

METU
Department of Economics
Fall 2020
Econ 201

STUDENT NAME AND LASTNAME: _____

STUDENT ID NUMBER: _____

Please check the box followed by the Scholastic Honesty Statement before you start your Midterm Examination:

☐ I hereby declare that all answers in this exam have been in accordance with METU academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I do not attempt cheating in any form including cooperation and systematic help from others, web resources, social media, other students, research assistants and academicians anywhere.

Student Signature _____

Date _____

Econ 201 Midterm 1

Fall 2020

There are 6 questions. You have 120 minutes to complete the exam. Please, read the questions carefully and show your work. Good Luck!

- 1) (20 points) Rengin consumes ice creams (x_1) and hamburgers (x_2): Her utility function is

$$U(x_1, x_2) = (x_1)^{\frac{1}{2}}(x_2)^{\frac{1}{2}}$$

Rengin's income is 100 TL. The price of an each good depends on the quantity that Rengin consumes. Specifically, she can buy the first ten ice creams at the price of 2 TL each. For each additional ice cream, there is a discount and Rengin has to pay only 1 TL. Moreover, she can buy the first five hamburgers at the price of 4 TL each. For each additional hamburgers, there is a discount and Rengin has to pay only 2 TL.

- a) (5 points) Derive and draw Rengin's budget constraint.
b) (15 points) Compute her optimal consumption.

- 2) (20 points) An agent's utility function is

$$u(x_1, x_2, x_3, x_4) = 2\min\{x_1, x_2\} + 3\max\{x_3, x_4\}.$$

Find the demand functions for each good.

- 3) (15 points) Draw a few representative indifference curves for the following utility function:

$$u(x_1, x_2, x_3) = \max\left\{\min\left\{x, \frac{1}{2}y\right\}, \min\left\{\frac{1}{2}x, y\right\}\right\}$$

- 4) (15 points) Zafer is a famous economist at Adam Smith Business School, University of Glasgow. His utility depends on how many Econometrica (E) publications he has, and how many Journal of Economic Theory (J) publications he has. His utility function is:

$$U(E, J) = (E + 1)^2(J + 2).$$

Until his next evaluation Zafer has 1760 days he will spare for research. Each Econometrica publication requires 240 days of research and each Journal of Economic Theory publication requires 80 days of research. How many Econometrica publications will Zafer have in his next evaluation?

5) (10 points) For each of the following statements, **briefly explain all of the underlined terms.** Then, **explain** why the statement is **true or false**.

- a) (5 points) Let $u(x,y)$ and $v(x,y)$ be two utility functions. If $v(x,y)=2u(x,y)$ then the marginal rate of substitution for utility function v is twice the marginal rate of substitution for utility function u .
- b) (5 points) Price elasticity of demand is always negative.

6) (20 points) Consider the following maximization problem:

$$\max_{x_1 \geq 0, x_2 \geq 0} U(x_1, x_2) = \sqrt{x_1} + x_2 \quad \text{subject to } x_1 + 2x_2 \leq I.$$

- a) (10 points) Form the Lagrangian function and state the Kuhn-Tucker conditions.
- b) (10 points) Find the solution to the optimization problem using the Kuhn-Tucker conditions.