Universidad Carlos III de Madrid May 2018

Microeconomics

Name: Group:

1	2	3	4	5	Grade

You have 2 hours and 45 minutes to answer all the questions.

1. Multiple Choice Questions. (Mark your choice with an "x." You get 2 points if your answer is correct, -0.66 points if it is incorrect, and zero points if you do not answer.)

1.1. The lexicographic preferences $\succsim_L$ over consumption bundles in $\mathbb{R}^2_+$ are defined as $(x, y) \succsim_L (x', y')$ if $x > x'$, or if $x = x'$ and $y \geq y'$. Hence, $\succsim_L$

☐ does not satisfy axiom $A.1$ (completeness)
☐ does not satisfy axiom$A.2$ (transitivity)
☐ does not satisfy axiom $A.3$ (monotonicity)
☐ satisfies axioms $A.1$, $A.2$ and $A.3$.

1.2. A consumer with monetary income $I = 4$ is considering buying the consumption bundle $(0, 2)$ at prices $(p_x, p_y) = (3, 2)$. If $RMS(0, 2) = 2$, then

☐ buy less good x and more good y ☐ buy more of both goods
☐ buy more good x and less good y ☐ the bundle $(0, 2)$ is optimal.

1.3. The prices were $(p_x, p_y) = (1, 1)$ in 2017, and are $(p'_x, p'_y) = (1, 2)$ in 2018. Therefore the true consumer price index (CPI) for a consumer with income $I = 3$, and preferences are represented by the utility function $u(x, y) = \min\{2x, y\}$ is

☐ 1 ☐ $\frac{4}{3}$ ☐ $\frac{3}{2}$ ☐ $\frac{5}{3}$,

1.4. and his Laspeyres CPI is

☐ 1 ☐ $\frac{4}{3}$ ☐ $\frac{3}{2}$ ☐ $\frac{5}{3}$.

1.5. An individual with preferences represented by the Bernoulli utility function $u(x) = \sqrt{x}$, where x is his salary, has two job offers (X and Y) with wages that depend on whether the economy falls into a *recession* (R), *maintains* the current situation (M), or stars a booming cycle (B), which occurs with probabilities $p_R = 1/4$, $p_M = 1/2$ and $p_B = 1/4$. Job offer X pays $(x_R, x_M, x_B) = (16, 25, 36)$ and job offer Y pays $(y_R, y_M, y_B) = (0, 16, 100)$. Hence, the expected utility and certainty equivalent of his preferred job offer, (Eu^*, EC^*), are

☐ $(Eu^*, EC^*) = (4, 16)$ ☐ $(Eu^*, EC^*) = (5, 20)$
☐ $(Eu^*, EC^*) = (5, 25)$ ☐ $(Eu^*, EC^*) = (6, 36)$,

1.6. and the maximum amount the individual is willing to pay in order to know with certainty the state of the economy, M, satisfies

☐ $M = 0$ ☐ $M \in (5, 10)$
☐ $M \leq 5$ ☐ $M \geq 10$.

1.7. The production function of Lolita, the competitive cow of Holstein that produces milk using oats (x) and barley (y) which she buys at prices $p_x = 8$ and $p_y = 4$, is $F(x, y) = x^2\sqrt{y}$. In the short run the amount of oats is fixed to $\bar{x} = 2$ units. There in the short run Lolita has

☐ economies of scale ☐ diseconomies of scale
☐ constant returns to scale ☐ increasing average variable cost,

1.8. and her competitive supply of milk $S(p)$ at prices $p = 2$ and $p = 6$ is

☐ $S(2) = 0$, $S(6) = 3$ ☐ $S(2) = 4$, $S(6) = 6$
☐ $S(2) = 0$, $S(6) = 12$ ☐ $S(2) = 4$, $S(6) = 12$.

1.9. The Lerner index of a monopoly that produces the good with costs $C(Q) = 20 + Q^2$ if the demand is $D(P) = \max\{12 - P, 0\}$ is

☐ $\frac{1}{4}$ ☐ $\frac{1}{3}$ ☐ $\frac{1}{2}$ ☐ $\frac{2}{3}$,

1.10. and its profit with first degree price discrimination is

☐ 2 ☐ 4 ☐ 6 ☐ 8.

