

Full Name: a

Student Number: Class:

[illegible]

1. When Ana buys bundle A , B is not affordable; when she buys B , A is affordable. Then:
 - a) A is directly revealed preferred to B .
 - b) B is directly revealed preferred to A .
 - c) None is directly revealed preferred to the other.
 - d) The choices violate the weak axiom of revealed preference.
2. If substitution and income effects work in opposite directions, and the former is larger (in absolute value) than the latter. Then the good is:
 - a) An inferior and Giffen good.
 - b) An inferior and ordinary good.
 - c) A normal and ordinary good.
 - d) The information is insufficient to answer.
3. Ana's marginal rate of substitution is -2 at any bundle. This means:
 - a) None of the other answers are correct.
 - b) She has quasi-linear preferences.
 - c) The goods are perfect complements to her.
 - d) The goods are perfect substitutes to her.
4. Which of the following utility functions does NOT represent the same preferences as $u(x, y) = x^{0.5} + y$?
 - a) $v(x, y) = \ln(x^{0.5} + y)$.
 - b) $w(x, y) = (x^{0.5} + y)^3$.
 - c) $z(x, y) = (x^{0.5} + y)/3$.
 - d) All other alternatives represent the same preferences as $u(x, y) = \ln(x^{0.5} + y)$.
5. Ana's preferences are strictly convex and $MU_x/MU_y = 2y/x$. Prices are $p_x = 6$, $p_y = 2$. At her optimal bundle:
 - a) $y = 0.5x$.
 - b) $y = 2x$.
 - c) $y = 3x$.
 - d) None of other alternatives are correct.
6. Two goods are perfect complements. Then the income expansion path is:
 - a) Horizontal.
 - b) Vertical.
 - c) A straight line through the origin.
 - d) None of the other alternatives are correct.
7. Ana would be equally better off if the price of good X fell by €5 or if her income increased by €90. Then, €90 is the:
 - a) Equivalent variation.
 - b) Compensating variation.
 - c) Change in consumer surplus if the price of X fell by €5.
 - d) Income effect if the price of X fell by €5.
8. Ana is a net seller of good X . The price of X falls. Then Ana:
 - a) Will remain a net seller of good X and be worse off.
 - b) Will be worse off regardless of whether she remains a net seller of good X or switches to net buyer.
 - c) Will switch to net buyer of good X and be better off.
 - d) None of other alternatives are correct.
9. Leisure is a normal good to Ana. Her real wage rate rises. Then she:
 - a) Will want to work longer hours.
 - b) Will want to work shorter hours.
 - c) Will want to keep working the same hours.
 - d) May want to work shorter, longer, or the same hours.
10. An output level where marginal cost equals the price and is no less than the minimum average variable cost maximises profit if:
 - a) Marginal cost is increasing.
 - b) Marginal cost is decreasing.
 - c) The marginal cost curve is U-shaped.
 - d) The average variable cost curve is U-shaped.
11. The short-run cost:
 - a) Is always higher than or equal to the long-run cost.
 - b) Is always lower than or equal to the long-run cost.
 - c) Is always lower than the long-run cost.
 - d) Can be equal to or higher or lower than the long-run cost.
12. Which of the following production functions exhibits decreasing returns to scale?
 - a) $f(x_1, x_2) = 11x_1^{0.8} x_2^{0.8}$.
 - b) $f(x_1, x_2) = 11(x_1^{0.8} + x_2^{0.8})$.
 - c) $f(x_1, x_2) = 8x_1^{1.1} x_2^{1.1}$.
 - d) None do.
13. A firm sells at price of €8, buys input 1 at a price of €5, and at current levels marginal product of input 1 is 0.5. Then increasing use of input 1 will lead to:
 - a) Lower profits.
 - b) Higher profits.
 - c) Unchanged profits.
 - d) The information is insufficient to answer.
14. With the production function $f(x_1, x_2) = 10x_1^{0.6} x_2^{0.3}$, when the firm uses $x_1 = 4$ and $x_2 = 6$ the technical rate of substitution is:
 - a) -1.5 .
 - b) $-2/3$.
 - c) -3 .
 - d) -2 .
15. The area underneath the marginal cost curve equals:
 - a) The variable cost.
 - b) The average variable cost.
 - c) The total cost.
 - d) The average total cost.
16. The industry long-run supply curve:
 - a) Is as steep as the industry short-run supply curve, only further to the left.
 - b) Is steeper than the industry short-run supply curve.
 - c) Is as steep as the industry short-run supply curve, only further to the right.
 - d) Is approximately horizontal.

