

**Due at the start of class Wed., Feb. 6<sup>th</sup>**

1. Short questions
  - a. Define normal and inferior goods. Give some examples.
  - b. Explain why a person's marginal rate of substitution between two goods must equal the ratio of the prices of the goods for the person to achieve maximum satisfaction.
  - c. Show in a diagram that an x% increase in income has the same effect on the consumer's opportunity set as a y% percent decrease in both good prices. Give an x,y combination.
  - d. Given a demand curve  $Q = 20 - 3P$ , find the P, Q combination with unitary elasticity.
2. The price of CDs falls relative to books. This changes the budget constraint. CDs are normal goods.
  - a. Show the old and new budget constraints and the old and new optimal choices.
  - b. On the same graph, illustrate the income and substitution effects.
  - c. Make the graph again with CDs as an inferior good.
3. You see a homeless person on the street, and you decide that you want him to consume four more units of food. You have three options available to you (you know that he has some money):

Plan A: Pay for a food price subsidy to the homeless person. You give the homeless person non-transferable coupons which effectively lower the price of food to him. You provide enough of a subsidy so that the homeless person consumes four more units of food.

Plan B: You give the homeless person enough money so that he buys 4 more units of food.

Plan C: You give the homeless person 4 units of food (which you bought at full price).

  - a. Which of plans A and B is less expensive?
  - b. Which of plans A and B leaves the homeless man better off, according to his preferences?
  - c. How does the cost of plan C compare with plan A?
  - d. How does the cost of plan C compare with plan B?
  - e. Which plan do you prefer? Why?  
(Hint: represent each plan in an indifference curve diagram with food on the horizontal axis and AOG on the vertical axis.)

4. Derive an individual's ordinary demand curve for a commodity that is not a "good," for example garbage. (More is not better). Use a two-panel diagram with commodity space above ("all other goods" and garbage, with positive quantities of goods on the axes) and price-quantity space below. Indicate the price of garbage in both diagrams. Is the price of garbage positive? (Hint: assume that garbage has increasing marginal disutility.)
  
5. Larry's utility function over pizza (X) and root beer (Y) is  $X^5Y^5$ . Larry has \$10, and root beer and pizza initially each cost \$1 per unit.
  - a. How much root beer and pizza does Larry consume?
  - b. The price of pizza rises to \$2. What happens to Larry's demands for root beer and pizza?
  - c. How much worse off is Larry, in terms of expenditure required to attain his original utility level? Show this in an indifference curve diagram.
  - d. Calculate Larry's change in welfare using the ordinary demand curve for pizza. Show this in a demand diagram. Is it close to the other measure?
  
6. Opie (age 6) has one book (X) and two game cartridges (Y). Books cost \$10 and game cartridges cost \$30. Both are non-returnable once purchased. Opie has the following utility function  $U(X,Y) = XY^6$ . Aunt Bea decides to spend \$70 on presents for Opie. She buys him four books and one game cartridge.
  - a. Graph Opie's initial position (budget constraint and indifference curve) prior to receiving the gifts. Is Opie optimized?
  - b. Graph Opie's position after he receives the gifts from Aunt Bea.
  - c. Develop a measure of the waste in this transaction. (Hint: Aunt Bea spends \$70 to raise Opie's utility from  $U_0$  to  $U_1$ . Could this have been done at less expense? Assume that books and game cartridges may be purchased in fractional amounts.)
  - d. What, if anything, is wrong with the measure of waste you have developed?