

Assignment #3Due Friday 9/29/06 by 6 p.m. in the Econ 301-1 slot in the Economics Alcove

Please show the calculations used to arrive at your answers. Draw graphs neatly and label axes and points clearly. In general, leave numbers in fractional form while solving problems. Round final answers to the first decimal place if necessary.

A. Alex runs a one-person, ten-cow dairy operation which produces 600 gallons of milk a week. This is his sole source of income. Alex's utility function is $U(x,y) = 60x^4y^2$, where x = gallons of milk and y = dollar units of other goods

(1) a. What is Alex's demand function for milk?

b. Show whether milk is a normal or an inferior good.

(2) The price of milk is \$4 per gallon.

a. How many gallons of milk does Alex consume?

b. How many dollar units of other goods?

(3) All the dairies except Alex's are hit by a tornado, wiping out many cows and causing the price of milk to rise to \$10 per gallon. Break down the corresponding change in Alex's consumption of milk between the substitution, ordinary income, and endowment income effects.

(4) The government gives all the dairy farmers a milk-producing hormone to feed to their cows. Alex's cows become twice as productive, producing 1200 gallons of milk a week. However, all this extra milk on the market causes the price to drop to \$3 per gallon. Will Alex change his consumption of milk, and if so, by how much?

B. Michi, another dairy owner, decides to sell her dairy to MILKUM, a big corporation. She invests her money from this sale and receives \$204 a week in interest income from this and other investments. Michi decides to work for MILKUM, which offers her an hourly wage of \$8. Michi's utility function is $U(C,R) = (C + 500)R$, where C = consumption of goods and services (which cost \$1 per unit), and R = hours of leisure.

(1) Graph Michi's budget constraint and mark Michi's endowment point on the constraint.

(2) How many hours will Michi work per week? Mark Michi's consumption point on your graph from (1) and show how to read off the number of hours worked from the graph.

(3) MILKUM is forced by government regulation to pay an overtime wage: For every hour over 40 worked per week, the company pays 150% of the usual hourly wage, namely \$12.

a. Graph Michi's new budget constraint on the same graph as you used for sections (1) and (2).

b. Explain why Michi will now increase her number of work hours.

(4) MILKUM finds a loophole in the government regulation and stops paying overtime. To get even, the government places a wage tax of 50% on MILKUM, which it passes along fully to its workers.

a. Graph Michi's new budget constraint on the same graph as you used for sections (1), (2), and (3). Now how many hours will Michi work per week?

b. Does this change in hours worked imply that leisure is an inferior good? Explain why or why not.

C. There are two goods in the economy, food and clothing. Observations are made of Kevin's buying patterns and the prevailing prices for 3 months:

| <u>Month</u> | <u>Unit Price of:</u> | | <u>Units Bought of:</u> | |
|--------------|-----------------------|-----------------|-------------------------|-----------------|
| | <u>Food</u> | <u>Clothing</u> | <u>Food</u> | <u>Clothing</u> |
| April | 3 | 2 | 4 | 9 |
| May | 5 | 4 | 8 | 5 |
| June | 2 | 1 | 8 | 2 |

- (1) a. Graph these 3 bundles and their associated budget constraints.
 - b. From looking at this graph, can you tell if Kevin has violated the Weak Axiom of Revealed Preference (WARP)? How can you tell?
- (2) Check to see if Kevin has violated WARP by creating a table like Table 7.2 in Varian, p. 127, and using the starring method as described in the accompanying text.
- (3) a. Using the formulas on p. 131 and setting May=t and April=b, calculate the Paasche quantity index and the Laspeyres quantity index.
 - b. Using these indices, demonstrate whether or not one can tell if Kevin was better off in April or in May and, if possible, show which month he preferred.
- (4) For the same 2 months calculate:
 - a. The Paasche price index
 - b. The Laspeyres price index.
 - c. The expenditure index.
 - d. Verify your answer to (3) b. by using these indices.