Regular-Period Exam

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.

- a) [1.8 mark] A firm's production function is $y = f(x_1, x_2) = x_1x_2$. The input prices are $w_1 = 1$ and $w_2 = 4$. Find the optimal input quantities to produce $y = 100$. What is the cost of $y = 100$? Explain your reasoning and show all relevant calculations.
- b) [1 marks] A firm operates with the production function is $y = f(x_1, x_2) = x_1^{0.5} + x_2^{0.5}$. The input prices are $w_1 = 10$ and $w_2 = 15$. Input 2 is fixed in the short run. Find the short run cost curve when $x_2 = 40$. Explain your reasoning and show all relevant calculations.

- c) [2 marks] A firm operates with the cost function:

$$c(y) = \begin{cases} 0.5y^2 + 50 & \text{if } y > 0 \\ 0 & \text{if } y = 0 \end{cases}$$

Find the supply curve and illustrate it in a graph. Explain your reasoning.

- d) [0.7 marks] A firm operates with increasing returns to scale at all output levels. What does its long-run average cost curve look like. Explain?
- e) [0.7 marks] Ana's preferences can be described by the utility function $u(x, y) = x^{1.5} + y^{1.5}$. Are her preferences monotonic and convex? Explain.
- f) [0.8 marks] Ana has strictly convex preferences. Bundles (6, 10) and (12, 7) are on her budget line and on the same indifference curve. Can any of these bundles be optimal? Explain and illustrate the situation in a graph.
- g) [2 marks] Ed's utility function is $u(x, y) = 10\ln x + y$. He has income is $m = 60$, and prices are $p_x = 4$ and $p_y = 1$. Find his optimal consumption bundle. Explain your reasoning and show all relevant calculations.
- h) [2 marks] Ana's utility function is $u(x, y) = xy$, and her demand functions are $x(m, p_x) = 0.5m/p_x$ and $y(m, p_y) = 0.5m/p_y$. Her income is $m = 60$, and initially prices were $p_x = 2$ and $p_y = 5$. Then the price of good X increases to $p_x' = 3$. Find the compensating variation and explain what it means.
- i) [1 mark] What does the weak axiom of revealed preference say? Indicate a situation where the axiom is violated and illustrate it in a graph. Explain.

Answers to multiple-choice question

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

Answers topics to open questions

- a) From cost minimisation conditions $TRS = -w_1/w_2$ you get $x_2 = 0.25x_1$; this together with $x_1x_2 = 100$ yields $x_1 = 20$ and $x_2 = 4$; so cost is 40.
- b) With input 2 fixed at $x_2 = 40$, then $y = x_1^{0.5} + 40^{0.5} \Leftrightarrow x_1(y, 40) = (y - 40^{0.5})^2$. So $c_s(y, 40) = w_1x_1(y, 40) + w_2 \times 40 = 10(y - 40^{0.5})^2 + 600$.
- c) Coincides with the vertical axis ($y = 0$) for prices below the minimum average cost; coincides with marginal cost curve above the minimum cost curve. $AC(y) = y + 25/y$ (note that the 50 is quasi-fixed cost, not a fixed cost, so the firm need not incur it if they produce zero), is minimised at $y = 10$, and $AC(10) = MC(10) = 10$. So supply is $y(p) = p$ if $p \geq 10$, $y(p) = 0$ if $p < 10$.
- d) It is decreasing: the long-run average cost falls as output rises. See Varian, chapter 19, section "Returns to scale and the cost function."
- e) They are monotonic because marginal utilities are positive, meaning any increase in any of the goods increases utility. They are concave, not convex, as the marginal rate of substitution (in absolute values) increases as you move down along the indifference curve.
- f) They cannot. As preferences are strictly convex, the section of the budget line between the two bundles — (6, 10) and (12, 7) — lies above the indifference curve that goes through them, which means that any bundle in that section is strictly preferred to any of the two bundles. The optimal bundle is somewhere between them, on a higher indifference curve.
- g) From the utility maximisation condition from $MRS = -p_x/p_y = -4/1$, you get $x = 2.5$; then from the budget line you get $y = 50$.
- h) Compensating variation is 13.48: after the price of good 1 has increased to 3, if Ana's income increased by 13.48 (so new income would be 13.48), she would be able to achieve the same utility as she has with the old, lower, price and original income. See example in Varian in the section "Compensating and Equivalent Variation."
- i) See Varian, chapter "Revealed Preference."