ECO 300 – MICROECONOMIC THEORY
Fall Term 2005
PROBLEM SET 2
Due 12.30 p.m. on Thursday October 6

There are five questions on three pages

QUESTION 1: (10 points, divided 2 for (1) and 4 each for (2) and (3) )

This deals with income-consumption and price-consumption curves, reviewing ECO 100 material. See Pindyck-Rubinfeld pp. 108-113.

Multiple choice – simply write the letter for the best answer

(1) Consider a graph on which one good Y is on the vertical axis and the only other good X is on the horizontal axis. On this graph the income-consumption curve has a positive slope for low incomes, then it takes a zero slope for a higher income, and then it takes a negative slope for even higher incomes (the curve looks like an arc, first rising and then falling as income increases). This curve illustrates that, for all income levels,
a. both X and Y are normal.
b. only Y is normal.
c. both X and Y are inferior.
d. only X is normal.

(2) Jon's income-consumption curve is a straight line from the origin with a positive slope. Now suppose that Jon's preferences change such that his income-consumption curve remains a straight line but rotates 15 degrees clockwise. Jon's demand curve for the good on the horizontal axis
a. will shift left.
b. will shift right.
c. will not change.
d. might do any of the above.

(3) Felicity regards two brands as perfect substitutes for one another. The two have unequal prices. As her income changes, her income-consumption path is
a. always upward sloping
b. always horizontal
c. always vertical
d. overlaps the axis corresponding to the cheaper soap
e. overlaps the axis corresponding to the more expensive soap

QUESTION 2: (20 points, 5 for Anna's part, 5 for Sam's and 10 for Zel's)

The maximum a person can work per day is 16 hours, and the number of hours to work is a continuous choice variable. The first 8 hours pay $10 per hour, and any additional hours pay $20 each. Diagram the budget constraint, showing hours of work H on the horizontal axis and dollars of income $ on the vertical axis.

Consider three people. Each has a constant marginal rate of substitution between leisure and work, and therefore straight line indifference curves.

(1) Anna Arbeiter is willing to work each hour in return for $8
(2) Sam Spielmann is willing to work each hour in return for $25
(3) Zel Zweistein is willing to work each hour in return for $15

Diagram their indifference maps, again showing hours of work H on the horizontal axis and dollars of income $ on the vertical axis. Why are the indifference curves upward-sloping?

Find optimal choices for each.

Say briefly in words (no need to draw fresh diagrams) what will happen to Zel's optimal choice if the overtime rate (a) drops to $19.99 per hour, (b) rises to $20.01 per hour?

QUESTION 3: (15 points; 12 for the first para and 3 for the second)

Richard Poor's income in 2005 is $1000, and in 2006 it will be $1200. He can borrow from the local loan shark at an interest rate of 50 per cent per annum. He can save, but the local bank pays interest on saving at only 10 per cent per annum. If Richard borrows in 2005, he must repay the principal and interest in 2006; if he saves in 2005, he gets back the principal and interest in 2006. Diagram Richard's budget constraint, showing dollars of consumption in 2005 on the horizontal axis and dollars of consumption in 2006 on the vertical axis. Your diagram need not be drawn very accurately to scale; a freehand sketch will suffice. But you should correctly label the intercepts of the budget constraint on the axes, and the slopes of its two separate linear portions.

Now suppose Richard's situation is reversed, so he can borrow at 10 per cent but savings earn 50 per cent. What happens to his budget constraint? (Be careful; think what you would do in Richard's shoes in this situation.)

QUESTION 4: (35 points, 8 each for calculating the Laspeyres and Paasche indexes, 16 for the true, 3 for the intuition)

Recall the midnight snack price index problem from the class of Thursday September 29. Your utility from consuming pizzas (X) and burgers (Y) was $U(X,Y) = X\,Y$. In 2005, the price of each pizza was $10 and the price of each burger was $5. (The income was $200.)

Now suppose that in 2006, instead of the burger price increasing as was the case in the class example, the pizza price falls to $6. Calculate the Laspeyres, Paasche, and true cost of living indexes for 2006, taking 2005 as 100.

What is the economic intuition for the relationship between the Laspeyres and the true index in this case?

QUESTION 5: (20 points; 16 for calculating the index, 4 for the question that follows)

Recall the midnight snack price index problem from the class of Thursday September 29. Your utility from consuming pizzas (X) and burgers (Y) was U(X,Y) = X Y. In 2005, the price of each pizza was $10 and the price of each burger was $5. In 2006 the price of burgers increased to $10. The Laspeyres price index for 2006 relative to 2005 was 150, while the true cost of living index was only 141.42, which is (150-141.42)/150 = 0.57 or 5.7% less than the Laspeyres index.

Now suppose instead that the price of burgers in 2006, instead of increasing by 100% to $10, increases by only 10%, to $5.50 . Redo the whole calculation to show that the true cost of living index is 104.88, and is 0.0011, or only 0.11%, less than the Laspeyres index.

Intuitively what do you conclude from this?