x, y) = x^{1/2} y^{1/3} ,$$

where *x* represents the quantitiy consumed of good *X* and *y* the quantity consumed of good *Y*. Let $p_x = 2$ and $p_y = 3$ be the prices of each unit of goods X and *Y*, respectively, and assume the consumer has a yearly income of 5000 monetary units.

a) Determine the consumer's optimal combination of goods.

b) After an increase in the supply of good *Y*, its price decreased to $p_y = 1$, whereas the price of good *X* remained unchanged. Simultaneously, the consumer's income was reduced in 20%. Compute the consumer's new optimal consumption combination. How did the above changes affect the consumer's utility?

PART 6 Market structure: Beyond perfect competition: 12. Monopoly; 13. Oligopoly; 14. Monopolistic competition and product differentiation

17. Suppose that, in the short run, a monopolist faces the following demand curve:

$$p = 100 - Q$$

and his total cost is given by:

$$CT = Q^2 + 16\,.$$

Given the information above, compute:

a) The price the monopolist should charge in order to maximize profits.

b) The monopolist's maximum profit.

18. Suppose that a monopolist's short run total costs are given by:

$$CT(Q) = 12\ Q^3 - 30\ Q^2 + 50\ Q + 700$$

where *CT* represents total cost and *Q* is the number of units produced. Market demand is:

$$Q^d(p) = 15 - \frac{p}{30}$$

where Q^d is quantity demanded and *p* is the price of the good.

a) Compute the price that the monopolist should announce – and the number of units sold – if he aims at maximizing profits.

b) Find the level of profits that corresponds to the equilibrium situation determined in a).

19. Consider the game represented by the following matrix:

		Player 2	
		X	*Y*
Player 1	*X*	(2; 0)	(3; -2)
	Y	(5; 1)	(*a*; *b*+1)

Under which conditions on *a* and *b*, does this game have dominant strategy equilibrium?

20. Two firms, *A* and *B*, are the only computer sellers in the market and can choose, as strategy, one of the following:

— To only sell type ***M*** computers;

— To only sell type ***I*** computers.

The profits resulting from the adoption of the above strategies, ***M*** and ***I***, are described in the following matrix:

		Firm ***B***			
		M		***I***	
Firm ***A***	***M***	300 *(A)*	800 *(B)*	700 *(A)*	700 *(B)*
	I	500 *(A)*	500 *(B)*	800 *(A)*	300 *(B)*

a) Find the non-cooperative equilibrium of the game.

b) Is there a different solution for the game that makes both firms better off? In case such a solution exists, under which conditions can it be reached?