Economics 308: Intermediate Microeconomics
Department of Economics, Finance and Legal Studies
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Problem Set #1

1. The notion of utility is an "ordinal" one for which it is assumed that people can rank combinations of goods as to their desirability, but that they cannot assign a unique numerical (cardinal) scale for goods that quantifies "how much" one combination is preferred to another. For each of the following ranking systems, describe whether an ordinal or cardinal ranking is being used:
    a. military or academic ranks
    b. prices of vintage wines
    c. rankings of vintage wins by the French Wine Society
    d. press rankings of the "Top Ten" football teams
    e. results of the current U.S. Open Golf Championships (in strokes)

2. Suppose that an electric company charges consumers 10 cents per kilowatt hour for electricity for the first 1,000 used in a month but 15 cents for each extra kilowatt hour after that. Draw the budget constraint for a consumer facing this price schedule and discuss why many individuals may choose to consume exactly 1,000 kilowatt hours.

3. Paul Video derives utility only from CDs, denoted as C and DVDs, denoted as D. His utility function is:
$$u = C^{1/2}D^{1/2}$$
    a. Sketch Paul's indifference curves for $u = 5$, $u = 10$, and $u = 20$.
    b. Suppose Paul has $200 to spend and that CDs cost $5 and DVDs cost $20. Draw Paul's budget constraint on the same graph as his indifference curves.
    c. Suppose Paul spends all of his income on DVDs. How many can he buy and what is his utility?
    d. Show that Paul's income will not permit him to reach the $u = 20$ indifference curve.
    e. If Paul buys 5 DVDs, how many CDs can he buy? What is his utility?
    f. Show that the utility calculated in part e is the highest Paul can achieve with his $200.

4. Sally has $100 to buy supplies for her computer. The two items that she needs are computer ribbons and computer paper. Paper costs $10 for 1000 sheets, and ribbons cost $5 and must be replaced after 2000 sheets of paper.
    a. Sketch Sally's budget line.
    b. What will her indifference curves look like?
    c. Can you figure out the equilibrium?

5. The MRS of food (vertical axis) for shelter (horizontal axis) measures the amount of food that must be received in order to absorb the loss of 1 unit of shelter without losing utility. If that value is 3, if the price of food is 5, and if the shelter price is 10, then the consumer is not maximizing his utility. Sketch a budget line, assuming the consumer

has $100 to spend, and draw in a possible indifference curve that illustrates the situation described here. Then, on the same graph, show what could be done to correct the problem, and explain why this will work.

6. When the price of gasoline is $1/gal, you consume 1000 gal/yr. Then two things happen:
   (1) The price of gasoline rises to $2/gal and
   (2) a distant uncle dies, with the instruction to his executor to send you a check for $1000/yr.
   If no other changes in prices or income occur, do these two changes leave you better off than before?

7. Suppose Jennifer always spends half her income on food. How will changes in the price of food affect the quantity of food consumed? How will changes in the price of food affect total spending on food? How large an increase in income would be needed to offset the effect of a 10 percent increase in the price of food?

8. Ivan always buys left and right shoes in pairs. Explain why a sale on right shoes will have an income effect but no substitution effect on his left and right shoe purchases.

9. Mr. Wright, a clothing salesman, is forced by his employer to spend at least $100 of his weekly income of $500 on clothing. Show that his utility level is lower than if he could freely allocate his income between clothing and other goods (treat other goods as y).

10. Pete Moss buys 100 units of fertilizer and 80 units of grass seed along with quantities of other goods. The price of fertilizer rises by 40 cents per unit, and the price of grass seed drops by 50 cents per unit; other prices and Pete's income remain unchanged. Will Pete buy more, less, or the same amount of fertilizer? Explain.

11. Irene's demand for pizza is given by:
$$Q = 0.3I/P$$
   where Q is the weekly quantity of pizza bought (in slices), I is weekly income, and P is the price of pizza. Using this demand function, answer the following:
   a. Is this function homogenous in I and P?
   b. Graph this function for the case of I = 200.
   c. One problem in using this function to study consumer surplus is that Q never reaches zero no matter how high P is. Hence, suppose that the function holds for only P ≤ 10 and that Q = 0 for P > 10. How should your graph in part b be adjusted to fit this assumption?
   d. With this demand function (and I = 200), it can be shown that the area of consumer surplus is approximately $CS = 198 - 6P - 60\ln(P)$. Show that if P = 10, CS = 0.
   e. Suppose P = 3. How much pizza is demanded and how much consumer surplus does Irene received? Give an economic interpretation to this magnitude.