

NAME _____

Peking University
Intermediate Microeconomics
Fall 2023
Dr. Jin Qin

Final Exam Practice

Instructions:

1. Print your name on both the answer sheet and the examination.
2. This examination consists of 5 multiple-choice questions with each one worth 2 points and 5 short-answer questions for 80 points, 100 points total. Make sure you have a complete examination.
3. Please write down all your answers on the answer sheet. Answers written on the question sheet will NOT be graded.
4. The space provided on the answer sheet should be sufficient for your answer. If you need additional space, attach a blank paper.
5. Please write neatly. If I cannot read an answer, you will receive no credit for it.
6. Show enough of your work so that I can tell how you arrived at the answer. You will receive credit for sound reasoning. Partial credit will be awarded wherever I deem there is sufficient justification.
7. When drawing graphs, make sure to label everything, including the axes. It is not particularly important to draw your graphs with perfect precision.
8. If you have difficulties with a question, skip it and move on...once you come back to the troubling question, you may find that other questions have triggered some new thought patterns.
9. When you complete the examination, return both the answer sheet and this question sheet.
10. Now, try to relax and do your best...

Honor pledge: I have neither given nor received unauthorized aid on this examination.

Signed _____

1. (2 points) Suppose the observed annual quantity of steel exchanged in the European market is 30 million metric tons, and the observed market price is 90 euros per ton. If the own-price elasticity of demand for steel is -0.3 in Europe, what is an appropriate value for the price coefficient (b) in a linear demand function $Q = a - bP$?
 - A. $b = 0.9$
 - B. $b = -0.9$
 - C. $b = 0.1$
 - D. $b = -0.1$

2. (2 points) Fiori views apples and oranges as perfect substitutes in his consumption, and $|MRS| = 1$ for apples and oranges in his indifference map. Suppose the price of apples is \$2 per pound, the price of oranges is \$4 per pound, and Fiori's budget is \$30 per week. What is Fiori's utility maximizing choice between these two goods?
 - A. 3 pounds of apples and 6 pounds of oranges.
 - B. 5 pounds of apples and 5 pounds of oranges.
 - C. 7.5 pounds of oranges and no apples.
 - D. 15 pounds of apples and no oranges.
 - E. None of the above.

3. (2 points) What does "Cost Complementarities" mean?
 - A. Situation in which output can be doubled for less than a doubling of cost.
 - B. Situation in which a doubling of output requires more than a doubling of cost.
 - C. Situation in which joint output of a single firm is greater than the output that could be achieved by two different firms when each produces a single product.
 - D. Situation in which joint output of a single firm is less than could be achieved by separate firms when each produces a single product.
 - E. Situation in which MC of producing one output falls as more of another output is produced.

4. (2 points) Mr. Brown is the only producer of Fiori. It produces Fiori at a constant marginal cost $c > 0$, and sells them at a price of P_1 per unit in Market 1 and at a price of P_2 per unit in Market 2. The demand for Fiori in Market 1 has a constant own-price elasticity of demand equal to -2 ; the demand for Fiori in Market 2 has a constant price elasticity equal to $-\frac{3}{2}$. Then, the ratio of the profit-maximizing price in Market 1 to the profit-maximizing price in Market 2 is
- A. $\frac{1}{3}$.
 - B. $\frac{2}{3}$.
 - C. $\frac{3}{2}$.
 - D. 3.
 - E. dependent on the value of c .
5. (2 points) Which of the following is one of the characteristics of a monopolistically competitive industry?
- A. Individual firms can influence the market price.
 - B. Monopoly profits in the long-run.
 - C. Few firms in the industry.
 - D. Homogeneous products.
6. (Extra) A monopolist Fiori sells in two markets. The demand is given by $p_1 = 122 - 2x_1$ in the first market and $p_2 = 306 - 5x_2$ in the second market, where x_i is the quantity sold in market i and p_i is the price charged in market i . Fiori faces a constant marginal cost of production, $c = 6$, and no fixed costs, while Fiori can charge different prices in the two markets. What is the profit-maximizing combination of quantities for Fiori?
- A. $x_1 = 58$ and $x_2 = 32$.
 - B. $x_1 = 29$ and $x_2 = 30$.
 - C. $x_1 = 59$ and $x_2 = 29$.
 - D. $x_1 = 39$ and $x_2 = 28$.
 - E. $x_1 = 49$ and $x_2 = 40$.

