

Exercise 2

Theory of Demand

1. **(SE&IE)** Consider two goods, X and Y. Let $U(X, Y) = XY$. $P_Y = \$1$, $P_X = \$4$, and $I = \$72$. **Recall the answer from Exercise 1.** The consumer's initial optimal bundle (Bundle A) is where $X^* = 9$ and $Y^* = 36$. When $P_X' = \$9$, the consumer's new optimal bundle (Bundle C) is where $X^* = 4$ and $Y^* = 36$.
 - a. In this case of price rise, how will the Slutsky's method compensate income of the consumer? Increasing or decreasing it? By how much?
 - b. Find numerical values of the SE and IE using the Slutsky's method, and draw a consumer choice diagram to show the two effects.

Hints

- i. Bundle B or the decomposition bundle can be found at the point where the IC is tangent to the imaginary BL that has been income-compensated from Part a).
- ii. Hence, it can be found by solving the optimality condition and the imaginary BL.
- iii. Please make sure to use $P_X' = \$9$ when solving because the price has already risen.
- c. Draw the uncompensated and compensated demand curves. What is the difference between the two curves?
- d. Explain the difference between the Hicks' and Slutsky's methods in identifying the substitution effect. On the same diagram from Part b), illustrate the Hicks' method.

Applications

1. **(Labor Supply)** With relevant diagrams, explain why some people may work less when they are richer. Make sure to refer to the substitution and income effects.
2. **(Voucher and Cash Subsidy)** With relevant diagrams, discuss the pros and cons between vouchers and cash subsidies? Is there any case where the consumer will be indifferent between the two?
3. **(Voucher and Cash Subsidy)** Paul consumes only two goods, pizza (P) and hamburgers (H) and considers them to be perfect substitutes, as shown by his utility function: $U(P, H) = P + 4H$. The price of pizza is \$3 and the price of hamburgers is \$6, and Paul's monthly income is \$300. Knowing that he likes pizza, Paul's grandmother gives him a birthday gift certificate of \$60 redeemable only at Pizza Hut. Though Paul is happy to get this gift, his grandmother did not realize that she could have made him exactly as happy by spending far less than she did. How much would she have needed to give him in cash to make him just as well off as with the gift certificate?

Hints

- i. First, show that Paul will only consume hamburgers (a corner solution).
 - ii. With the voucher from his grandma, he is going to buy $60/3 = 20$ pizzas.
 - iii. Find his utility from consuming only hamburger from the money he has and 20 pizzas from the voucher. Then, find the cash subsidy that would allow him to reach the same utility by consuming only hamburgers.
4. **(Revealed Preference)** A “rational” consumer with an income of \$24 always buys two goods, X and Y. In the first period, $P_x = \$4$ and $P_y = \$2$, and the consumer spends \$20 on Y and \$4 on X. In the second period, $P_x' = \$3$ and $P_y' = \$3$, and the consumer spends \$18 on Y and \$6 on X.
- a. What is meant by “rational”?
 - b. Using the revealed preference principle and a diagram, explain whether the consumer is better off or worse off in the second period. Make sure to include the inequality.
 - c. Suppose there is another bundle (called Bundle C) in the second period with 6 units of X and 2 units of Y. On the previous diagram, draw three indifference curves passing through the three bundles to show the preference. Explain how the consumer would rank Bundle C.