Regular-Period Exam — Multiple-Choice Questions

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. This is a closed-bool exam: you cannot look up books or notes of any kind. Invigilators will not help you with the exam.
3. Switch off and put away any mobile phones, computers, and any other data storage device.
4. This exam paper must be returned to the invigilator even if you decide to quit.

ANSWER TABLE

	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 faces the demand curve $y(p) = 40 - 2p$. Its marginal revenue is:
   a) $Rmg = 40 - 4p$.
   b) $Rmg = 40 - 4y$.
   c) $Rmg = 20 - p$.
   d) $Rmg = 20 - y$.

2. Which of the following cost functions is more likely to give rise to a monopoly?
   a) $c(y) = 2y$.
   b) $c(y) = 0.5y$.
   c) $c(y) = y^{0.5}$.
   d) None of them is more likely to give rise to a monopoly than the others.

3. A monopolist has marginal cost = 8. If it charges $p = 10$ in markets 1 e 2, price-elasticities of demand will be $\varepsilon_1 = 1.3$ and $\varepsilon_2 = 1.6$. Then it is possible to increase profit by:
   a) Increasing the price in market 1, and lowering it in market 2
   b) Lowering the price in market 1 and increasing it in market 2.
   c) Lowering the price in both markets.
   d) Increasing the price in both markets.

4. In a cartel, to maximise total profit all firms actually producing should produce quantities such that:
   a) All have the same marginal cost.
   b) All have the same average cost.
   c) All have the same average variable cost.
   d) None of the other options are correct.

5. The Cournot model can be defined as:
   a) A sequential game where firms choose quantities.
   b) A sequential game where firms choose prices.
   c) A simultaneous game where firms choose prices.
   d) None of the other options are correct.

6. Presently in a two-firm cartel, both firms produce the same quantity, and the cartel's marginal revenue is €10. Then each individual firm's marginal revenue is:
   a) Less than €10.
   b) Higher than €10.
   c) €10 as well.
   d) The information is insufficient to answer.

7. A firm can choose as pure strategies to produce 20 or to produce 30. A mixed strategy is defined as:
   a) To alternate between 20 and 30 in a repeated game.
   b) To produce a weighted average of 20 and 30.
   c) In a sequential game, the last firm to choose to respond with 20 to some of the fist firm's strategies; with 30 to the other strategies.
   d) None of the other options are correct.

8. Ed maximizes expected utility and is risk averse. He has utility $u(200) = 10$, $u(400) = 14$. Then:
   a) $u(300) = 12$.
   b) $u(300) > 12$.
   c) $u(300) < 12$.
   d) The information is insufficient to answer.

9. Ed has initial wealth €1000 and faces a 5% chance of losing €400. The fair insurance premium is
   a) €50.
   b) €20.
   c) 0.4.
   d) None of the other options are correct.

10. Ed, a risk-averse expected-utility maximiser, can buy an asset for €100, which will be worth €80 or €120 with 50% chance each. Then he will:
    a) Prefer to buy.
    b) Be indifferent between buying or not.
    c) Prefer not to buy.
    d) The information is insufficient to answer.

11. Ed started cycling dangerously in heavy traffic after he bought health insurance. This is a case of:
    a) Moral hazard.
    b) Adverse selection.
    c) Signalling.
    d) None of the other options are correct.

12. A university degree costs more than the wage difference between workers with and without degree. Then:
    a) Even low-ability workers will want the degree.
    b) Nearly all workers will have high ability.
    c) There will be a separating equilibrium.
    d) There will be a pooling equilibrium.

13. Pareto efficiency can be achieved when there are externalities:
    a) In no circumstances.
    b) If the externality affects many people and property rights are well defined.
    c) If the externality affects many people and property rights are poorly defined.
    d) If the externality affects very few people and property rights are well defined.

14. Firm X produces x with the cost function $c_x(x) = x^2 + 10$. Firm Y makes y with the cost function $c_y(y, x) = y^2 + x$. Both firms are perfectly competitive, and $p_x =$ €20, $p_y =$ €40. The Pigouvian tax is:
    a) €3.
    b) €2.
    c) €1.
    d) Zero.

15. At the Pareto-efficient quantity of a public good, the marginal cost of the good must be equal to:
    a) None of the other options are correct.
    b) Each individual's marginal benefit.
    c) The sum of all individuals' marginal benefits.
    d) The average of all individuals' marginal benefits.

