Mid-Term Exam of Intermediate Microeconomics

Problem Set (A)

Fall 2020, Tsinghua University

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Student ID	

Notice:

Please write your answers on the **Answer Sheet**.

Answers on **Problem Set** will **not** be graded.

Please hand in your **Answer Sheet** and this **Problem Set** at the end of the exam.

If not mentioned specifically, all individuals are considered "Rational" in this exam.

True or False (16 points, 2 points each)

1. A preference relation is "well-behaved" if it is monotonic and convex.

2. A good is ordinary if and only if the demand increases when income increases. A good is Giffen if and only if the demand decreases when income increases.

3. For a consumer who has an allowance to spend and no endowment of goods, an increase in the price of an inferior good consumed cannot make the consumer better off.

4. Jie's utility function is $U(x, y) = min\{x, y\}$. He maximizes his utility subject to a budget constraint. The price of x is the same as the price of y. If (i) the price of x rises, (ii) the price of y decreases and (iii) his income remains constant, then he will spend more money on the consumption of y.

5. If a consumer has quasi-linear preferences, then his Engel curves are straight lines.

6. The Weak Axiom of Revealed Preference (WARP) is only a sufficient condition for applying economic rationality to explain observed choices.

7. In the case of perfect substitutes preferences, the entire change in demand from a price change is due to the substitution effect.

8. A reservation-price curve describes the most that would be paid for q units of a commodity purchased simultaneously.

Single Choice (30 points, 3 points each)

1. Among the following utility functions, how many of them represent preferences of a consumer who does **NOT** have homothetic preferences?

(a) U (x, y) = xy

(b) U (x, y) = x + 2y

(c) U (x, y) = $x + y^{0.5}$

(d) U (x, y) = min {x, y}

A. 0 B. 1 C. 2 D. 3

2. Jie's utility function is $U(x, y) = xy$. Mengjie's utility function is $U(x, y) = 1000xy + 2000$. Zhang's utility function is $U(x, y) = xy(1-xy)$. Yunwen's utility function is $U(x, y) = -1/(10+xy)$. Haipeng's utility function is $U(x, y) = x/y$. Chang's utility function is $U(x, y) = -xy$. Which of the following statements is **CORRECT**?

A. No two of these people have the same preferences.

B. They all have the same preferences except for Haipeng.

C. Jie, Mengjie, and Chang all have the same indifference curves, but Mengjie and Yunwen are the only ones with the same preferences as Jie.

D. Jie, Zhang, and Yunwen all have the same preferences.

3. Jie's utility function is $U(x, y) = min\{x+2y, y+3x\}$. If he chooses the bundle (1, 7), then he would be indifferent between the current bundle and another bundle that is:

A. (3, 6) B. (1, 2) C. (2, 2) D. (6, 2)

4. Jie and Yunwen spent all their incomes on milk and tea. They have the same income and face the same prices for the two goods. The only difference is that Jie thinks milk and tea are one-to-one perfect substitutes, but Yunwen thinks milk and tea are perfect complements. Milk costs $3 per bottle, and tea costs $5 per bottle. Now suppose the price of the milk increases from $3 to $4, determine the part of demand change of milk that is due to substitution or income effect for them.

A. Entirely income effect for Jie and Entirely income effect for Yunwen

B. Entirely substitution effect for Jie and Entirely substitution effect for Yunwen

C. Entirely substitution effect for Jie and Entirely income effect for Yunwen

D. Entirely income effect for Jie and Entirely substitution effect for Yunwen

5. The Beijing government is considering about raising the price of public transportation from 2 to 4 yuan. To seek the support of the citizens, the government has promised that if the proposal is passed, every citizen in Beijing will get a subsidy of 200 yuan. As a citizen, however, Mr. Zheng refuses that proposal. What can you tell about Mr. Zheng from that?

A. The absolute value of EV is greater than 200.

B. The absolute value of CV is greater than 200.

C. The absolute value of ΔCS is greater than 200.

D. All the three above are incorrect.

6. The demand for kitty litter, in pounds, is $ln\mathrm{D}(p)=1000-p+lnm$, where *p* is the price of kitty litter and *m* is income. Which of the following statements is **INCORRECT**?

A. The price elasticity of demand for kitty litter when p = 2 and m = 500 is -2.

B. The income elasticity of demand for kitty litter when p = 3 and m = 1500 is 1.

C. The seller will never choose an output in the own-price inelastic range of market demand.

D. In the own-price elastic range of market demand, a price decrease reduces the seller's revenue.

7. The demand function for apple is *D(p)=900-3p* and the supply function is *S(p)=100+5p*. The government imposes a tax of $40 per unit of apple. The deadweight loss caused by the tax is:

A. 1000 B.1200 C. 1500 D. 1800

8. In a certain kingdom, the demand function for rye bread was *D(p) = 201 - 4p* and the supply function was *S(p) = 13 + 3p* where *p* is the price in zlotys and *q* is loaves of bread. The king made it illegal to sell rye bread for a price above 23 zlotys per loaf. To avoid shortages, he agreed to pay bakers enough of a subsidy for each loaf of bread so as to make supply equal demand. How much would the subsidy per loaf have to be?

