PLCY 788 Micro Theory for Public Policy Analysis

Problem Set 3

This assignment is due in class on Thursday September 21, 2006. You may work together but should not copy answers verbatim and must hand-in individual assignments. Assignments will not be returned so make a copy of what you turn in.

1. In problem set 2 you derived the ordinary demand curves for the preferences \( U(H,B) = H^{2/3}B^{1/3} \).
   a. Verify that these demand curves satisfy the homogeneity and ‘adding-up’ properties of consumer theory.
   b. Derive the own price, cross price and income elasticity of demand for \( H \) and \( B \) and describe the type of goods these are (normal, inferior, gross substitutes, gross complements).
   c. Derive the indirect utility function that corresponds to these preferences.

2. Average family size in the U.S. has declined over the last century. Use indifference curves for children (x-axis) and all-other-goods (AOG; y-axis) to illustrate each of the following explanations for the reduction in family size.
   a. Children have become more expensive.
   b. People’s tastes for large families have changed.
   c. Children are inferior goods.

3. Use indifference curve diagrams to illustrate each of the following policies designed to reduce the consumption of gasoline during a (hypothetical) gas shortage. Place gasoline quantity on the x-axis and AOG on the y-axis. Assume that the representative consumer’s income is \( M \) and the price of gas is \( p \).
   a. Ration coupons are issued to the consumer on a monthly basis. These coupons allow the consumer to purchase 100 gallons of gas for 0.5\( p \). All subsequent units must be purchased at the price of 2\( p \). Show the initial budget constraint and the post-policy budget constraint. On separate diagrams, show a consumer that buys more and one who buys less gas after the policy. (Assume coupons are not transferable.)
   b. Now consider a policy where monthly ration coupons are distributed that entitle the consumer to purchase 100 gallons of gas per month at the prevailing market price (\( p \)) and no more. Show the pre and post policy budget constraints. On separate diagrams, illustrate the case where a consumer is and is not affected by this policy.
   c. Which policy is the most effective at reducing the consumption of gas?

4. Say the demand for chocolate chip cookies (\( x \)) is given by \( x = 16 + 0.4M - 8p + 2py \) where \( M \) is income in thousands of dollars, \( p \) is price of cookies, and \( py \) is the price of ice-cream.
   a. Suppose the current levels of \( x \), \( M \), \( p \) and \( py \) are 21.6, 20, 0.80 and 2 respectively. Calculate the own price, cross price and income elasticity of demand for cookies.
   b. Suppose that the price of ice-cream increases by 20%. What will be the new quantity demanded of cookies? Are the two goods complements or substitutes?

5. A certain Public Policy Professor consumes AOG (whose price=1) and local telephone calls. The telephone company offers him two options for purchasing local calls: I: $10 fixed fee and zero cents per call; II: $2 fixed fee and ten cents per call.
   a. Show the budget lines and ‘affordable sets’ for each of these options.
   b. Assuming normal convex indifference curves, show a possible solution for each of these options.
   c. When will the Professor choose option I? Explain in words and show graphically.