Microeconomics

Fall 2026-2027

Midterm
October 2026

Duration: 1 hour (60 minutes)

Total: 20 points (Part A: 10 points, Part B: 10 points)

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General Guidelines

- You may use a calculator;
- You may not use a programmable calculator;
- You may not use notes, books or other reference material;
- All other belongings, including phones or other electronic devices, must be on the floor;
- Detection of switched-on mobile phones will result in the test being nullified;
- Write your name and student number;
- You can only leave the room after 30 minutes into the exam and up to 15 minutes before the exam ends;
- Any form of fraud will, at least, imply an invalid grade for this course.

Full Name: _____

Student ID: _____

Part A: True / False questions

Each statement is worth 1 point (10 points in total): 1 point for the correct answer with a correct justification, partial points for the correct answer with an incomplete or partly incorrect justification, and 0 otherwise. An answer without justification does not receive any marks. A short justification (1-2 sentences) is enough.

1. Convexity of preferences is a necessary condition for indifference curves to be downward sloping.

☐ True ☐ False

Justification:

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_____

2. Monotonicity of preferences means that a consumer strictly prefers bundle $\mathbf{x}$ to bundle $\mathbf{y}$ whenever $\mathbf{x}$ contains more of at least one good, even if it contains less of the other goods.

☐ True ☐ False

Justification:

_____

_____

3. If the income effect of good 1 is zero, then $CV = EV = \Delta CS$ for a change in the price of good 1.

☐ True ☐ False

Justification:

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4. The Hicksian demand $h(p, u)$ is equal to the Marshallian demand $x(p, m)$ whenever $u = v(p, m)$, that is, whenever $m = e(p, u)$.

☐ True ☐ False

Justification:

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5. Shephard's lemma states that the partial derivative of the indirect utility function with respect to the price p_i is equal to the Marshallian demand for good i.

☐ True ☐ False

Justification:

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6. A Giffen good must be an inferior good, but an inferior good is not necessarily a Giffen good.

☐ True ☐ False

Justification:

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7. The substitution effect of an own-price increase is non-positive only for normal goods; for inferior goods it can be positive.

☐ True ☐ False

Justification:

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8. In the utility maximization problem, the Lagrange multiplier λ measures how much maximal utility changes when income m increases marginally.

☐ True ☐ False

Justification:

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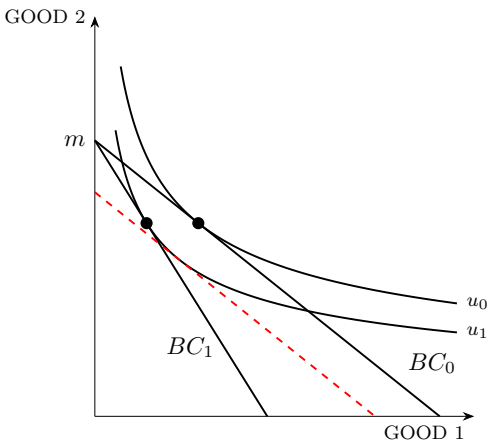
9. A consumer's utility function satisfies $u(\mathbf{x}) = 4$ and $u(\mathbf{y}) = 2$. Therefore the consumer prefers $\mathbf{x}$ to $\mathbf{y}$, and also gets twice as much satisfaction from $\mathbf{x}$.

☐ True ☐ False

Justification:

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10. The figure shows the budget line rotating inward from BC_0 (old price p^0) to BC_1 (new, higher price p^1) after an increase in the price of good 1, with income m fixed. The dashed line is parallel to BC_0 and tangent to u_1. The distance between m and the point where the dashed line crosses the Good 2 axis is the compensating variation (CV) of this price change.



☐ True ☐ False

Justification:

Part B: Calculation questions

Questions 11–20 are worth 1 point each (10 points in total). Show your calculations; if a question does not ask for an explanation, there is no need to give one.

11. Find the partial derivatives f_x and f_y of $f(x, y) = \dfrac{x^2 y}{x + y}$.

12. Let $h(x, y) = 14x + 15y - 2x^2 - xy - 3y^2$. Find the critical point by solving the first-order conditions, and use the second-order conditions to classify it.

13. A consumer has utility $u(x_1, x_2) = x_1 x_2^2$, income $m = 90$ and faces prices $p_1 = 3$ and $p_2 = 4$. Find the optimal bundle. Show intermediate steps.

14. A consumer has utility $u(x_1, x_2) = \sqrt{x_1 x_2}$. Write the indifference curve for utility level $\bar{u}$ as x_2 as a function of x_1.

15. A consumer wants to reach utility $\bar{u} = 25$ with $u(x_1, x_2) = x_1 x_2$ at prices $p_1 = 2$ and $p_2 = 8$. Set up the expenditure minimization problem and find the Hicksian demands h_1 and h_2.

16. A consumer has the indirect utility function $v(p_1, p_2, m) = \dfrac{m^2}{4p_1 p_2}$. Find the Lagrange multiplier λ of the utility maximization problem at $p_1 = 1$, $p_2 = 4$, $m = 16$.

17. A consumer has the indirect utility function $v(p_1, p_2, m) = m\, p_1^{-1/4} p_2^{-3/4}$. Use Roy's identity to derive the demand for good 1.

18. A consumer has the Marshallian demand $x_1(p_1, p_2, m) = \dfrac{m}{2p_1}$ and the Hicksian demand $h_1(p_1, p_2, u) = u\sqrt{\dfrac{p_2}{p_1}}$. At $p_1 = 1$, $p_2 = 1$, $m = 4$ (where $u = 2$), compute the total effect, the substitution effect and the income effect of a marginal increase in p_1, and verify that they satisfy the Slutsky equation.

19. A consumer has utility $u(x_1, x_2) = \sqrt{x_1} + x_2$, income m and prices p_1 and p_2. Assume income is large enough that both demands are positive. Show that $x_1 = \left(\frac{p_2}{2p_1}\right)^2$ is the Marshallian demand for good 1.

20. Consider the same consumer with utility $u(x_1, x_2) = \sqrt{x_1} + x_2$, indirect utility $v = \frac{m}{p_2} + \frac{p_2}{4p_1}$, and income $m = 100$. The price $p_2 = 1$ is fixed and p_1 rises from 1 to 4. Find the compensating variation (CV). You may use alternative methods, if you do so, justify.