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You have 2 hours and 45 minutes to answer all the questions.

1. Multiple Choice Questions. (Mark your choice with an "x." You get 2 points if your answer is correct, -0.66 points if it is incorrect, and zero points if you do not answer.)

1.1. The Pareto preferences

☐ do not satisfy axiom $A.1$ (completeness) ☐ do not satisfy axiom $A.3$ (monotonicity)
☐ do not satisfy axiom $A.2$ (transitivity) ☐ do not satisfy axiom $A.4$ (continuity).

Questions 1.2 and 1.3 refer to a consumer with preferences over x and y represented by the utility function $u(x, y) = 2x + y$, and a monetary income $I = 12$.

1.2. At prices $(p_x, p_y) = (3, 1)$, his optimal consumption bundle is

☐ $(0, 12)$ ☐ $(4, 0)$
☐ $(2, 6)$ ☐ $(3, 3)$.

1.3. The substitution and income effects, SE and IE, of a increase of the price of y to $p'_y = 2$ over the demand of y are

☐ $SE = -12$, $IE = 0$ ☐ $SE = 0$, $IE = -6$
☐ $SE = -6$, $IE = -6$ ☐ $SE = 0$, $IE = -12$.

Questions 1.4 and 1.5 refer to a consumer with preferences over food (x) and clothing (y) represented by the utility function $u(x, y) = xy$, and whose monetary income in 2018 was $I = 2$. In 2018 prices were $(p_x^{2018}, p_y^{2018}) = (1, 1)$, and in 2019 they are $(p_x^{2019}, p_y^{2019}) = (4, 1)$.

1.4. The true consumer price index of this individual is

☐ 1 ☐ 1.5 ☐ 2 ☐ 2.5.

1.5. The consumer price index of this individual calculated as a Laspeyres index is

☐ 1 ☐ 1.5 ☐ 2 ☐ 2.5.

Questions 1.6 and 1.7 refer to a consumer with preferences over lotteries represented by the Bernoulli utility function $u(x) = \sqrt{4x}$, who receives two job offers, X and Y, that pay wages that depend on whether the economy enters a boom (A), maintains its actual growth (B) or enters a recession (C). Specifically, X pays $(x_A, x_B, x_C) = (64, 16, 0)$ and Y pays $(y_A, y_B, y_C) = (36, 16, 16)$. The probabilities of scenarios A, B and C are $p_A = 1/4$, $p_B = 1/2$ and $p_C = 1/4$, respectively.

1.6. Identify the expected utilities of X and Y for this individual.

☐ $Eu(X) = 9$, $Eu(Y) = 10$ ☐ $Eu(X) = 9$, $Eu(Y) = 8$
☐ $Eu(X) = 8$, $Eu(Y) = 9$ ☐ $Eu(X) = 8$, $Eu(Y) = 10$.

1.7. Identify the certainty equivalents of X and Y for this individual.

☐ $CE(X) = 25$, $CE(Y) = 16$ ☐ $CE(X) = 25$, $CE(Y) = 20.25$
☐ $CE(X) = 16$, $CE(Y) = 20.25$ ☐ $CE(X) = 16$, $CE(Y) = 25$.

Questions 1.8 and 1.9 refer to Lolita, a competitive cow that produces milk Q using oats O and barley B according to the production function $Q = \sqrt{O(B-2)}$.

1.8. Lolita has

☐ increasing returns to scale ☐ decreasing returns to scale
☐ constant returns to scale ☐ undetermined returns to scale.

1.9. The prices of oats and barley are $p_O = 4$ and $p_B = 6$, respectively. In the short run Lolita cannot change the among of barley she uses, which is $\bar{B} = 6$. Then, depending on her milk production, in the short run Lolita has

☐ diseconomies of scale for $Q < 6$ ☐ economies of scale for $Q < 6$
☐ diseconomies of scale for $Q > 4$ ☐ diseconomies of scale for $Q > 4$.

1.10. A firm that produces a good with constant marginal cost monopolizes two markets, A and B. If the demand elasticity in A is larger than in B, then relative to the monopoly equilibrium without price discrimination, third degree price discrimination

☐ results in an increase of the consumer surplus in market A
☐ results in an increase of the consumer surplus in market B
☐ results in an decrease of the consumer surplus in markets A and B
☐ results in an increase of the total surplus.