A. 21 zlotys

B. 20 zlotys

C. 19 zlotys

D. 9 zlotys

9. A farmer gets 40 eggs and 20 tomatoes every week from her chickens and her tomato plants. She has no other source of income. She has convex, downward-sloping indifference curves. The current market prices are $2 per egg and $3 per tomato. At these prices she chooses the same bundle that she is endowed with (40 eggs and 20 tomatoes). Which of the following statements is **CORRECT**?

A. An increase in the price of eggs (with the price of tomatoes remaining constant) will decrease her utility.

B. An increase in the price of tomatoes (with the price of eggs remaining constant) will make her worse off.

C. If both prices rise, she will be worse off, but if only one price rises she might be made better off or worse off, depending on her tastes.

D. If relative prices change in any way whatsoever, she will certainly be no worse off and may be better off than she was before the price change.

10. Which of the following statements is **INCORRECT**?

A. The marginal revenue curve must be below the demand curve and steeper than the demand curve.

B. If there are only two goods and a consumer's choice data violate SARP, then his choice data must violate WARP as well.

C. Fixing the tax rate, ss market demand becomes more own-price elastic, buyers bear less tax burden and the deadweight loss rises.

D. The price offer curve must pass through the endowment point, which represents the lowest utility level among all points on the price offer curve.

Filling Blanks (20 points, 2 points each blank)

1. Jie likes video games and sausages. In fact, his preference can be represented by $U(x, y) = ln(x + 1)+y$, where x is the number of video games he plays and y is the number of dollars that he spends on sausages. Let p_x be the price of a video game and m be his income. Since Jie has _____ preferences, you can solve this equation alone to get his demand function for video games, which is _____. His demand function for the dollars to spend on sausages is _____.

2. Jie's utility function is $U(C, R) = \frac{1}{2} lnC + \frac{1}{2} lnR$, where C is the dollar value of consumption and R is the leisure. Jie's job pays $1 per hour. He has 16 hours to divide

between work and leisure. Now suppose the government decides to charge an income tax with tax rate of 25%, what is the dollar value of compensating variation between these two cases?_____ What is the dollar value of equivalent variation between these two cases? _____ What is the change in consumer's surplus? _____

3. Suppose there are no taxes on the first $500 that Jie earns per week, but on income above $500 per week, he must pay a *t%* tax. Jie's job pays $10 per hour. His utility function is $U(C,R) = R \times C^2$, where *C* is the dollar value of consumption and *R* is the leisure. He has 100 hours to divide between work and leisure. If *t%=60%*, Jie will choose to work _____ hours per week. If *t%=20%*, Jie will choose to work _____ hours per week.

4. The demand function for apple is *D(p) = 1800-50p*, and the supply function is *S(p) =90p*. The law used to be that anyone who consumed an apple had to pay two apples to Jie. Then he ate all the apples he got. So the number of apples produced was _____. But now Jie decides to sell all the apples he collects back to the market at the going selling price. In equilibrium, the number of apples that will be produced is _____.

Short Answers (24 points, 12 points each)

1. Jie works in a machine factory. He can work as many hours per day as he wishes at a wage rate of *w*. Let *C* be the number of dollars he has to spend on consumption and let *R* be the number of hours of leisure that he chooses. Assume that Jie has the utility function $U(C,R) = C \times R$.

a) Suppose that Jie earns $8 per hour and has 18 hours per day to devote to labor or leisure, and suppose that he has $16 of nonlabor income per day. Write an equation for his budget between consumption and leisure, then draw his budget line in the graph.

b) How many consumptions will he choose? How many hours per day will he work?

c) Suppose that Jie's wage rate rises to $12 per hour. (He still has $16 a day in nonlabor income.) How many hours of leisure per day will he choose? You are required to decompose his change in demand into three parts, namely substitution effect, ordinary income effect and endowment income effect.

2. Jie's utility function is $U(x, y) = 2\sqrt{x} + 2y$. He faces prices (1, 2), and his income is 2. Then the prices change to (1, 3).

a) What is the initial demand choice of Jie?

b) What is the demand after the prices change? Show the substitution effect and income effect.

c) What are the changes of consumer surplus when the prices change? Is Jie getting better or worse?

d) What are the dollar values of Equivalent Variation and Compensating Variation when the prices change?

Discussion (10 points, 5 points each)

1. (a) Is it possible that a single buyer's demand function for a certain good is inelastic, but the total demand of a certain good is elastic? (b) Is it possible that a single buyer's demand function for a certain good is elastic, but the total demand of a certain good is inelastic?

For each of the above two questions, if your answer is yes, please give an example; if your answer is no, please state why.

2. Suppose in the intertemporal choice problem, the nominal interest rate for the savings (r_1) is lower than the nominal interest rate for the borrowings (r_2). Consider rational, strictly convex and monotonic preferences, m_1 and m_2 are incomes received in periods 1 and 2; c_1 and c_2 are consumptions in periods 1 and 2; and p_1 and p_2 are the prices of consumption in periods 1 and 2, respectively.

a) Please write down and draw the budget constraint.

b) Other things being equal, if the nominal interest rate for the savings (r_1) decreases, will a saver still be the saver? How does his saving change? Please state why.