Mid-Term Exam of Intermediate Microeconomics

Problem Set (A)

Fall 2022, 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.

True or False (30 points, 3 points each)

1. If Jie has quasilinear utility as $U(x, y) = lnx + y$ with income m, where $m > p_y$, then the change of demand for good x with a change of p_x is completely due to substitution effect.

2. If preferences are strictly convex and monotonic, then the most preferred affordable bundle is unique.

3. If the vertical and horizontal axes of demand curve are reversed, it becomes the Engel curve.

4. If the price of a good changes but income remains constant, there is only a substitution effect but no any income effect.

5. If no commodity is a bad, then indifference curves must be strictly negatively sloped.

6. Jie purchases two goods, x and y. Good x is an inferior good for some range of income, then there must be another range of income for which good x is a normal good.

7. If utility is quasilinear with respect to the monetary commodity, the compensating variation, the equivalent variation, and the change in consumer's surplus are all equal, for sufficiently high income levels.

8. An inferior good may be a Giffen good for a net demander.

9. Approximating the net utility gain area under the reservation-price curve and above the price line, by the corresponding area under the ordinary demand curve and above the price line, gives the Consumer's Surplus measure of net utility gain.

10. Consider a two-period well-behaved consumer who borrows in period 1. r denotes the interest rate. If r decreases, this consumer will still be a borrower.

Single Choice (30 points, 3 points each)

1. Jie has a utility function $U = min\{x_1, 0.5x_2\}$, where x_1 is the money spent on consumption in period 1, and x_2 is the money spent on consumption in period 2. If she had an income of 20 in period 1, and 9 in period 2, and if the interest rate were 0.10, how much would Jie choose to spend on in period 1?

A. 12

B. 10

C. 13

D. 11

2. If the number of consumers in the market are doubled and they all maintain the original income level and preferences for a normal goods. If price is positioned on vertical axis, quantity is positioned on horizontal axis, then which corresponding change in the demand for this good is CORRECT?

A. The absolute value of slope of the demand curve remains the same, and the absolute value of price elasticity of demand doubles at the same price.

B. The absolute value of slope of the demand curve remains the same, and the absolute value of price elasticity of demand remains unchanged at the same price.

C. The absolute value of slope of the demand curve has reduced by half, and the absolute value of price elasticity of demand doubles at the same price.

D. The absolute value of slope of the demand curve has reduced by half, and the absolute value of price elasticity of demand remains unchanged at the same price.

3. The utility function of Jie is $y = min(6x_1 + 3x_2, 3x_1 + 6x_2)$. His income is 120. If the price of x_1 is 9 per unit and the price x_2 is 15 per unit, then

A. Jie will only consume x_1.

B. Jie will consume both and equal amounts of x_1 and x_2.
C. Jie will consume both and more x_1 than x_2.
D. Jie will consume both and more x_2 than x_1.

4. Jie consumes two goods (x_1, x_2). When the price is (18,17), he consumes bundle (15,14). When the price is (11,12), he consumes bundle (16,13). Which of the following statements is true?
A. Jie violates the weak axiom of revealed preference.
B. Jie prefers x_1 to x_2, if he has enough income.
C. Jie prefers x_2 to x_1, if he has enough income.
D. We don't know which bundle is preferred.

5. The demand curve is $D(p) = 10 - 0.5p$ and supply curve is $S(p) = p - 1$. If the good is now taxed by government at a certain level. Which of the following statements is true?
A. Consumers pays more than half of the tax.
B. Suppliers pays more than half of the tax.
C. Consumers and suppliers share the tax equally.
D. It depends on which size of the tax the government imposes.

6. Which of the following utility function represents a strictly convex utility?
A. $U(x, y) = x + y,\ x, y \in R$
B. $U(x, y) = x^{0.5} + y^{0.5},\ x, y > 0$
C. $U(x, y) = -x^2 + y^2,\ x, y \in R$
D. $U(x, y) = xy,\ x, y < 0$

7. Jie is now facing a problem on how to allocate his salary on two periods consumption. Jie will gain 100 RMB in period 1 and 120 RMB in period 2, borrowing and saving are unlimited so long as Jie has no debt at the end of period 2 with interest rate $r = 0.2$. And there is only one commodity in the market with price 1 RMB per unit in period 1, 1.2 RMB per unit in period 2. Jie's utility function is $U(x, y) = xy$, where x is the consumption in period 1, y is the consumption in period 2. So the amount of consumption in period 1 should be?
A. 80
B. 100

C. 120

D. 160

8. There are five individuals whose preferences are represented as follows.

Jie: $U(x,y) = \sqrt{x} + 2y$

Yongchun: $U(x,y) = 3(x+y) + 10$

Haipeng: $U(x,y) = x + y^2$

Haocheng: $U(x,y) = 4xy$

Xutang: $U(x,y) = \min\{5x, y\}$

Who has the homothetic preference?