Microeconomics-Final Exam: Test (uc3m, June 2021)

Name: Group:

You have 30 minutes. Mark your answer with an "x." You get 2 points for each correct answer, -0.66 for each incorrect answer, and zero points for each question you do not answer.

1. It is known that a consumer's preferences $\succeq$ satisfy axioms $A.1$, $A.2$ and $A.3$, and that $A = (0, 2) \succ B = (1, 1)$. Therefore, we can infer the following relation between these bundles and $C = (1, 2)$:

☐ $C \succ B$ ☐ $C \backsim A$ ☐ $C \backsim B$ ☐ $C \succ A$.

2. If a consumer's preferences satisfy monotonicity (axiom $A.3$), then her indifference curves

☐ are convex ☐ are decreasing ☐ do not cross ☐ are continuous.

3. Which axiom is not satisfied by the preferences represented by the utility function $u(x, y) = 2\sqrt{x} - y$?

☐ A.1 (completeness) ☐ A.2 (transitivity) ☐ A.3 (monotonicity) ☐ A.4 (convexity).

4. The demand at prices $(p_x, p_y) \gg 0$ of a consumer who prefers lexicographically good x to good y is:

☐ $x(p_x, p_y, I) = y(p_x, p_y, I) = \dfrac{I}{2(p_x + p_y)}$ ☐ $x(p_x, p_y, I) = \dfrac{I}{p_x}$, $y(p_x, p_y, I) = 0$

☐ $x(p_x, p_y, I) = \dfrac{I}{2p_x}, y(p_x, p_y, I) = \dfrac{I}{2p_y}$ ☐ indeterminate.

In 2019 prices were $(p_x, p_y) = (1, 2)$, and households A and B consumed the bundles $(x_A, y_A) = (2, 1)$ and $(x_B, y_B) = (4, 4)$, respectively. In 2021 prices are $(p'_x, p'_y) = (3, 2)$. Assume that the bundles of households A and B are used to identify the consumption bundle of the representative agent. Then:

5. the (plutocratic) consumer price index (CPI), that is, the CPI resulting from the version of the Laspeyres formula used by the Instituto Nacional de Estadística (Spain), is:

☐ 3/2 ☐ 11/6 ☐ 7/4 ☐ 2.

6. while a democratic CPI is:

☐ 3/2 ☐ 11/6 ☐ 7/4 ☐ 2.

7. The risk premium of the lottery that pays $x = (0, 8)$ with probabilities $p = (1/4, 3/4)$ for an individual whose preferences are represented by the Bernoulli utility function u is 2. If the preferences of another individual are represented by the Bernoulli utility function $v = 2u$, then her certainty equivalent of the lottery is:

☐ 2 ☐ 4 ☐ 6 ☐ 0

8. The expected utility and risk premium of the lottery l that pays $x = (0, 2, 4)$ with probabilities $p = (3/8, 1/2, 1/8)$ for a consumer whose preferences over lotteries are represented by the Bernoulli utility function $u(x) = x^2$ are:

☐ $Eu(l) = 2,\ RP(l) = 1$ ☐ $Eu(l) = 2,\ RP(l) = 1/2$
☐ $Eu(l) = 4,\ RP(l) = -1/2$ ☐ $Eu(l) = 4,\ RP(l) = -1$.

9. An individual whose preferences are represented by the Bernoulli utility function $u(x) = x$ receives a job offer the pays wages depending on whether the economy accelerates its growth (A), maintains its actual growth rate (B) or enters into a recession (C). In each of these scenarios the wages are 24, 8, and 0, respectively. The probabilities of scenarios A, B and C are $p_A = 1/4, p_B = 1/2$ and $p_C = 1/4$, respectively. Currently, the individual has a job that pays a fixed salary equal to 10. Therefore, the value of perfect information for this individual is:

☐ $\frac{7}{2}$ ☐ $\frac{7}{4}$ ☐ $\frac{5}{2}$ ☐ $\frac{5}{4}$.

