Microeconomics In-class Quiz 4
Spring 2025

Student ID:

Name:

Instructions

1. Do NOT flip over this page until every student receives this quiz. Your TA will let you know when you can start.
2. During this closed-book quiz, you cannot consult any materials.
3. It is okay to write your reasoning in Korean.
4. There are five questions in total. Both sides are printed, so make sure you check the backside of each page.
5. [**IMPORTANT**] Make your answers **legible**. Clearly delineate your scratches from your answers. Deducted points due to illegible writing cannot be the reason for reevaluation.

Honor Code: Cheating on exams or quizzes, plagiarizing someone else's answers as one's own, or any other instance of academic dishonesty violates the standards of academic integrity.

Confidentiality Code: Sharing the information of the exam or quiz contents with other students in any form and medium is strongly prohibited, as it raises information inequity.

I, _____, consent to the Honor Code and the Confidentiality Code.
(write your name)

1. Airbus and Boeing form a duopoly in the airliner market. The market inverse demand for planes is $P = 400 - Q$, where P is the market price (in millions of dollars) of an airplane and $Q = q_A + q_B$ is the market quantity of airplanes produced in a year. Both firms have a marginal cost of 40.

(a) [1 point] Given that Airbus' production level q_a, find the best response function of Boeing.

(b) [2 points] Describe a Nash equilibrium when two firms decide the output level simultaneously. What would be the aggregate quantity in the equilibrium?

(c) [2 points] When Boeing decides the output level first, and then Airbus' decision follows, what would be the aggregate quantity in the Subgame-Perfect Equilibrium?

(d) [1 point] Suppose Airbus and Boeing are merged to form a monopoly. What would be the output level in this airplane market?

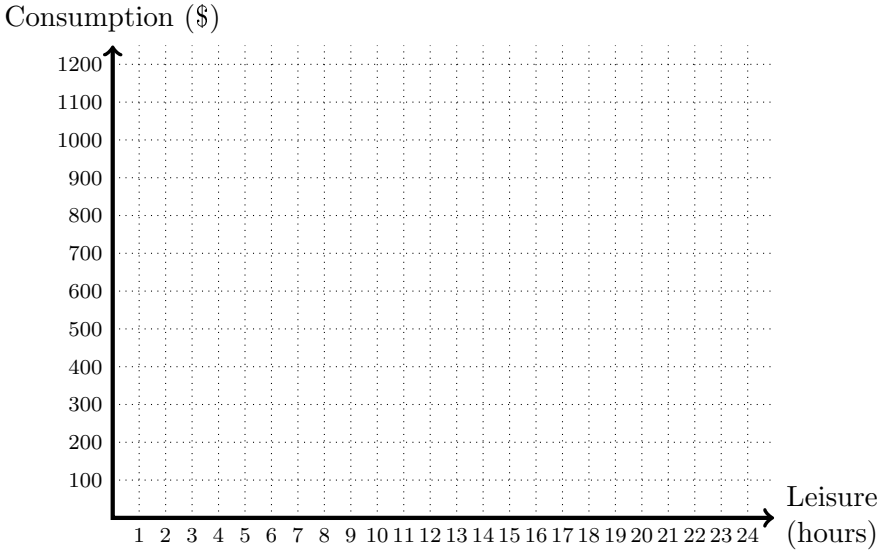
2. A firm's short-run production function is given by $Q = 2\sqrt{L}$, and the associated marginal product of labor is $MP_L = \frac{1}{\sqrt{L}}$.

(a) [1 point] If the firm's marginal revenue is 100, what's the marginal revenue product of labor?

(b) [2 points] If this firm can hire workers for w, how many workers would this firm demand?

3. Suppose Nick decides how much to work per day. Assume that labor market is perfectly competitive, and the hourly wage is \$50. He can choose 0 to 24 hours of work per day. Whatever the remainder of the working hours is the leisure hours. The entire labor income is used for consumption.

(a) [1 point] If Nick works for h hours, his income is $50h$, and leisure hours are $24 - h$. Draw his budget constraint on leisure–consumption plane.



(b) [2 points] Nick's utility is $U = \min\{C, 30L\}$, where C is Consumption and L is Leisure. Draw two or more indifference curves on the graph above. What's his optimal working hours?

4. Steve is a traveling salesman. His utility function is given by $U = \sqrt{I}$, where I is his income. Steve's weekly income is \$900, but if Steve got a speeding ticket, he will receive a fine of \$500. There is a 50% chance he will be caught speeding in any given week.

(a) [1 point] Calculate Steve's expected income and expected utility.

(b) [1 point] Suppose that Steve's boss offers him a position in online sales that eliminates the risk of being caught speeding. What salary would provide Steve with the same utility he expected to receive as a traveling salesman?

(c) [2 points] Suppose instead that Steve was given the opportunity to purchase 'speeding ticket insurance' that would pay all of his fines. What is the most Steve would be willing to pay to obtain this insurance?

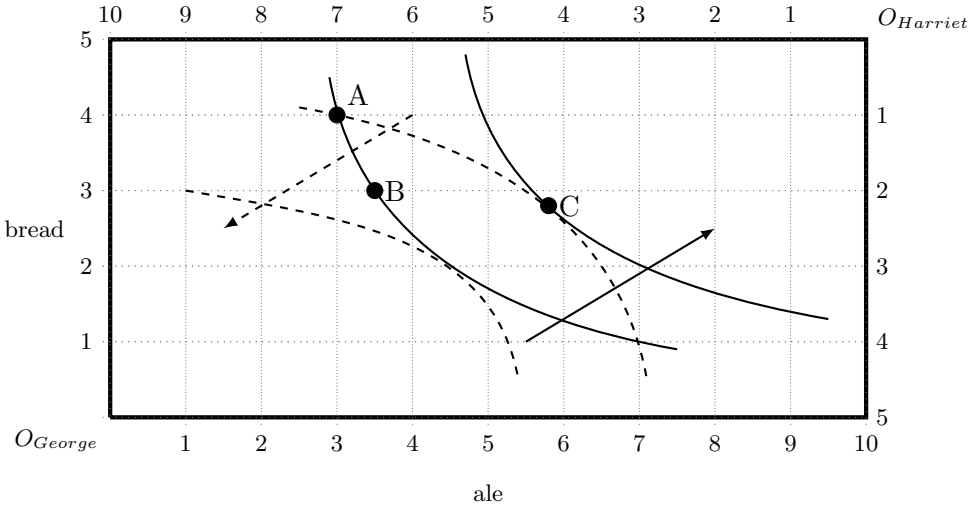
5. A classmate offers to play the following game: Once you pay the participation fee of $\$p$, he will toss a fair coin; if it lands heads, he will pay you \$10; if it lands tails, he will pay you \$30.

(a) [1 point] If you are risk-neutral, what is the largest participation fee you will pay to play this game?

(b) [2 points] Your classmate Risa has a utility function $U = W^2$. If Risa bases her decisions on expected utility, would she play if the participation fee is \$22?

(c) [1 point] Is Risa risk-averse, risk-neutral, or risk-loving?

6. The Edgeworth box below describes an exchange economy of George and Harriet with two goods—ale and bread. Arrows indicate the direction of utility increases. Dashed lines are for Harriet.



(a) [1 point] Suppose the resources are allocated at point A. How many units of ale and bread do George and Harriet have?

(b) [2 point] Is moving from point A to point B Pareto improvement? Explain.

(c) [2 point] Is moving from point B to point C Pareto improvement? Explain.