DUSP 11.203 Frank Levy
Microeconomics Session 5

Problem Set #3
Problem Set Due Session 7

1) You want to think about the consumer's choice problem at two levels. It is a stylized way of describing how people spend their income. It is also a general approach to allocating a scarce resource across competing uses in order to advance some goal (utility, in the case of the consumer). In this second approach, an idea like "non-satiation" translates into the statement that more spending on a particular use will always advance the goal. Ditto for diminishing marginal utility, etc. At the same time, not all resource allocation problems fit the assumptions of the consumer's choice problem. With all this in mind, explain why each of the following situations do or do not plausibly fit with the assumptions of complete ordering, transitive ordering, non-satiation, and diminishing marginal utility fit with the following situations.

a) As we know from the first problem set, Teton Village is trying to decide how to develop a fixed area of land between hotels/condos and shopping.

b) Kathleen Sullivan, the Boston Chief of Police, has a primary goal of reducing the crime rate. She has observed that when she increases police patrols in a district, there is no reduction in the crime until the patrols reach a critical mass after which the crime rate begins to drop sharply.

2) You have a utility function of the form:

$$U(A, H) = 10LN(A) + 15LN(H)$$

The price of a hamburger is \$3.00, the price of an apple is \$0.50, and my income is \$30.00.

In this problem, your job is to evaluate the potential solution:

Apples = 36; Hamburgers = 4.

a) By applying appropriate calculus to this utility function, derive the expression for the marginal utilities of apples and hamburgers, respectively. (We are looking for algebraic expressions here – not specific numerical values). (The derivative of the LN function is contained in the calculus notes on the web site.)

b) Take the expressions you derived in (a) and calculate the specific values of the marginal utility of apples and hamburgers at the proposed solution of Apples = 36 and Hamburgers = 4. Using the information on prices, determine whether the proposed solution satisfies one condition for utility maximization - that (Marginal Utility/Price) be equal across all commodities.

c) Determine whether the proposed solution satisfies the other condition for utility maximization - that the proposed solution requires spending all income.

d) In class, we developed formulae for both the slope of the budget line and the slope of an indifference curve. Using these formulae, calculate the slope of the budget line in this problem and then calculate the slope of the indifference curve at the point of the proposed solution: Apples = 36; Hamburgers = 4.

e) Sketch a set of axes that we use to describe the consumer choice problem with Apples on the vertical axis and Hamburgers on the horizontal axis. Put the budget line in the graph but don't draw indifference curves. Using the two slopes you calculated in (d), explain whether the proposed solution lies to "the Northwest" (i.e. too many apples) or "the Southeast" (too many hamburgers) of the utility maximizing solution.

3) You have a utility function defined over two goods, hot dogs and glasses of beer.

$$U(B,H) = 2LN(B) + 2LN(H)$$

with: P_{beer} = \$.80/glass, $P_{hot\ dog}$ = \$1.60/hot dog. Your income = \$9.60.

a) Solve your consumer's choice problem to find the combination of hot dogs and beer that maximizes utility.

b) Suppose that \$.80 is the normal price for a glass of beer but during happy hour, the price drops to \$.40 per glass while hot dogs stay at \$1.60. What is the utility maximizing combination of beer and hot dogs at these prices?

c) Suppose the Massachusetts State Legislature, appalled at the extent of drunk driving, requires all restaurants and bars to institute a safe-drinking program that bans happy hour prices and limits each customer to three beers. What would your utility maximizing solution be in this case? (Don't jump to the mathematics but rather reason this one through).

4) Use the concept of opportunity cost to explain why each of the following statements does or does not use proper economic logic.

a) "Even though the house was a wreck, it was a good deal for them because he is an electrician and she is a house painter and so they could fix up the house and the only money they would have to spend would be on materials."

b) “Our firm can finance this new project in either of two ways. We can take out a loan from the bank or we can fund it from our internal reserves. If we take out a loan, we have to pay a 6 percent rate of interest to the bank and so the project will have to return something more than 6 percent on our investment to avoid losing money. If we fund the project from our reserves, we don’t owe any interest to the bank and so the project’s rate of return can be as low as 1 or 2 percent without creating any problem.”

5) The choice of where to live, like any other choice, can be modeled in a utility maximizing framework. Consider a simple model of a U. S. city where all employment is at the city center and all houses are single family homes of the same design and age, and sit on lots of the same size. To further simplify the problem, assume all homes are rented so we can talk of a monthly expenditure on a home that parallels expenditures on other goods.

a) As we move further from the city center, what do we expect to happen to the pattern of rents? Why should this be so?

b) Consider a simple world in which consumers spend money on three goods: Housing, Transportation to Work and “Everything Else”. Use these variables to set up a consumer’s choice model to explain a family’s location decision. Keep the utility function general (e.g. U(? ? ?)) where you fill in the blanks, but be as specific as you can be about the form of the budget constraint.

6) In class, we said that we wouldn’t be working with utility functions of the form:

$$U(H, A) = 6A + 4H$$

a) Use a piece of graph paper or a drawing program to draw a set of indifference curves for this function with levels of utility in the range from U= 18 to U = 100.

b) On the same graph, draw a budget constraint based on the following information:

P_H = \$3.00, P_A = \$1.00, Income = \$12.00

c) Describe the nature of the utility maximizing solution. How does this solution square with the idea of “not putting all your eggs in one basket”? What properties of the utility function produce that result?