ECO 300 – MICROECONOMIC THEORY
Fall Term 2005
PROBLEM SET 2 – ANSWER KEY

The distribution of scores was as follows:

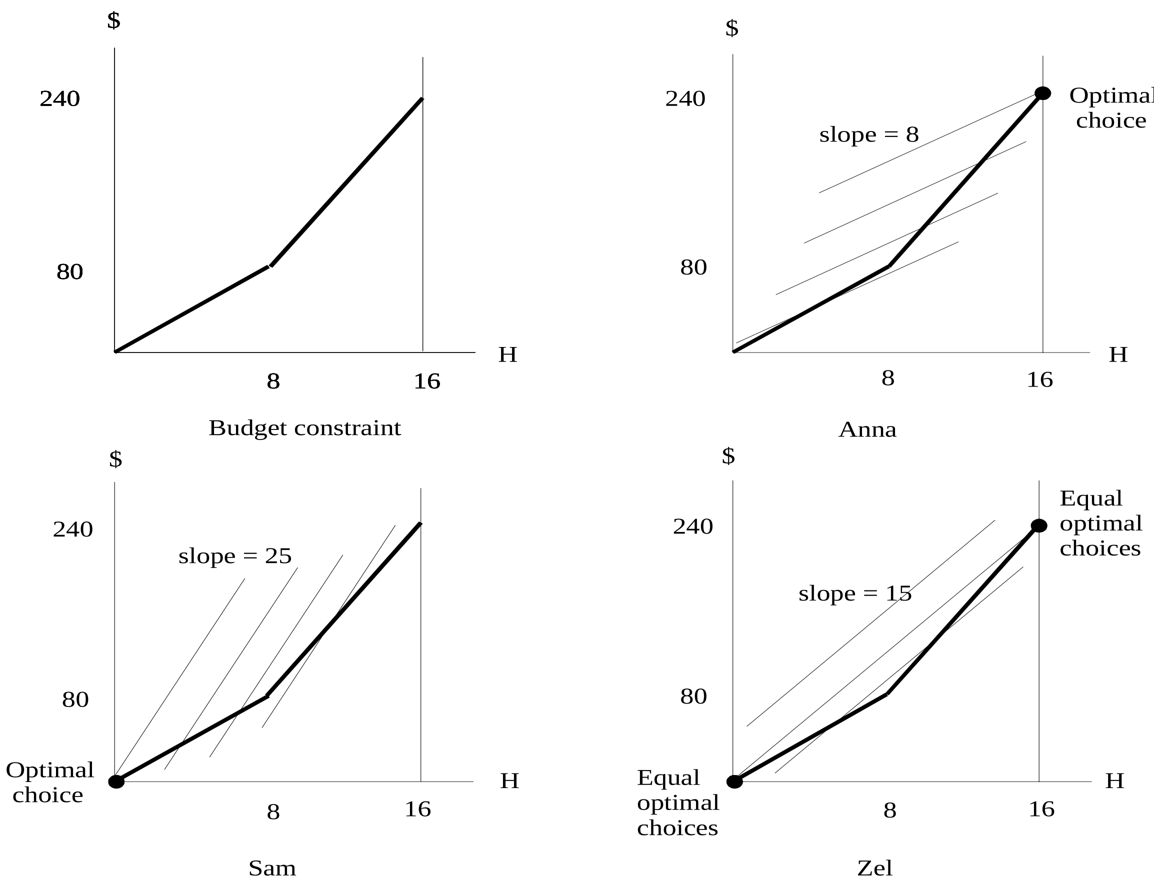
90-99	40
80-89	30
70-79	2
< 70	1

QUESTION 1

(1) d. (2) b. (3) d.

QUESTION 2

See figure for the budget line and all three cases of indifference maps and optimal choices. The indifference curves are upward-sloping because work is a "bad" rather than a "good." If the horizontal axis were reversed to show leisure instead of work, the indifference curves would be the conventional downward-sloping ones.



If the overtime rate drops just slightly below $20, to $19.99 per hour, then Zel will no longer be indifferent; she will clearly prefer zero work to 16 hours of work. Conversely, if the rate rises to $20.01 per hour, then she will prefer 16 hours of work to 0.

COMMON ERRORS: On this question, many people showed imperfect understanding or sloppiness in labeling their graphs etc.

[1] Too many people seem not to really understand indifference curves; they make statements like "Anna is happy at any point." Even if they drew Zel's IDC correctly, many people said he will always work 16 hrs, not recognizing the indifference. Generally one point taken of if right answer for Zel after the rate changes, if a student had the wrong answer for Zel before: that does not constitute a correct answer as to how the optimum *changes* when the rates change.

