

**Before you start read the following carefully:**

- The exam has a maximum duration of two hours and fifteen minutes (2h 15m).
- The exam has two parts: Part A consists of 12 multiple-choice questions, Part B of three open questions.
- Write your answers to Part A in the table below, on this page. At the end of the exam, separate this sheet from the rest of the exam and hand it in together with your answers to Part B. Make sure you have written your identification on this page below.
- You cannot look up any book or any other learning material.
- You may only use non-graphical calculators.
- Keep any mobile phone, tablet or pc switched off.

<b>Full name:</b>		
<b>Student number:</b>	<b>Class:</b>	<b>Degree:</b>

**Part A (6 marks)**

Indicate with an 'O' the correct answer to the questions 1 to 12, in the table below. You get 0.5 marks for each correct answer and will have a 0.15 deduction for each wrong answer.

**At the end of your exam, separate this sheet from the rest of the exam paper and hand it in together with your answers to Part B.**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>a)</b>	a)	a)	a)	a)	a)	a)	a)	a)	a)	a)	a)	a)
<b>b)</b>	b)	b)	b)	b)	b)	b)	b)	b)	b)	b)	b)	b)
<b>c)</b>	c)	c)	c)	c)	c)	c)	c)	c)	c)	c)	c)	c)
<b>d)</b>	d)	d)	d)	d)	d)	d)	d)	d)	d)	d)	d)	d)





**1. The shift in the supply of mobile phones that has been taking place in recent years, with smartphones replacing the traditional simple cellphones, is due to:**

- a) a decrease in the prices of inputs like memory circuits, displays, etc.
- b) technological progress.
- c) an increase in the number of mobile phone brands supplying smartphones.
- d) all the other answers.

**2. If the price of a good increases, the producer surplus:**

- a) decreases.
- b) remains constant.
- c) will change but it is not possible to say if it will increase or decrease.
- d) None of the other answers is correct.

**3. The setting of a quota below the equilibrium quantity:**

- a) increases the consumer surplus.
- b) reduces the producer surplus.
- c) gives rise to a deadweight loss.
- d) None of the other answers is correct.

**4. The price elasticity of demand (in absolute value) of the annual subscription of a regional newspaper is 1,6 when the price of the subscription is between 26 and 30 euros. If the price of the annual subscription increases from 28 to 30 euros:**

- a) the total revenue of the editorial firm that issues the journal will increase.
- b) the newspaper will become a normal good.
- c) the total revenue of the editorial firm that issues the journal will decrease.
- d) the newspaper will become an inferior good.

**5. An excise tax on a good, imposed on producers does not give rise to a deadweight loss if:**

- a) demand is perfectly inelastic.
- b) there are substitute goods in the market.
- c) the good is an inferior one.
- d) None of the other answers is correct.

**6. The incidence of a tax refers to:**

- a) the deadweight loss caused by the tax.
- b) the distribution of the cost of the tax between consumers and producers.
- c) the total revenue that the government receives with the tax.
- d) None of the other answers is correct.

**7. It is known that, at the point of consumption of the goods (X; Y) corresponding to the basket (40; 30), Gonçalo's marginal rate of substitution is equal to the relative price of the goods. It is, thus, possible to say that:**

- a) all the income is spent on that basket.
- b) basket (40; 30) is the optimal consumption basket.
- c) we don't have enough information to know whether that basket is the optimal consumption basket.
- d) Gonçalo must consume less of X and more of Y to reach the optimal consumption basket.

**8. The reason why indifference curves are typically bowed towards the origin (convex) is:**

- a) the principle of a diminishing marginal utility.
- b) that the marginal rate of substitution is constant along the indifference curve.
- c) that the indifference curves farther away from the origin represent higher levels of utility.
- d) the need to consume more of one good when consuming less of the other good.

**9. In the short run, there are decreasing returns when:**

- a) one more unit of the input increases total output more than the previous unit of input had increased.
- b) one more unit of the input increases total output less than the previous unit of input had increased.
- c) total output decreases.
- d) None of the other answers is correct.

**10. The firm's short-run supply curve coincides with:**

- a) The portion of the marginal cost curve above the average variable cost curve.
- b) The portion of the marginal cost curve above the average total cost curve.
- c) The portion of the average variable cost curve above the marginal cost curve.
- d) The portion of the average total cost curve above the marginal cost curve.



**11. The quantity supplied by the monopolist corresponds to the point:**

- a) where marginal cost curve intersects the demand directed at the monopolist.
- b) of the minimum average total costs.
- c) corresponding to the maximum of the marginal revenue.
- d) where marginal cost curve intersects the marginal revenue curve.

**12. What is responsible for the existence of zero profits under monopolistic competition, in the long run?**

- a) Market power.
- b) The differentiation of the product.
- c) Free entry and exit of firms in the market.
- d) A high average cost.