7. (Extra) Under which of the following scenarios is it most likely that monopoly power will be exhibited by firms?
- A. When there are few firms in the market and the demand faced by each firm is relatively inelastic.
 - B. When there are many firms in the market and the demand faced by each firm is relatively inelastic.
 - C. When there are few firms in the market and the demand faced by each firm is relatively elastic.
 - D. When there are many firms in the market and the demand faced by each firm is relatively elastic.
8. (Extra) What will happen when a firm raises the price of a differentiated product in an imperfectly competitive market?
- A. It will see lower sales but will not lose all its sales.
 - B. It will lose all its sales to competitor firms.
 - C. It will actually get new customers from other firms.
 - D. It will see an increase in revenues.
9. (Extra) Fiori and Thompson both consume Good 1 and Good 2. They both have the utility function of

$$U(x_1, x_2) = x_1^{\frac{1}{3}} x_2^{\frac{2}{3}}$$

Fiori is originally endowed with 9 units of Good 1 and 6 units of Good 2. Thompson is originally endowed with 18 units of Good 1 and 3 units of Good 2. What is the shadow price of $\frac{p_2}{p_1}$?

- A. 1
- B. 2
- C. 3
- D. 6
- E. 12

- 10. (30 points) Dr. J gives 4 homework assignments with a maximum score of 100 for the Intermediate Microeconomics course. Suppose he drops each student's two lower scores and uses the average score of the other two assignments to determine the final homework score. Naughty Brown is taking this class and gets a 20 and a 40 in the first two assignments. Let x be his score on the third assignment and y be his score on the fourth assignment.**
- 1) (10 points) Draw Naughty Brown's indifference curves for the scores on the third and fourth assignment with x on the horizontal axis and y on the vertical axis.**
 - 2) (10 points) For each assignment, Naughty Brown needs to invest x^2 seconds to get x points. If Naughty Brown allocates m ($\leq 20,000$) seconds in total on these two assignments, derive his optimal choice.**
 - 3) (10 points) Under the assumption of (2), suppose $m = 12,800$, while the third assignment increases in the level of difficulty so that Naughty Brown needs to invest $2x^2$ seconds to obtain a score of x . Calculate Naughty Brown's compensating and equivalent variations.**

- 11. (20 points) Two firms, Fiori and Thompson, produce brownies with the same production function of**

$$f(K, L) = \sqrt{L} + K$$

where K is the input of capital and L is the input of labor. The wage rate is w and the rental rate is r . Fiori chooses his input combination to produce in the cheapest way possible. Thompson produces as many brownies as Fiori, but he uses a quarter of Fiori's labor.

- 1) (10 points) When Fiori and Thompson both produce Q brownies, derive the cost functions for each of them.**
- 2) (10 points) Suppose the price of brownie is $p < r$, and Fiori achieves his maximum profit. Calculate the profit of Fiori and Thompson.**

12. (20 points) Mr. Brown is the only exam printing shop for PKU and THU. The demand for PKU is given by $Q_1 = 100 - 2P_1$, the demand for THU is given by $Q_2 = 800 - 4P_2$, and the cost of Mr. Brown is given by $C(Q) = 30Q$.

- 1) (8 points) If Mr. Brown is not allowed to price discriminate, figure out the optimal production to maximize profit.**
- 2) (8 points) If Mr. Brown is allowed to execute the third-degree price discrimination, figure out the optimal production to maximize profit.**
- 3) (4 points) Comparing the profits in the two situations, what could you conclude?**

13.(10 points) A small economy has only two consumers, Fiori and Thompson. Fiori's utility function is given by

$$U_F(x_F, y_F) = x_F + 154\sqrt{y_F}$$

Thompson's utility function is given by

$$U_T(x_T, y_T) = x_T + 7y_T$$

Assume there are enough primitive endowments, then, at a Pareto efficient allocation in which both individuals consume some of each good, how much y would Fiori consume?

14.(10 points) Fiori consumes pork and lamb only. When the price of pork rises, ceteris paribus, Fiori buys less pork, as well as, less lamb. Is lamb a normal good or an inferior good for Fiori? Explain in detail.

