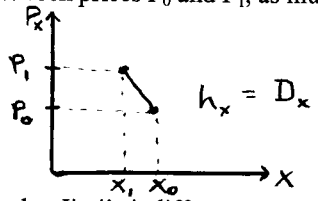
ECO 601
Fall 1998
1st Test

1. (25 pts.) Jimi's Hicksian (compensated) and Marshallian (uncompensated) demand curves for good X coincide between prices P_0 and P_1, as illustrated below:



   a) Show what Jimi's indifference curves look like, i.e., illustrate the effect of an increase in the price of good X from P_0 to P_1. Carefully point out the income and substitution effects of the price change.
   b) In a separate diagram, show what Jimi's Hicksian and Marshallian demand curves look like for good Y, given that Jimi lives in a two-good world.

2. (20 pts.) Janis's utility function is given by $U = X^{.25}Y^{.75} + 8$. Janis's brother Jim's utility function is given by $U = 0.5X^{.5}Y^{1.5}$. Janis and Jim's parents are concerned that they will consume different amounts of goods X and Y if they give them different levels of income. If Janis and Jim have the same income and pay the same prices for X and Y, will they consume the same or different amounts of X and Y? A complete answer will derive the Marshallian demand curves for X and Y for both Janis and Jim.

3. (15 pts.) Recall the three relationships among elasticities that we have studied. Evaluate each of the following three statements in light of these relationships. Explain whether you think the statement is valid and why. In each instance you should write out the specific elasticity relationship that you are using.
   a) In a two good world, if X is inferior then Y must be a luxury good.
   b) If X is a luxury good and if X and Y are gross substitutes, then demand for X is inelastic.
   c) Food is a necessity in all countries. If the substitution elasticity does not differ across countries, then we would expect the demand for food to be more elastic in poor countries than in rich countries.

4. (15 pts.) Parking spaces are a scarce commodity on campus. Suppose that campus police decide on the following strategy to deter illegal parking. The rental price of a parking space is set at $5 per day. Cars caught parking illegally are fined $10 per day. Enforcement activities are set at a level such that the probability of getting caught if one is parked illegally is 50%. Campus police notice that the majority of students always pay the rental fee by putting money in the parking meter and parking legally, while a few scofflaws never pay the rental fee and take the chance that they will not get caught.
   a) Illustrate the utility of wealth functions for each type of student in separate diagrams.
   b) Now, campus police propose to alter the penalty for illegal parking. The fine if you are caught is raised to $20, but enforcement efforts are reduced so that the probability of getting caught is 25%. Will the scofflaws be more likely to pay the rental fee and park legally under this new system? Explain with a diagram.

5. (10 pts.) Janis's younger sister Courtney has a utility function that is very similar to Janis's. Courtney's utility function is given by $U = X^{.25}Y^{.75}$. Compute Courtney's income elasticity of demand for good X. Compute Courtney's cross-price elasticity of demand between goods X and Y.

6. (15 pts.) Mick has $100 of income per week available for recreational activities, including exercise, movies, restaurant meals, etc. Mick's health club charges a fee of $4 per hour, and Mick chooses to use the facility for 10 hours per week.
   a) Illustrate Mick's consumption choice in a diagram with health club usage on the horizontal axis and other recreational activities on the vertical axis.
   b) Now Mick's health club institutes a new pricing policy. A fixed fee of $30 per week is charged for access to the facilities, but then a rate of $1 per hour is charged for each hour of utilization. Is Mick better off as a result of this change? Explain your answer using the diagram that you drew in (a).

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1. (15 pts.) In order for a utility function for two goods to have a strictly diminishing MRS, the following condition must hold: $f_2^2 f_{11} - 2f_1 f_2 f_{12} + f_1^2 f_{22} < 0$. Does the utility function $U = X^2Y^3$ exhibit diminishing marginal rate of substitution? Prove your answer using the above condition.

2. (15 pts.) True, false, or uncertain and explain. Goods with a large budget share have a greater price elasticity of demand (i.e. demand is more elastic) if they are inferior goods.

3. (15 pts.) Confronted with choices among gambles, a von Neumann-Morganstern decision-maker responds as follows: she is indifferent between \$60 with certainty and a gamble consisting of \$0 with probability .25 and \$100 with probability .75.
   a) In a diagram with wealth measured on the horizontal axis and utility of wealth measured on the vertical axis, sketch her utility of wealth function using the above information. You should indicate whether she is a risk seeker or risk averter.
   b) Now suppose that this same person is given a choice between \$50 with certainty and a gamble consisting of \$20 with probability .25 and \$60 with probability .75. Which will she choose? Indicate why in your diagram.

4. (25 pts.) Consider the consumption of the aging rock star, Ringo Harrison, who has left his beloved England and retired in France. Having invested poorly, he has a monthly income of $200f$. He only consumes two goods, beer and pizza. The price of beer is $20f$ and the price of pizza is $10f$. In this situation, Ringo buys six units of beer each month and spends the remainder of his income on pizza.
   a) Walmart decides to expand to France and opens a Sam's Club store in Ringo's hometown. Membership to Sam's Club stores costs a fixed fee of $30f$ per month, but entitles one to buy beer at a price of $15f$ per unit. Being a family-oriented business, Sam's Clubs only sell beer. Pizza must be purchased elsewhere. Will Ringo pay $30f$ and buy a membership card to Sam's Club? If so, what will happen to his purchases of pizza and beer? Illustrate in a diagram and explain.
   b) Suppose that Ringo joins Sam's Club and buys ten units of beer. The next month, the management of Sam's Club decides to raise the monthly membership fee. How high can the membership fee go before Ringo will give up his membership? Is it an amount greater than, less than, or equal to $50f$? Illustrate and explain.

5. (30 pts.) Eugenio Hicks has a utility function of the form: $U = \ln(X) + Y$. Because he is different, his cousins from Cobb and Douglas branches of the family no longer speak with him.
   a) Derive Eugenio's Marshallian demand functions for goods X and Y. (In case you have forgotten, if $f(z)=\ln(z)$, then $df/dz=1/z$.).
   b) Calculate the income elasticities of demand for both good X and good Y.
   c) Sketch Eugenio's Marshallian and Hicksian demand curves for good X. Do the same for good Y.
   d) Calculate the cross-price elasticities of demand for good X with respect to P_Y and for good Y with respect to P_X.