**Part B (14 marks)**

1. A certain market has the following demand and supply functions, with the usual notation:

$$Q^d = 700 - 2p$$

$$Q^s = 3p$$

- Find the equilibrium price and quantity. [1 mark]
- Now the government decides to impose a quota of 400 units. What is the price paid by consumers, and what is the quota rent per unit traded? [1.5 marks]
- Find the deadweight loss caused by the quota. [1.25 marks]

2. Consider the following total cost function of a firm in a perfect competition market of a certain good:

$$TC = Q^2 + 4Q + 1$$

- Is this total cost function for the short run or for the long run? Justify. [0,5 mark]
- Calculate the expressions for the average total cost, the average variable cost, the average fixed cost, and the marginal cost. [2 marks]

Assume that there are 10 identical firms in this market and that the (inverse) market demand curve is given by

$$P = 13 - \frac{Q}{10}$$

- What is the market supply curve? [1.5 marks]
- What is the market equilibrium? Depict it graphically. Calculate the producer surplus. [2 marks]

3. Firms Alpha and Beta are the only firms operating in their market. Each can choose high or low output. This market is expected to last only one year. The profit each will make in that year will depend on both firms' output, as shown in the *payoff* matrix below. As usual, the number to the left in each cell is the profit of the firm choosing rows (Alpha); that to the right is the profit of the firm choosing columns (Beta):

		Beta	
		High output	Low output
Alpha	High output	14, 16	24, 11
	Low output	10, 26	20, 22

- Do any of the firms have dominant strategies? Explain. [1,5 marks]
- Is there an equilibrium in dominant strategies in this game? Explain. [0,5 marks]



- c) Now suppose the market will last for many years. In each year the firms will have profits as shown in the table above. Would the firms choose different strategies in this new situation? Explain. [1,5 marks]
- d) Why are there markets where only two firms operate, as in this example? [0,75 marks]

### Answers

Part A

1-D; 2-D; 3-C; 4-C; 5-A; 6-B; 7-C; 8-A; 9-B; 10-A; 11-D; 12-C

Part B

**1. a)**

$$Q_d = Q_s \Leftrightarrow 700 - 2p = 3p \Leftrightarrow 700 = 5p \Leftrightarrow p = 140 \text{ m.u.}$$

$$Q_s(140) = 140 \cdot 3 \Leftrightarrow Q = 420 \text{ m.u.}$$

**1b)**

Price paid by the consumers:  $p_d$  (400)

$$Q_d = 700 - 2p_d \Leftrightarrow 400 = 700 - 2p_d \Leftrightarrow 2p_d = 300 \Leftrightarrow p_d = 150 \text{ m.u.}$$

Quota rent per unit:  $p_d - p_s$

$$p_s = 400/3 = 133,3$$

$$p_d - p_s = 150 - 133,3 = 16,7 \text{ m.u.}$$

**1c)**

$$DWL = 16,7 \cdot 20/2 = 167 \text{ m.u.}$$

**2.a)**

It is defined in the short-run because there are fixed costs. In this case, the fixed costs are equal to 1.

**2.b)**

$$ATC = \frac{TC}{Q} = \frac{Q^2 + 4Q + 1}{Q} = Q + 4 + \frac{1}{Q}$$

$$AVC = \frac{VC}{Q} = \frac{Q^2 + 4Q}{Q} = Q + 4$$

$$AFC = \frac{FC}{Q} = \frac{1}{Q}$$

$$MC = \frac{\partial TC}{\partial Q} = 2Q + 4$$

**2.c)**

$$P = MC$$



$$P=2Q+4,$$

$$Q_i = \frac{P}{2} - 2$$

$P > AVC$  Always happens that  $2Q+4 > Q + 4$

$$Q > 0 \quad P > 4$$

Individual supply curve is  $Q_i = \frac{P}{2} - 2$  for  $P > 4$ .

Market supply curve  $Q^S = 10 * Q_i = 5P - 20 \rightarrow Q^S(p) = 5P - 20$

2d)

$$Q^D = Q^S$$

$$P=13-Q/10$$

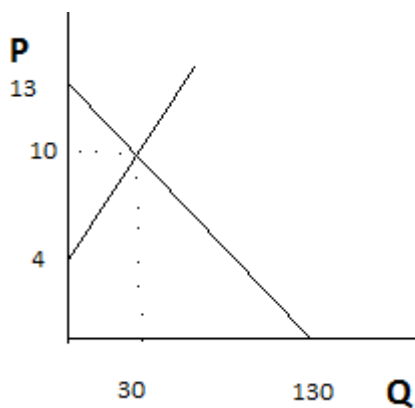
$$Q^D = 130 - 10P$$

$$5P-20=130-10P$$

$$P^*=10$$

$$Q^*=30$$

$$PS = \frac{(10-4)*30}{2} = 90 \text{ u.m}$$



3.a) Both have. Alpha will make a higher profit choosing high output no matter what Beta chooses, and similarly for Beta.

3.b) Yes. Both firms will choose high output, as high output is a dominant strategy for each firm.

3.c) They might tacitly cooperate by choosing low output, so making higher profits than with low output. If the game is played only once, each firm would have an incentive to produce high output, but



if they play repeatedly, they would have an incentive to produce low so that the other firm would produce low in the following year. They might adopt a tit-for-tat strategy: in the first year the firm produces low; in every subsequent year it produces low if the other firm produced low the previous year, and produces high if the other firm produced high the previous year. If both adopt this strategy both will make higher profits every year.

**3.d)** The causes of duopolies are the same as the causes of monopolies, but in a weaker form. A duopoly will arise if two firms have exclusive control over a crucial input, enjoy a technological advantage over potential competitors, or are protected from competition by legal barriers to entry. The most common reason though is economies of scale. If there are economies of scale average cost falls with output. If economies of scale apply to any output level we may end up with a monopoly. But if economies of scale exist only up to a certain relatively high output level we may end up just with two firms.