- 15.(Extra) Consider a perfectly competitive economy with two goods (1 and 2) and two agents (A and B). The agents' utility functions and initial endowments are given by**

$$u_A(x_1, x_2) = u_B(x_1, x_2) = x_1 x_2$$

$$e_A(x_1, x_2) = (6, 0)$$

$$e_B(x_1, x_2) = (0, 6)$$

- 1) Figure out x_A and x_B in the equilibrium.**
- 2) If A trades according to the utility function $u_A(x_1, x_2) = x_1^2 x_2$, figure out x_A and x_B in the new equilibrium.**
- 3) Compare the results from (1) and (2), explain why consumers tend to disparage something before purchasing it.**

Final Exam Practice

Name _____ Student ID # _____

1	2	3	4	5	6	7	8	9

10.

11.

12.

13.

14.

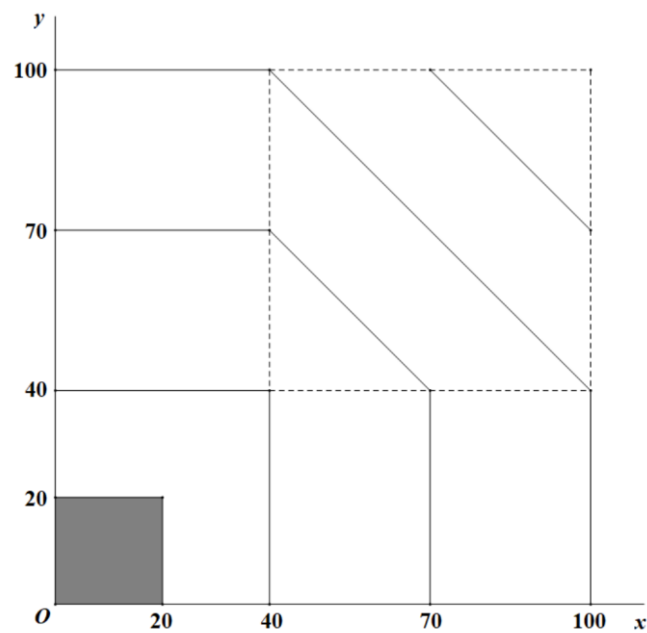
15.

Intermediate Microeconomics (Fall 2023)
Final Exam Practice Answer Key

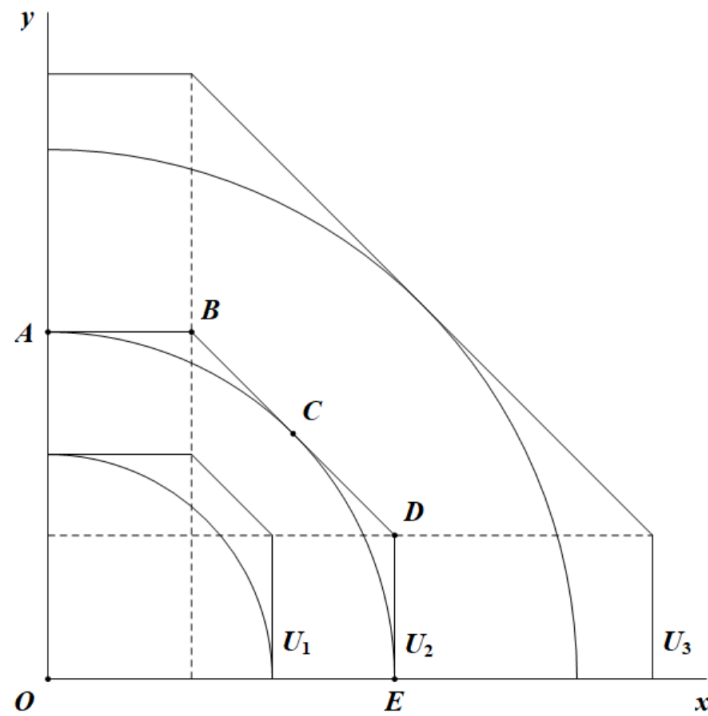
1 – 9 CDEBA BAAD

10.

1) Check the Problem Session 6 from 00:06:20 to 00:16:40.