10. Lolita is a competitive cow that produces milk using oats (A) and hay (H) according to the production function $F(O, H) = O + \sqrt{H}$. Therefore, as a milk producer Lolita has

☐ decreasing marginal cost ☐ constant returns to scale
☐ diseconomies of scale ☐ a concave total cost function.

11. A firm produces a good with labor and capital according to the production function $F(L, K) = \min\{\sqrt{L}, 2K\}$. If the prices of labor and capital are $w = 1$ and $r = 4$, respectively, then for $q > 0$ its cost functions satisfy:

☐ $MC(q) = 2\,(q + 1)$ ☐ $C(q) = 4 + q^2$ ☐ $AC(q) = \frac{4}{q} + 3$ ☐ $MC(q) = 4 + 2q$.

12. If a firm's cost functions satisfy $AC(q) > MC(q)$ for all q, then the firm has:

☐ decreasing average cost ☐ constant returns to scale
☐ diseconomies of scale ☐ increasing marginal cost.

13. The two existing technologies, A and B, allow to produce a good with costs $C_A(q) = 3q^2 + 12q + 3$ and $C_B(q) = 5q^2 + 20$, respectively. If the market demand is $D(p) = \max\{36 - p, 0\}$, then in the long run competitive equilibrium (with free entry and free use of technologies A and B) the price, p_L^*, and the number of firms of each type, (n_A^*, n_B^*), satisfy:

☐ $p_L^* = 18 = n_A^* + n_B^*$ ☐ $p_L^* = 18 = n_A^*,\ n_B^* = 0$
☐ $p_L^* = 20, n_A^* = 0,\ n_B^* = 16$ ☐ $p_L^* = 20, n_A^* + n_B^* = 16$.

14. If a monopoly produces the good with zero cost and the market demand is $D(p) = \max\{1 - \frac{p}{4}, 0\}$, then the monopoly's Lerner index is

☐ $L = 0$ ☐ $L = \frac{1}{4}$ ☐ $L = \frac{1}{2}$ ☐ $L = 1$.

15. A monopoly produces the good with cost $C(q) = q^2$, and the market demand is $D(p) = \max\{12 - p, 0\}$. The effect of a price cap of $\bar{p} = 8$ euros/unit is:

☐ an increase in the deadweight loss of the monopoly ☐ a decrease of the total surplus
☐ an increase of the consumers surplus ☐ a decrease of the monopoly's output.

Microeconomics-Final Exam: Test (uc3m, June 2, 2022)

Name: Group:

You have 45 minutes. Mark your answer with an "x." You get 2 points for each correct answer, -0.66 for each incorrect answer, and zero points for each question you do not answer.

1. The Pareto preferences, defined as $(x, y) \succsim_P (x', y') \Leftrightarrow \{x \geq x', y \geq y'\}$:

☐ do not satisfy axiom $A.2$ (transitivity) ☐ do not satisfy axiom $A.1$ (completeness)
☐ satisfy axioms $A.1$, $A.2$ and $A.3$ ☐ do not satisfy axiom $A.3$ (monotonicity).

2. If the marginal rate of substitution of a consumer is $MRS(x, y) = y/4$, his monetary income is $I = 3$ euros and prices are $p_x = p_y = 1$, then his optimal consumption bundle is:

☐ $(3, 0)$ ☐ $(2, 1)$ ☐ $(1, 2)$ ☐ $(0, 3)$.

3. A consumer considers car and gas as perfect complements and wishes to consume as much as possible of both. Hence, the income and substitution effects, IE and SE, of an increase in the price of gas over its demand are:

☐ $IE = 0$, $SE < 0$ ☐ $IE < 0$, $SE = 0$
☐ $IE < 0$, $SE < 0$ ☐ $IE > 0$, $SE = 0$.

4. A consumer's preferences over bundles in $\mathbb{R}^2_+$ satisfy $(x, y) \succsim (x', y') \Leftrightarrow x > x'$ or $\{x = x',\ y \geq y'\}$, her income is $I > 0$ and the prices are $p_x = p_y = 1$. Hence, the compensated variation of 1 euro tax per unit of x this consumer is:

☐ $2I$ euros ☐ 2 euros ☐ I euros ☐ zero.

