

Economics 500: Microeconomic Theory  
State University of New York at Binghamton  
Department of Economics  
Fall, 2004

Problem Set #3

1. Monica always buys one unit of food together with three units of housing, no matter what the prices of these two goods. Use this information to decide whether the following events would make her better off or worse off or leave her welfare unchanged.
  - a. The prices of food and housing increase by 50 percent with Monica's income unchanged.
  - b. The prices of food and clothing increase by 50 percent, and Monica's income increases by 50 percent.
  - c. The price of food increase by 50 percent, the price of housing remains unchanged and Monica's income increases by 25 percent.
  - d. The price of food remains unchanged, the price of housing increases by 50 percent and Monica's income increases by 25 percent.
  - e. How might your answers to part c and part d change if Monica were willing to alter her mix of food and housing in response to price changes?
  
2. 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.
  
3. The residents of Uurp consume only pork chops (X) and Coca-Cola (Y). The utility function for the typical resident of Uurp is given by
$$U(X,Y) = (XY)^{1/2}$$
In 2002, the price of pork chops in Uurp was \$1 each; Cokes were also \$1 each. The typical resident consumed 40 pork chops and 40 Cokes. In 2003, swine fever hit Uurp and pork chop prices rose to \$4; the Coke price remained unchanged. At these new prices, the typical Uurp resident consumed 20 pork chops and 80 Cokes.
  - a. Show that utility for the typical Uurp resident was unchanged between the 2 years.
  - b. Show that using 2002 prices would show an increase in real income between the 2 years.
  - c. Show that using 2003 prices would show a decrease in real income between the two years.
  - d. What do you conclude about the ability of these indexes to measure changes in real income?

4. Thirsty Ed drinks only pure spring water, but he can purchase it in two different-sized containers – 0.75 L and 2.00 L. Because the water itself is identical, he regards these two goods as perfect substitutes.
  - a. Assuming Ed's utility depends only on the quantity of water consumed and that the containers themselves yield no utility, express this utility function in terms of quantities of 0.75 L containers (X) and 2.00 L containers (Y).
  - b. State Ed's demand function for X in terms of  $P_X$ ,  $P_Y$  and I.
  - c. Graph the demand curve for X, holding I and  $P_Y$  constant.
  - d. How do changes in I and  $P_Y$  shift the demand curve for X?
  - e. What would the compensated demand curve for X look like in this situation?
  
5. Show that if there are only two goods (X and Y) to choose from, both cannot be inferior goods. If X is inferior, how do changes in income affect the demand for Y?