2) Graph a figure and observe:



At the critical point

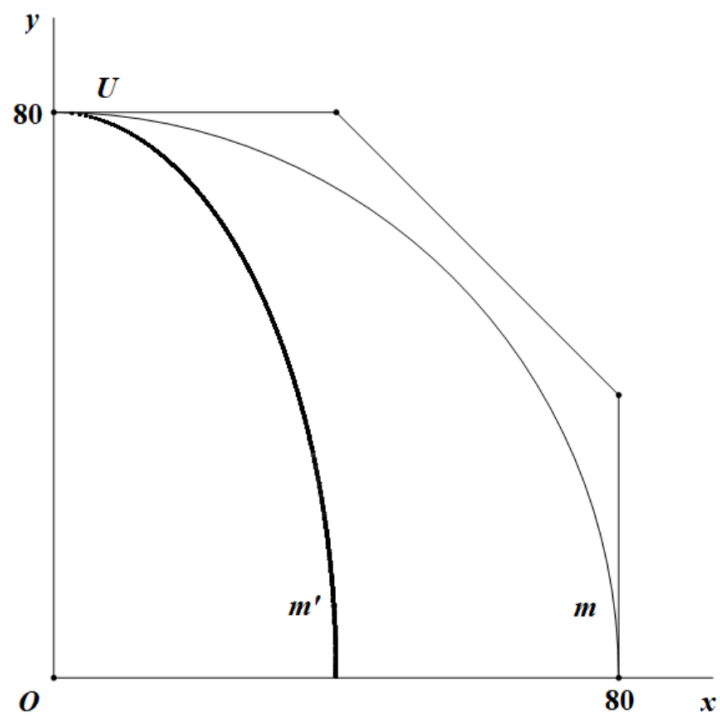
$$AB = BC = CD = DE = 40$$

$$\Rightarrow m = OA^2 = (40 + 40\sqrt{2})^2$$

- If $m \leq (40 + 40\sqrt{2})^2$, Naughty Brown will devote all his time to one assignment to achieve maximum utility.
- If $m > (40 + 40\sqrt{2})^2$, Naughty Brown will divide his time equally into two assignments for maximum utility.

There are multiple optimal choices, and one could be given by

$$(x, y) = \begin{cases} (\sqrt{m}, 0) \text{ or } (0, \sqrt{m}) & \text{when } m \leq (40 + 40\sqrt{2})^2 \\ (\sqrt{\frac{m}{2}}, \sqrt{\frac{m}{2}}) & \text{when } m > (40 + 40\sqrt{2})^2 \end{cases}$$

3) Graph a figure and observe:

Naughty Brown will not change his consumption bundle

\Rightarrow He will still devote all his time to the last assignment

$\Rightarrow CV = EV = 0$

11.

1) For Fiori:

$$A = wL + rK - \lambda (\sqrt{L} + K - Q)$$

$$\Rightarrow \frac{\partial A}{\partial L} = w - \frac{\lambda}{2\sqrt{L}} = 0 \text{ and } \frac{\partial A}{\partial K} = r - \lambda = 0$$

$$\Rightarrow (L, K) = \begin{cases} (Q^2, 0) & \text{when } Q < \frac{r}{2w} \\ \left(\left(\frac{r}{2w}\right)^2, Q - \frac{r}{2w}\right) & \text{when } Q \geq \frac{r}{2w} \end{cases}$$

$$\Rightarrow TC = \begin{cases} wQ^2 & \text{when } Q < \frac{r}{2w} \\ rQ - \frac{r^2}{4w} & \text{when } Q \geq \frac{r}{2w} \end{cases}$$

For Thompson:

$$(L, K) = \begin{cases} \left(\frac{Q^2}{4}, \frac{Q}{2}\right) & \text{when } Q < \frac{r}{2w} \\ \left(\left(\frac{r}{4w}\right)^2, Q - \frac{r}{4w}\right) & \text{when } Q \geq \frac{r}{2w} \end{cases}$$

$$\Rightarrow TC = \begin{cases} \frac{wQ^2 + 2rQ}{4} & \text{when } Q < \frac{r}{2w} \\ rQ - \frac{3r^2}{16w} & \text{when } Q \geq \frac{r}{2w} \end{cases}$$

2) For Fiori:

$$MC = \begin{cases} 2wQ & \text{when } Q < \frac{r}{2w} \\ r & \text{when } Q \geq \frac{r}{2w} \end{cases}$$

$$\Rightarrow Q = \frac{p}{2w} < \frac{r}{2w}$$

$$\Rightarrow \pi = pQ - wQ^2 = \frac{p^2}{4w}$$

For Thompson:

$$Q = \frac{p}{2w} < \frac{r}{2w}$$

$$\Rightarrow \pi = pQ - \frac{wQ^2 + 2rQ}{4} = \frac{7p^2 - 4rp}{16w}$$

12.