16. The aggregate demand for a public good can be obtained as the:
    a) Horizontal summation of all individual demand curves.
    b) Sum of all individual's marginal willingness to pay divided by the number of individuals.
    c) Marginal willingness to pay of the individual that values the good the most.
    d) Vertical summation of all individual demand curves.

Regular-Period Exam — Open Questions

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2. Keep any graphical calculators, computers, mobile phones, and any other data storage devices switched off and stored away from the table.

Group 1

Demand for blueberries in the Odmirian Republic is $p(y) = 10 - y$. There are two producers only, Alpha and Beta, with identical cost functions: $c_a(y_a) = 2 + y_a$ and $c_b(y_b) = 2 + y_b$.

a) [2 marks] The two firms independently and simultaneously choose quantities. Find the equilibrium quantities, market price, and profits. Explain your reasoning.

b) [1.5 marks] The government aims to increase production and consumption of blueberries. Could this be achieved by making sure that Alpha sets its quantity first, so becoming the quantity leader in the market? Explain.

Group 2

The two parts are independent.

a) [2 marks] Consider a simultaneous game with the payoff matrix below. Find all equilibria in pure strategies and mixes strategies. Explain.

		Bob	
		L	*R*
Alice	*T*	10, 15	50, 10
	D	10, 50	40, 40

b) [1.5 marks] Ana maximises expected utility and has utility form wealth $u(w) = \ln w$, where ln is the natural logarithm. She has initial wealth €10 000 but faces a 10% chance of losing €3 600. Ana can insure any amount, and the insurance premium is 10 cents per euro of capital insured. Will she want to buy full insurance? Explain and show any calculations you deem necessary.

Group 3

Demand for a certain good is given by $p(Q) = 80 - Q$. Private marginal cost is $PMC = Q/3$, but production causes an external marginal cost $EMC = 2Q/3$.

a) [1.5 marks] Find the unregulated equilibrium and compare it to the socially optimal outcome. Illustrate them in a graph.

b) [1.5 marks] The government decides to levy a tax per unit produced so as to achieve the socially optimal outcome. Find the value of the tax per unit and clearly explain how it achieves its aim.

Answers to the multiple-choice questions

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

Answers to the open questions

Question 1

a) This is the Cournot model. Each firm maximises its profit based on its expectation of the rival's output:

Max $\pi_a = p(y_a + y_b^e)y_a - c(y_a) = [10 - (y_a + y_b^e)]y_a - (2 + y_a) = 10y_a - y_a^2 + y_a y_b^e - 2 - y_a$
$\partial\pi_a/\partial y_a = 10 - 2y_a - y_b^e - 1 = 0 \Leftrightarrow y_a = 4.5 - 0.5y_b^e$ (1)
Max $\pi_b = p(y_a^e + y_b)y_b - c(y_b) = [10 - (y_a^e + y_b)]y_b - (2 + y_b) = 10y_b - y_a^e y_b + y_b^2 - 2 - y_b$
$\partial\pi_b/\partial y_b = 10 - y_a^e - 2y_b - 1 = 0 \Leftrightarrow y_b = 4.5 - 0.5y_a^e$ (2)
In equilibrium $y_a^e = y_a$ and $y_b^e = b_a$, so from (1) and (2): $y_a = b_a = 3$; total output is 6; $p(6) = 4$.
$\pi_a = \pi_b = 4 \times 3 - (2 + 3) = 7$.

b) This is the Stackelberg model. If Alpha sets its quantity first, it knows that Beta will know it and produce $y_b = 4.5 - 0.5y_a$. So Alpha maximises profit taking this into account:

Max $\pi_a = p(y_a + y_b^e)y_a - c(y_a) = [10 - (y_a + (4.5 - 0.5y_a))]y_a - (2 + y_a) = 5.5y_a - 0.5y_a^2 - 2 - y_a$
$\partial\pi_a/\partial y_a = 5.5 - y_a - 1 = 0 \Leftrightarrow y_a = 4.5$.
Then $y_b = 4.5 - 0.5 \times 4.5 = 2.25$; total output would be 6.75, so higher than before, so achieving the government's aim.

