Regular-Period Exam — Part A

Maximum duration of Part A: 50 minutes

Full Name: …… A

Student Number: …… Class: ……

1. Mark your answers with an 'O' in the table below. You get 0.5 marks for each right answer, and a 0.5/3 (≈ 0.167) 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 any calculators in this part. Switch off and put away any mobile phones, computers, and any other data storage device.
4. This test 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. If indifference curves are horizontal:
   a) Good 1 (on the horizontal axis) is a neutral good.
   b) Good 2 (on the vertical axis) is a neutral good.
   c) Good 1 (on the horizontal axis) is a bad.
   d) Good 2 (on the vertical axis) is a bad.

2. The utility function is $u = \ln(2x_1) + \ln(3x_2)$. Then:
   a) The goods are perfect substitutes.
   b) The goods are perfect complements.
   c) The function describes the same preferences as a Cobb-Douglas function.
   d) The function describes quasi-linear preferences.

3. The inverse demand curve is $p = 100 - 5y$. Now consumers halve their quantity demanded at any price. The new inverse demand curve is:
   a) $p = 100 - 10y$.
   b) $p = 100 - 2.5y$.
   c) $p = 50 - 2.5y$.
   d) $p = 50 - 10y$.

4. A Giffen good:
   a) May be a normal good.
   b) Has no income effect.
   c) May be an ordinary good.
   d) Must be an inferior good.

5. Ed has the endowment ($\omega_1 = 15$, $\omega_2 = 3$) and no other income. $p_1 = 3p_2$ and goods 1 and 3 are perfect substitutes for Ed, at a rate one unit of good 1 for one unit of good 2. Then Ed's net demand for good 2 is:
   a) 48.
   b) 18
   c) 45
   d) There is not enough information to answer.

6. Ed buys goods 1 and 2. At prices $(p_1, p_2) = (6, 7)$ he buys the bundle (6, 6). At prices $(p_1, p_2) = (1, 5)$ he buys the bundle (10, 0). Then:
   a) Ed violates the weak axiom of revealed preference.
   b) Bundle (6, 6) is directly revealed preferred to (10, 0).
   c) Bundle (10, 0) is directly revealed preferred to (6, 6).
   d) None of the bundles is directly revealed preferred to the other one.

7. Ed has strictly convex preferences. He chose bundle *A* in moment *t*1. Then in moment *t*2 prices changed and he switched to bundle *B*. Then, according to the weak axiom of revealed preference:
   a) If *B* was affordable in *t*1, Ed's utility increased.
   b) If *A* was affordable in *t*2, Ed's utility fell.
   c) If *B* was affordable in *t*1 and *A* was affordable in *t*2, Ed's utility did not change.
   d) None of the other options is correct.

8. When a price increases, the substitution effect:
   a) Is in the same direction as the income effect.
   b) Is in the opposite direction to the income effect.
   c) Is negative or zero.
   d) Cannot be zero.

9. Ed consumes in two periods and can lend or borrow at the same nominal interest rate *r*. There is no inflation. Which of the following describes his budget line:
   a) $c_1 + c_2(1 + r) = m_1 + m_2(1 + r)$.
   b) $c_2 = m_2 + (m_1 - c_1)(1 + r)$.
   c) $c_1(1 + r) + c_2 = m_1 + m_2$.
   d) $c_1 + c_2 = m_1(1 + r) + m_2$.

10. A technology uses two inputs that are perfect substitutes. Then the technical rate of substitution:
    a) Equals the ratio of the optimal quantities of inputs.
    b) Equal the ratio of input prices.
    c) Is constant.
    d) Varies along the isoquant.

11. A firm reduces all inputs by 30%, and its output falls by 40%. This means that the firm's technology exhibits:
    a) Increasing returns to scale.
    b) Decreasing returns to scale.
    c) Decreasing marginal product.
    d) Increasing marginal product.

12. A perfectly competitive firm has decreasing marginal product of the variable input in the short run. Then:
    a) The short-run average cost falls as output rises.
    b) The short-run average cost rises as output rises.
    c) The short-run marginal cost rises as output rises.
    d) None of the other options is correct.

13. A competitive firm's short-run supply curve coincides with:
    a) The short-run marginal cost curve.
    b) The short-run average cost curve.
    c) The short-run average cost curve above the minimum average variable cost.
    d) The short-run marginal cost curve above the minimum average variable cost.

14. As losses force firms to exit a market, the other firms:
    a) Increase their losses and output.
    b) Increase their profit and lower their output.
    c) Increase their profit and output.
    d) Increase their losses and lower their output.

15. In an exchange economy with two consumers, in equilibrium, if one consumer has a positive net demand for a good, then:
    a) None of the options is correct.
    b) The other also has a positive net demand for that good.
    c) The other also has a positive net supply of that good.
    d) The outcome is not Pareto-efficient.

16. The Walras Law states that with *N* markets:
    a) If *N*-3 markets are in equilibrium, so are the other three.
    b) If *N*-2 markets are in equilibrium, so are the other two.
    c) If *N*-1 markets are in equilibrium, so is the other one.
    d) None of the other options is correct.

Regular-Period Exam — Part B

Maximum duration of the exam: 90 minutes

5. You cannot look up books or notes of any kind. Invigilators will not help you with the test.
6. Switch off and put away any graphical calculators, computers, mobile phones, or any other data storage device.