1) If Mr. Brown is not allowed to price discriminate

$$Q = \begin{cases} 900 - 6P & \text{when } 0 \leq P \leq 50 \\ 800 - 4P & \text{when } 50 \leq P \leq 200 \end{cases}$$

$$P = \begin{cases} 200 - \frac{1}{4}Q & \text{when } 0 \leq Q \leq 600 \\ 150 - \frac{1}{6}Q & \text{when } 600 \leq Q \leq 900 \end{cases}$$

$$MR = \begin{cases} 200 - \frac{1}{2}Q & \text{when } 0 < Q < 600 \\ 150 - \frac{1}{3}Q & \text{when } 600 < Q < 900 \end{cases} = 30 = MC$$

$$\Rightarrow \begin{cases} Q = 340 \\ P = 115 \end{cases}$$

2) For PKU:

$$\text{If } P_1 = 50 - 0.5Q_1$$

$$MR_1 = 50 - Q_1 = 30 = MC$$

$$\Rightarrow \begin{cases} P_1 = 40 \\ Q_1 = 20 \end{cases}$$

For THU:

$$P_2 = 200 - 0.25Q_2$$

$$MR_2 = 200 - 0.5Q_2 = 30 = MC$$

$$\Rightarrow \begin{cases} P_2 = 115 \\ Q_2 = 340 \end{cases}$$

3) If price discrimination is not allowed, the monopolist will end up selling only to the larger market.

13.

For Fiori: $\frac{MU_x}{MU_y} = \frac{\sqrt{y_F}}{77}$

For Thompson: $\frac{MU_x}{MU_y} = \frac{1}{7}$

$$\Rightarrow \frac{\sqrt{y_F}}{77} = \frac{1}{7}$$

$$\Rightarrow y_F = 121$$

14.

The price of pork increases

⇒ The relative price of lamb decreases

⇒ The substitution effect of lamb is positive

Meanwhile, the total effect of lamb is negative

⇒ The income effect of lamb is negative

The price of pork increases

⇒ The real income of Fiori decreases

Meanwhile, the income effect of lamb is negative

⇒ Lamb is a normal good

15.

1) The budget constraint is given by

$$\begin{cases} m_A = 6p_1 \\ m_B = 6p_2 \end{cases}$$

$$\Rightarrow \begin{cases} p_1 x_A^1 = \frac{1}{1+1} * m_A = 3p_1 \Rightarrow x_A^1 = 3 \\ p_1 x_B^1 = \frac{1}{1+1} * m_B = 3p_2 \Rightarrow x_B^1 = 3 \frac{p_2}{p_1} \end{cases}$$

$$\text{Meanwhile, } x_A^1 + x_B^1 = 6 + 0 = 6$$

$$\Rightarrow p_1 = p_2$$

$$\Rightarrow \begin{cases} x_A^1 = x_A^2 = 3 \\ x_B^1 = x_B^2 = 3 \end{cases}$$

2)

$$\begin{cases} p_1 x_A^1 = \frac{2}{2+1} * m_A = 4p_1 \Rightarrow x_A^1 = 4 \\ p_1 x_B^1 = \frac{1}{1+1} * m_B = 3p_2 \Rightarrow x_B^1 = 3 \frac{p_2}{p_1} \end{cases}$$

$$\text{Meanwhile, } x_A^1 + x_B^1 = 6 + 0 = 6$$

$$\Rightarrow \frac{p_1}{p_2} = \frac{3}{2}$$

$$\Rightarrow \begin{cases} x_A^1 = 4, x_A^2 = 3 \\ x_B^1 = 2, x_B^2 = 3 \end{cases}$$

3) Compared to (1), A undervalues Good 2 when purchasing it, and ultimately consumes more Good 1 without reducing the consumption of Good 2.