LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

Microeconomics II

Licenciatura in Economics

1st of July 2019
Duration: 45m + 75m

Regular Exam — Part A

Maximum duration of Part A: 45 minutes

Full Name: …… A

Student Number: …… Class: ……

1. Mark your answers with an 'O' in the table below. You get 0.625 marks for each right answer, and a 0.625/3 (≈ 0.208) deduction for any wrong answer.
2. You cannot look up books or notes of any kind. Invigilators will not help you with the test.
3. You cannot use calculators, computers, mobile phones, or any other data storage device.
4. This test paper must be returned to the invigilator even if you decide not to take the test.

ANSWER SHEET

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
a	a	a	a	a	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	b
c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d

1. A monopolist has constant marginal costs and faces a linear demand curve. The government levies a new tax of €8 per unit sold. Then the profit-maximising price will:
   a) Increase by €8.
   b) Increase by €4
   c) Increase by €12.
   d) None of the other alternatives is correct.

2. A monopolist's marginal revenue:
   a) Is negative when demand is inelastic.
   b) Lower than the market price.
   c) Positive when demand is elastic.
   d) All other alternatives are correct.

3. A monopolist sells to two markets with different price-elasticities of demand and it engages in third-degree price discrimination. Then it will charge:
   a) The same price in both markets.
   b) A higher price where demand is more elastic.
   c) A higher price where demand is less elastic.
   d) The information is not enough to answer.

4. Which of the following is typical of monopolistic competition?
   a) Homogeneous product.
   b) Barriers to entry.
   c) Each firm faces a horizontal demand curve.
   d) Product differentiation.

5. Ed is risk-neutral. Then in the wealth-utility graph the point (expected value of wealth, expected utility of wealth):
   a) Lies above his utility curve.
   b) Lies below his utility curve.
   c) Lies on his utility curve.
   d) Does not exist.

6. An insurer does not ask their new health-insurance customers to provide any information about their previous health history. Then this insurer will likely charge:
   a) A higher-than-market-average insurance premium.
   b) A lower-than-market-average insurance premium.
   c) No insurance premium.
   d) All other alternatives are incorrect.

7. Which of the following will reduce risk?
   a) Avoidance of risky situations.
   b) Obtaining more and better information.
   c) Investment diversification.
   d) All other alternatives are correct.

8. A used-car seller offers a warranty. Then buyers will believe the car is of good quality if:
   a) It is unprofitable to offer a warranty on a bad car.
   b) All used cars come with a warranty.
   c) All bad used cards come with a warranty.
   d) The warranty is a false signal.

9. *A* and *B* play a game. *A* has strategies *A*1 and *A*2, and *B* strategies *B*1 and *B*2. *A*1 is the best response to *B*1. Then:
   a) *A*1 is a dominant strategy.
   b) *A*1 may or may not be a dominant strategy.
   c) *B*1 is part of every Nash equilibria.
   d) None of the other alternatives is correct.

10. In a two-player game, both players have a dominant strategy. Then:
    a) That pair or strategies is a Nash equilibrium, and it is possible that other Nash equilibria exist.
    b) That pair or strategies is a Nash equilibrium, and there is at least another one.
    c) That pair or strategies is the only Nash equilibrium.
    d) There are no Nash equilibria.

11. Two firms have identical cost functions. Then the Bertrand equilibrium is:
    a) Efficient, as all mutually beneficial trades take place.
    b) Efficient, because new firms can enter the market.
    c) Inefficient, as not all mutually beneficial trades take place.
    d) Inefficient, because no new firms can enter the market.

12. In a Stackelberg equilibrium with two firms with identical cost functions:
    a) The leader produces more than the follower.
    b) The leader produced less than the follower.
    c) Both firms produce the same.
    d) Each firm chooses its output level according to its reaction function.

13. A community is made up of 5 people. Each person has decreasing marginal willingness to pay (WTP_i) for public good *X*. When $X = 10$, $WTP_i = €2$ for each person. Then if the marginal cost of *X* is constant at:
    a) €2, the optimal quantity of *X* is 50.
    b) €2, the optimal quantity of *X* is 10.
    c) €10, the optimal quantity of *X* is 10.
    d) None of the other alternatives is correct.

14. Which of the following is the best example of a "tragedy of the commons"?
    a) Excessive fishing in international waters.
    b) Funding by voluntary contributions to the restauration of a historic building is suboptimal as everyone is counting on others to foot the bill.
    c) Pollution is excessive because the polluter does not fully bear the costs caused by pollution.
    d) None of the other alternatives is an example of a tragedy of the commons.

15. By definition, the pollution level in inefficiently high if:
    a) The polluter's marginal benefit from polluting exceeds the external marginal cost.
    b) The polluter's marginal cost of reducing pollution exceeds the external marginal cost of pollution.
    c) Private negotiation is prohibitively high.
    d) None of the other alternatives is correct.

16. Ed and Al share public good *X*. If $X = 10$, Ed's and Al's marginal rates of substitution (amount of private good per unit of public good) are 1.1 and 0.6. One unit of *X* costs one unit of private good. Then the current provision (10):
    a) Is less than the Pareto-efficient one.
    b) Is higher than the Pareto-efficient one.
    c) Is Pareto efficient, as any change in the quantity of *X* will harm Ed, Al, or both.
    d) There is no Pareto-efficient quantity as Ed and Al prefer different quantities of *X*.

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Licenciatura in Economics

1st of July 2019
Duration: 45m + 75m

Normal-Period Exam — Part B

Maximum duration of the exam: 2 hours

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2. Switch off and put away any graphical calculators, computers, mobile phones, or any other data storage device.