5 and 6. In 2021 prices were $(p_x, p_y) = (1, 2)$, while they are $(p'_x, p'_y) = (2, 3)$ in 2022. All households have the same income I and their preferences are represented by a utility function $u(x, y) = x + \alpha y$, where $\alpha \in (0, \infty)$.

5. Identify the true CPI of a household with preference parameter $\alpha < 3/2$.

☐ $\frac{3\alpha}{2}$ ☐ $\frac{2I}{3}$ ☐ $\frac{3}{2}$ ☐ 2.

6. The statistical service calculates the CPI (of the Laspeyres type) using data of expenditures of households A, B and C, whose preference parameters are $\alpha_A = 1$, $\alpha_B = 4$ and $\alpha_C = 8$, respectively. Hence, the CPI corresponding to 2021 is

☐ $\frac{3}{2}$ ☐ $\frac{3I}{2}$ ☐ $\frac{5}{3}$ ☐ $\frac{5I}{3}$.

7. Lolita is a competitive cow that produces milk using oatmeal (O) and hay (H) according to the production function $F(O, H) = \min\{2O, \sqrt{H}\}$. Thus, as a milk producer Lolita has:

☐ decreasing returns to scale ☐ constant returns to scale
☐ diseconomies of scale ☐ decreasing marginal cost.

8, 9 and 10. An individual whose preferences are represented by the Bernoulli utility function $u(x) = \ln x$, receives a job offer that pays $w_A = 64$ if the economy accelerates its growth (A), $w_B = 16$ if it maintains its actual growth rate (B) and $w_C = 4$ if it enters into a recession (C). The probabilities of scenarios A, B and C are $p_A = 1/4, p_B = 1/2$ and $p_C = 1/4$, respectively. In her current job she receives a fixed salary $\bar{w} = 14$.

8. What is the minimal counteroffer of a (fixed) wage increase by the firm in which she currently works that will discourage her from accepting this job offer?

☐ 2 ☐ 4 ☐ 8 ☐ 0

9. If the firm in which she currently works does not counteroffer, then what is the value of perfect information (VPI) for the worker?

☐ $VPI = 0$ ☐ $VPI = 4$ ☐ $4 < VPI < 5$ ☐ $VPI = 5$

10. What would be the certainty equivalent (CE) of the job offer and the value of perfect information (VPI) if the worker was risk neutral?

☐ $CE = 14, VPI = 0$ ☐ $CE = 25, VPI = 5$
☐ $CE = 20, VPI = 5$ ☐ $CE = 25, VPI = 2.5$.

11. A firm produces a good with labor and capital according to the production function $F(L, K) = \sqrt{L(K-2)}$ for $K \geq 2$, and $F(L, K) = 0$ for $K <\geq 2$. If the input prices are $w = 1$ and $r = 4$, then the firm's conditional input demand for $q > 0$ satisfies:

☐ $L(q) = q^2$ ☐ $K(q) = q^2 + 2$
☐ $L(q) = \frac{q}{2}$ ☐ $K(q) = 2q + 2$.

12. The production function of a firm is $F(L, K) = \sqrt{LK}$. The input prices are $w = 1$ and $r = 4$. In the short run capital is fixed to $\bar{K} = 4$. Then, the firm's short run cost functions satisfy:

☐ $C'(q) = 4q$ ☐ $C(q) = 4(q+1)^2$

☐ $\frac{CV(q)}{q} = 4\sqrt{q}$ ☐ $\frac{C(q)}{q} = \frac{16}{q} + \frac{q}{4}$.

13. In a long run competitive equilibrium the price is:

☐ greater than the marginal cost of the most efficient technology
☐ greater than the average cost of the most efficient technology
☐ independent of the market demand
☐ smaller the larger the number of firms in the market.

14. A firm that produces a good with total costs $C(q) = 10q$ monopolizes a market in which the elasticity of demand is constant and equal to -2. Therefore, in equilibrium the price is

☐ 10 ☐ 20 ☐ 2 ☐ 5.

15. With respect to the monopoly equilibrium, the effects over the surpluses of producers (PS) and consumers (CS) of the introduction of a maximum price below the monopoly equilibrium price are:

☐ Both PS and CS may increase ☐ PS decreases and CS increases
☐ Both PS and CS may decrease ☐ PS decreases, but the effect on CS is ambiguous.