QUESTION 1 (5 marks)

Ed's preferences are described by the utility function $u(x_1, x_2) = x_1^{0.25} x_2^{0.75}$.

a) [2.5 marks] Find Ed's demand functions. Use the Lagrangean method, the substitution method, or the conditions for the optimal bundle (that is, do not use rules for this or that type of preferences).

b) [1 mark] The prices are $p_1 = 5$, $p_2 = 3$, and Ed's optimal bundle has 25 units of good 2. Find the optimal quantity of good 1. Explain.

c) [1.5 marks] Are these goods normal or inferior goods? Ordinary or Giffen goods. Explain.

QUESTION 2 (3 marks)

Consumers spend their income on goods 1 and 2. The government is considering a policy that would lower the production costs of good 1, and so would make good 1 available at a lower price. To see whether the benefits to consumers outweigh the cost of the policy, the government wants to find out how much the average consumer would be willing to pay (say, in the form of a lump-sum tax) for the benefit of being able to buy good 1 at the lower price.

a) [1 mark] Define compensating variation and equivalent variation. Which of these concepts is relevant in the situation above? Explain.

b) [2 marks] Illustrate the notion of compensating variation in an appropriate graph. (Assume well behaved preferences.)

QUESTION 3 (4 marks)

a) [2 marks] Firm XPTO operates with the short-run cost function $c(y) = 2y^2 + 800$. It sells its product in a perfectly competitive market, and the price of the product is currently €100. Find the firm's optimal output level and its profit. Explain and show all relevant calculations.

b) [1 mark] What is the minimum price at which the firm would be willing to sell in the short run? Explain and show all relevant calculations.

c) [1 mark] Zenith, a different firm, operates with the short-run production function $f(L) = 20L^{0.5}$, where L is the only variable input. The firm sells its product at €2 per unit and pays €10 per unit of input. Find the profit-maximising level of output and the profit. Explain and show all relevant calculations.

Answers to Part A

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

Answers to Part B

Question 1

a) The demand functions give the quantities in the optimal bundle as a function of income and prices. The optimal bundle must be on the budget line, equation (1) below, and where the budget line is tangent to an indifference curve, which implies $MRS = -p_1/p_2$, equation (2):

$p_1x_1 + p_2x_2 = m$ (1)

$MRS = -MU_1/MU_2 = -0.25x_1^{-0.75}x_2^{0.75}/(0.75x_1^{0.25}x_2^{-0.25}) = -x_2/(3x_1)$

$MRS = -p_1/p_2 \Leftrightarrow -x_2/(3x_1) = -p_1/p_2 \Leftrightarrow x_2 = 3p_1x_1/p_2$ (2)

Substituting (2) into (1):

$p_1x_1 + p_2(3p_1x_1/p_2) = m \Leftrightarrow p_1x_1 + 3p_1x_1 = m \Leftrightarrow x_1 = 0.25m/p_1$ (3)

Substituting (3) into (2):

$x_2 = 3p_1(0.25m/p_1)/p_2 = 0.75m/p_2$

So Ed's demand functions are:

$x_1(p_1, p_2, m) = 0.25m/p_1$

$x_2(p_1, p_2, m) = 0.75m/p_2$

b) Using the demand function obtained in a), we know $x_2(5, 3, m) = 25 \Leftrightarrow 0.75m/3 = 25 \Leftrightarrow m = 100$. Then $x_1(5, 3, 100) = 0.25 \times 100/5 = 5$.

c) From the demand functions obtained in a) $\partial x_1/\partial m = 0.25/p_1 > 0$; $\partial x_1/\partial m = 0.75/p_2 > 0$; so both goods are normal, that is quantity demanded rises when income rises. Normal goods are necessarily ordinary goods, that is if quantity demanded rises when income rises, then it will fall if the price rises. But we can check this directly: $\partial x_1/\partial p_1 = -0.25m/p_1^2 < 0$; $\partial x_2/\partial p_2 = -0.75m/p_2^2 < 0$.

Question 2

a) The maximum amount of money the consumer would be willing to pay as a lump-sum tax to be able to buy at the lower price is such that the consumer would be able to buy as good a bundle after the price reduction (and lower income) as the bundle they were buying before. This amount is the compensating variation. The equivalent variation, in the present case, would be the extra income that would allow the consumer to buy at the unchanged prices a bundle just as good as they could by with the reduced price.

b) See Varian, chapter 14, figure 14.4 and surrounding text.

Question 3

a) The firm maximises profit with marginal cost equal to price: $MC = p \Leftrightarrow 4y = 100 \Leftrightarrow y = 25$. Profit is $\pi = py - c(y) = 100 \times 25 - (2 \times 25^2 + 800) = 2{,}500 - 2{,}050 = 450$.

b) In the short run the firm is willing to produce as long as revenue covers variable cost (the fixed cost will have to be paid whether the firm produces anything or not), which means as long as the price covers the average variable cost. In the present case, $VC = 2y^2$, so $AVC = 2y$. So the minimum average variable cost is zero (when $y = 0$), which means the firm will produce at any price above zero.

c) The firm maximises profit: $\max \pi = pf(L) - wL - F = 2 \times 20L^{0.5} - 10L - F$, where F is the fixed cost. The first order condition is: $\partial\pi/\partial L = 20L^{-0.5} - 10 \Leftrightarrow L^{-0.5} = 0.5 \Leftrightarrow L = 4$. Profit is: $\pi = 2 \times 20 \times 4^{0.5} - 10 \times 4 - F = 40 - F$.