A. Everyone but Jie and Haipeng

B. Everyone but Jie, Haipeng and Haocheng

C. Everyone but Haocheng and Xutang

D. None

9. Jie consumes only rye bread and milk. His endowment is 5 units of rye bread and 10 units of milk. Both goods are normal goods. Jie is a net seller of rye bread. If the price of rye bread rises and the price of milk stays the same, how are his demand and welfare affected?

A. The demand for rye bread must decrease and the welfare level must increase.

B. The demand for rye bread must decrease and the welfare level may decrease.

C. The demand for rye bread may increase and the welfare level must increase.

D. The demand for rye bread may increase and the welfare level may decrease.

10. In a fruit market the demand function is $D(p) = 2000 - 50p$ and the supply function is $S(p) = 150p$. The law used to be that any consumer who consumed one unit of fruit had to pay another two unit of fruit to the government. And the government then destroy all the fruit it got. Now the government decides to resell all the fruit that it collects in the local market at the going selling price. The number of fruit that will now be produced:

A. decreases by 500

B. increases by 500

C. decreases by 1000

D. increases by 1000

Filling Blanks (20 points, 2 points each blank)

1. Jie will harvest 100kg corn in period 1 and no corn in period 2 and his utility function is $U(x_1, x_2) = x_1 x_2$. But there is a rat in his house and the rat will eat 25% Jie's corn at the beginning of period 1. So, Jie's optimal consumption at period 2 is _____kg. If Jie has a cat, the rat will only eat 10% of his corn. So, Jie's optimal consumption at period 2 is _____kg. (Please give a numerical answer)

2. Jie has the utility function $U(x, m) = 100x - 0.5x^2 + m$, where x is a commodity and m is his saving. If his income is \$10,000 and the average price of consumption is \$50, then in market of x, the consumer's surplus is _____. If the average price of consumption increases to \$65, then in market of x, the new consumer's surplus is _____. (Please give a numerical answer)

3. Jie consumes two goods x and y, and his utility function is $U(x, y) = 4\sqrt{x} + y$. The prices for goods x and y are both \$4 and his income is \$16. He can consume any amount of x and y. If the price for x increases to \$8, the income effect for y is _____. If the price for y also increases to \$8, then compared with the original state, the change in Jie's surplus is _____. (Please give a numerical answer)

4. If the demand function for rye bread is $D(p) = 400 - 50p$, the price elasticity of demand when $p = x$ is _____. The price elasticity of demand when sellers' revenue is maximized is _____.

5. Jie consumes two goods x and y in two periods 1 and 2. His utility function is $U(x_1, y_1, x_2, y_2) = (\sqrt{x_1} + \sqrt{y_1})(\sqrt{x_2} + \sqrt{y_2})$, where (x_1, y_1) is the consumption in period 1, (x_2, y_2) is the consumption in period 2. The prices for goods x and y are both 1, and prices do not change over time. Jie's earnings in period 1 and period 2 are both 2. The interest rate is 10%. He would consume $x_2 =$ _____ and $y_2 =$_____. (Please give a numerical answer)

Short Answers (20 points, 10 points each)

1. Jie has the utility function $U(x, m) = x - 0.5x^2 + m$, where x is the consumption and m is his saving. If his income is w and the average price of consumption is p.

(a) Please find out Jie's optimal consumption and saving decision.

(b) What is the utility level at this price and wage?

(c) If the average price of consumption increases from p to $2p$, please derive the equivalent variation and compensating variation through detailed calculation, respectively. What is the relationship between EV and CV?

(d) Can you explain how to derive the relationship between EV and CV without above calculation? Discuss the substitution effect and income effect for consumption here.

2. Jie's utility function is $U(C_1, C_2) = lnC_1 + \frac{1}{4}lnC_2$, where C_1 and C_2 denote his consumption level when young and when old, respectively. There is no price inflation ($p_1 = p_2 = 1$). Suppose his income when young is $m_1 = 40$, and his income when old is $m_2 = 20$. Jie can borrow and save at the interest rate r =150%.

(a) What is the present value and the future value of Jie's lifetime income?

(b) Please show the optimal consumption plan (C_1, C_2) and the corresponding level of savings (S) or borrowings (B).

(c) If the interest rate rises from 150% to 200%, show the substitute effect, the ordinary income effect, and the endowment income effect for C_1 and C_2.

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