Question 2

a) Bob will play *L*, as *L* is the dominant strategy for him. For Alice, *T* and *D* are both best responses to Bob's *L*, so there are two equilibria in pure strategies: (*T, L*) and (*D, L*). In mixed strategies, Bob plays *L* with probability 1 (because he gets a higher payoff with *L* no matter what Alice does), and Alice plays *T* with any probability between 0 and 1 (and *D* with the remaining probability), because all those strategies give her the same payoff (10). This might not be obvious to you, so you might want to do the calculations.

Let Alice play *T* with probability *a* and *D* with probability 1 – a; Bob plays *L* with probability *b* and *R* with probability 1 – b. Each player maximises expected payoff, *EP*:

Max $EP_b = 15ab + 10a(1 - b) + 50(1 - a)b + 40(1 - a)(1 - b)$
$\partial EP_b/\partial b = 15a - 10a + 50(1 - a) - 40(1 - a) = 10 - 5a > 0$ (because $a \leq 1$)
$\partial EP_b/\partial b > 0$ means that EP_b increases with *b*, so Bob will want *b* as high as possible, so $b = 1$.

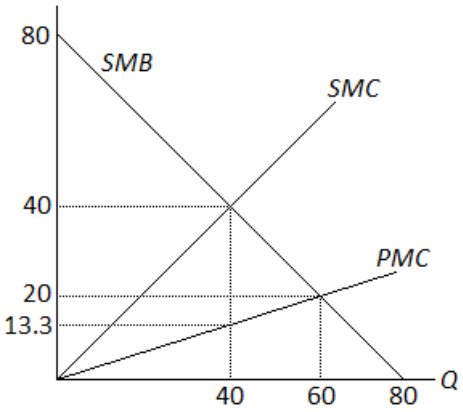
Max $EP_a = 10ab + 50a(1 - b) + 10(1 - a)b + 40(1 - a)(1 - b)$
$\partial EP_a/\partial a = 10b + 50(1 - b) - 10b - 40(1 - b) = 10(1 - b)$
We know already $b = 1$ in equilibrium, so $\partial EP_a/\partial a = 0$, meaning Alice gets the same payoff no matter the value of *a* (we know she gets payoff 10), so any *a* belonging to [0, 1] is a best response to Bob's $b = 1$.

b) The insurance premium is fair, that is, it is equal to the expected compensation (10% of the capital insured). This means the expected wealth is the same no matter how much capital k Ana insures: $E(w) = 0.1(10{,}000 - 3{,}600 + k - 0.1k) + 0.9(10{,}000 - 0.1k) = 9{,}640$ (= initial wealth minus expected loss). With full insurance, Ana is guaranteed final wealth €9,640; insuring less than that, she gets the same expected final wealth, but faces risk (she will get more if there's no loss; less if the loss occurs). So, as she is risk averse, she prefers to insure the whole €3,600. You could always do the calculations:

$$\text{Max } U = 0.1\ln(10{,}000 - 3{,}600 + k - 0.1k) + 0.9\ln(10{,}000 - 0.1k) =$$
$$= 0.1\ln(6{,}400 + 0.9k) + 0.9\ln(10{,}000 - 0.1k)$$
$$\partial U/\partial k = 0.09/(6{,}400 + 0.9k) - 0.09/(10{,}000 - 0.1k) = 0 \Leftrightarrow k = 3{,}600$$

Question 3

a) Unregulated equilibrium:
$PMC(Q) = p(Q) \Leftrightarrow Q/3 = 80 - Q \Leftrightarrow Q = 60$; $p(60) = 20$.
Socially optimal equilibrium:
$SMC(Q) = SMB(Q) \Leftrightarrow PMC(Q) + EMC(Q) = p(Q) \Leftrightarrow$
$\Leftrightarrow Q/3 + 2Q/3 = 80 - Q \Leftrightarrow Q = 40$.



b) This is known as Pigouvian tax. To achieve the socially optimal outcome it must be equal to the external marginal cost at the socially optimal quantity, so $EMC(40) = 2 \times 40/3 = 26.67$. This tax will increase the private marginal cost, so at $Q = 40$, the producer total marginal cost (marginal cost without tax, 13.33, plus the tax) will equal the social marginal cost and the price, so $Q = 40$ will be the market equilibrium as intended.