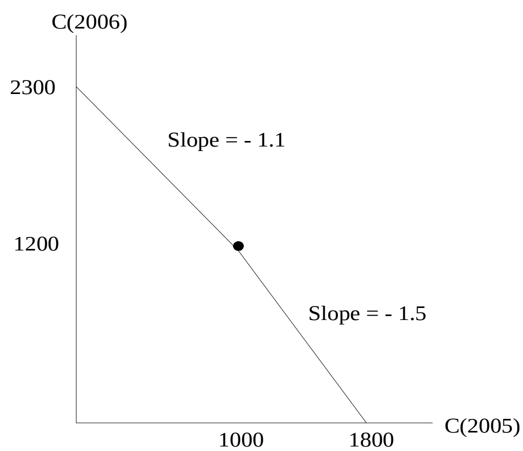
[2] You should use a ruler or so to draw straight lines. If you don't, and your freehand drawing is not very good, you should use labels to indicate that you are drawing a straight line (e.g. "I = 8 L", or "slope = 8").

[3] You should always draw more than one indifference curve, to give an idea of what the whole indifference *map* looks like.

[4] You should draw for each person the budget constraint and indifference curves in the same graph, and should indicate his/her optimal choice in graph.

QUESTION 3

The figure shows the kinked budget constraint.



With the reversed situation, you might think the budget constraint would have the reverse kink at the point (1000,1200). But no; facing this opportunity Richard will become both a borrower and a lender. Suppose Richard is walking down the street. There are two banks, A and B. Bank A has a poster in its window: "Borrow from us at the special low rate of 10 percent". Bank B has a poster: "We pay 50 percent to depositors". Richard will go to Bank A and borrow as much as it will lend him; then go to Bank B and deposit the sum (or as much of it as he chooses) to earn the higher interest.

COMMON ERRORS ON Q. 4 AND 5: Calculating percentages. Intuition often wrong.

QUESTION 4

Recall that with income in 2005 equal to $200, and prices $P_X = 10$, $P_Y = 5$, you buy X = 10 and Y = 20, and get utility U = 200.

When the prices are $P_X = 6$, $P_Y = 5$, it costs 6 * 10 + 5 * 20 = 160 to buy the same quantities. Therefore the Laspeyres price index is (160/200)*100 = 80.

At the new prices, with the income of 200, you spend half on each good, buying 100/6 = 16.67 pizzas and 100/5 = 20 burgers. The cost of this basket in 2005 would be

$$10 * (100/6) + 5 * 20 = 166.67 + 100 = 266.67$$

Therefore the Paasche index is (200/266.67)* 100 = 75.

The income Z that will yield the original utility 200 is calculated as follows. The equal division rule still applies because the utility function is unchanged. Therefore (Z/2) is spent on each good. The quantities are X = Z/(2*6) = Z/12 and Y = Z/(2*5) = Z/10. The utility is Z^2 /120. If this is to equal 200, we have Z = $\sqrt{}$(120*200) = 154.91. The true cost of living index is then (154.91/200)*100 = 77.46.

We have Paasche < True < Laspeyres, exactly as for the case of the price increase!

The intuition for Laspeyres > True even in this case is that while it costs less to buy the same basket at the new lower prices, substitution allows you to economize even further and achieve the old utility level at even less cost.

QUESTION 5

Recall that with income in 2005 equal to $200, and prices $P_X = 10$, $P_Y = 5$, you buy X = 10 and Y = 20, and get utility U = 200.

When the prices are $P_X = 10$, $P_Y = 5.5$, it costs 10 * 10 + 5.5 * 20 = 210 to buy the same quantities. Therefore the Laspeyres price index is (210/200)*100 = 105.

The income Z that will yield the original utility 200 is calculated as follows. The equal division rule still applies because the utility function is unchanged. Therefore (Z/2) is spent on each good. The quantities are X = Z/(2*10) = Z/20 and Y = Z/(2*5.5) = Z/11. The utility is Z^2 /220. If this is to equal 200, we have Z = $\sqrt{}$(220*200) = 209.76. The true cost of living index is then (209.76/200)*100 = 104.88.

The bias in the Laspeyres index is (105-104.88)/105 = 0.001143 .

When the price of pizza increased by 100% (from $5 to $10), the bias in Laspeyres index was 5.72%. When the price of pizza increases by 10% (from $5 to $5.5), the bias is only 0.114%, which is less than one fiftieth of the previous bias. Thus for small relative price changes, the bias gets very small quite fast.