QUESTION 1 (4 marks)

a) (1.5) A monopolist has constant marginal costs at €2 (and no fixed costs) and sells to two markets with inverse demand curves $p_1(y_1) = 20 - y_1$ e $p_2(y_2) = 30 - 2y_2$. Resale between markets is impossible, and the monopolist is free to charge the prices it wants in each market. Find the maximum profit and the profit-maximising quantities and prices. Explain your reasoning and show all relevant calculations.

b) (1.5) Two duopolists face the inverse demand curve $p(y) = 40 - y$ and marginal costs $MC_1(y_1) = 2y_1$ and $MC_2(y_2) = 4y_2$. The duopolists decide to maximise their joint profit. Find the optimal price and quantities. Explain your reasoning and show all relevant calculations.

c) (1) In the long-run monopolistically competitive equilibrium, in which section of the (long-run) average cost curve does the firm operate? Explain.

QUESTION 2 (4 marks)

Consider the following non-cooperative game:

		Al	
		L	*R*
Ed	*T*	1, 2	2, 3
	D	0, 5	3, 4

a) (1) Is it possible for a simultaneous game not to have a Nash equilibrium? Explain.

b) (1.5) Consider the game in the matrix above. Assume it is simultaneous. Find the equilibrium in pure strategies. Explain.

c) (1.5) Now assume the game is sequential, and Ed plays first. Find the equilibrium. Explain.

QUESTION 3 (4 marks)

Demand in a competitive market is $p(y) = 120 - y$; the industry private marginal cost is $PMC(y) = y + 20$; and production generates an external marginal cost $EMC(y) = y$.

a) (1.5) Find the socially optimal quantity and price. Explain.

b) (1.5) Find the unregulated equilibrium price and quantity. Explain.

c) (1) The government decides to levy a Pigouvian tax to reach Pareto efficiency. What is the appropriate tax rate and resulting tax revenue? Explain.

Answers to Part A (this version, A)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
b	d	c	d	c	a	d	a	b	c	a	a	c	a	d	a

Answers to Part B

Question 1

a) The monopolist maximises profit with marginal revenues equal to marginal cost. As marginal cost is constant at 2, we must have $MR_1(y_1) = 2 \Leftrightarrow 20 - 2y_1 = 2 \Leftrightarrow y_1 = 9$ and $MR_2(y_2) = 2 \Leftrightarrow 30 - 4y_1 = 7$. Then $p_1(9) = 11$, $p_2(7) = 16$. With no fixed costs, average cost equals average variable cost, which equals marginal cost as this is constant. So $AC = MC = 2$, therefore $c(y) = c(y_1 + y_2) = 2((y_1 + y_2)$. So profit is $\pi = p_1 y_1 + p_2 y_2 - c(y_1 + y_2) = 11 \times 9 + 16 \times 7 - 2\,(9 + 7) = 179$.

b) To maximise joint profit firms must choose quantities such that marginal revenue equals both marginal costs. So, $MC_1(y_1) = MC_2(y_2) \Leftrightarrow 2y_1 = 4y_2 \Leftrightarrow y_1 = 2y_2$. Marginal revenue is $MR(y) = 40 - 2y = 40 - 2(y_1 + y_2)$. So, $MC_2(y_2) = MR(y_1 + y_2) \Leftrightarrow 4y_2 = 40 - 2(y_1 + y_2) \Leftrightarrow 4y_2 = 40 - 2(2y_2 + y_2) \Leftrightarrow y_2 = 4$. Therefore $y_1 = 2y_2 = 8$. The price is $p(4 + 8) = 28$.

c) It operates on the decreasing section of the average cost curve. For the explanation see Varian.

Question 2

a) With a finite number of players and strategies there is always an equilibrium in mixed strategies but there may be no equilibrium in pure strategies as it is the case with the payoff matrix above, it it is a simultaneous game:
   (*T*, *L*) is not a Nash equilibrium because *L* is not a best response to *T* (*R* is, 3 > 2);
   (*T*, *R*) is not either because *T* is not a best response to *R* (*D* is, 3 > 2 again, different 2 and 3);
   (*D*, *R*) is not either because *R* is not a best response to *D* (*L* is, 5 > 4);
   (*D*, *L*) is not either because *D* is not a best response to *L* (*T* is, 1 > 0).

b) There isn't one, as explained in a).

c) Ed knows Al would respond to *T* with *R* (because he would get 3 rather than 2), so Ed would get 2; and would respond to *D* with *L* (he would get 5 rather than 4), so Ed would get zero. So Ed will play *T* to get 2 rather than zero. So the equilibrium is (*T*, *R*).

Question 3

a) The socially optimal is that that equates marginal social cost, *MSC*(*y*), to marginal social benefit, *MSB*(*y*). In this case *MSB*(*y*) = *p*(*y*) (as there is no external benefit) and *MSC*(*y*) = *PMC*(*y*) + *EMC*(*y*). So *PMC*(*y*) + *EMC*(*y*) = *p*(*y*) $\Leftrightarrow$ $y + 20 + y = 120 - y \Leftrightarrow y = 33.333$. At this quantity, $p(33.333) = 86.667$.

b) Assuming a competitive market, *PMC*(*y*) = *y* + 20 is the industry inverse supply curve, so in equilibrium *PMC*(*y*) = *p*(*y*)$\Leftrightarrow$ $y + 20 = 120 - y \Leftrightarrow y = 50$; $p(50) = 70$.

c) The appropriate tax rate *t* equal the external marginal cost at the socially optimal quantity. Therefore $t = EMC(33.333) = 33.333$. This tax is in practice an extra cost the firms must bear for each unit they produce. So they will produce only up to the point where *PMC*(*y*) + 33.333 = *p*(*y*), which yields the desired quantity $y = 33.333$. Tax revenue is $t \times y = 33.333 \times 33.333 = 1{,}111.111$.