14.03 Exam 1 Fall 1999

DO NOT OPEN THIS EXAM UNTIL TIME IS ANNOUNCED!

There are 70 points on this exam and you have 80 minutes to complete it. The points can be used as a guideline for how many minutes to spend on each problem, with 10 minutes left over for rethinking hard problems. If you are uncertain of the answer to a problem, we suggest that you move on to the next question and return to the hard question at the end of the exam, time permitting.

There are three parts to the exam. Please use a separate blue book for each part, and be don't forget to write your name on each blue book

Part I is TRUE-FALSE-UNCERTAIN AND WHY. You must defend your answers with one or two sentences or graphs. *Answers without explanations will received zero credit.*

Part II is short answer.

Part III is short answer with multiple parts to each question.

NOTE: When we refer to "well-behaved" indifference curves, we mean the following properties: convex, diminishing MRS, differentiable.

If you have a question about the exam, please come to the front of the room to ask your professor.

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Part I. 5 points each

True, False, or Uncertain AND WHY. You must explain your answer with one or two sentences and/or graphs. Answers without justification receive zero points.

1. In response to widespread student malnutrition at MIT, President Vest establishes an in-kind food transfer program which gives each student two slices of pizza per day valued at $1 each (distributed by specially marked "Mozzarella Institute of Technology" trucks). Every day after eating his two free slices, Fred buys a third slice from the MIT truck, also at $1 per slice. Fred would have been better off if President Vest had given him $2 per day to spend on whatever he liked.

2. Orange juice sells for $2.00 per gallon and gasoline sells for $1.00 per gallon. Although we don't know how to measure utility, we do know that if a consumer buys both goods, she receives twice as much utility from orange juice as from gasoline.

3. When the price of a product rises, the Bureau of Labor Statistics (BLS) estimates how much of the price change is due to quality improvements and how much is due to inflation. A research economist working for the Bureau of Labor Statistics discovers that the price of kitchen stoves in the U.S. did not change at all between 1998 and 1999. Hence, he can conclude that stoves did not contribute to quality change bias in the CPI last year.

4. In the first period, Px=2 and Py=1 and the consumer buys 11 units of X and 8 units of Y. In the second period, Px=1 and Py=2 and the consumer buys 10 units of X and 10 units of Y. This consumer's preferences violate the Weak Axiom of Revealed Preference.

Part II: 10 points each

1. A college dean wants to know whether her school's alcohol ban reduces drinking by freshman. All freshmen at her college live on campus in either Dorm A or Dorm B and each is allowed to choose his or her dorm during 'rush' week. The college is located in a 'dry' (alcohol free) town and so there is no off-campus drinking. To estimate the impact of the ban, the dean runs an experiment over two years. In year 1, she hires student informants to monitor the drinking habits of the residents of each dorm (regardless of where they do their drinking). She finds that students from Dorm A drink 3.0 beers per week on average while those from Dorm B drink 2.8 beers per week. In year 2, the dean announces during rush week that drinking will be allowed in Dorm B this year but not in Dorm A. Her informants again monitor drinking and find that Dorm A residents drink 2.1 beers per week on average while Dorm B residents drink 3.7 beers per week. The Dean uses the difference-in-difference methodology to estimate the impact of the drinking ban on the drinking behavior of the average student. She finds a statistically significant difference.

   A) What is the difference-in-difference estimate of the impact of the dormitory drinking ban on drinking by college freshman? (2 points)

   B) Does the dean's design constitute a valid 'natural experiment? Explain why or why not. (6 points)

   C) The college's trustees are considering lifting the campus drinking ban and ask the dean to report on the impact this will have on overall drinking. What is her best estimate? (2 points)

   [Your answer should include a definition of a 'natural experiment' and should be specific about whether or not this example fits the definition and how this affects the conclusions that can be drawn. You should assume that the price of beer, the composition of the freshman class (including its taste for beer), the state of the economy, and other environmental factors are approximately constant over the two years. You do not need to use information other than what is given above to answer this question.]

2. MIT decides to implement an MIT Consumer Price Index (MIT-CPI) to track the well being of its students. It uses a Laspeyres index. MIT finds that all goods and prices remained exactly the same between 1998 and 1999 except for one thing. After the new I-Campus deal was announced between Microsoft and MIT, prices for Macintosh computers rose sharply during 1998 – 1999. (A spokesperson for MS-MIT was unable to provide an explanation for this price increase.) Consequently, some students chose to purchase Windows PCs during 1998 – 99 instead of buying Macintosh computers, even though these students consider Windows PCs to be of lower quality. We conclude that the MIT-CPI understates the true increase in the cost of living since some students are now consuming low quality computers. True, false, or indeterminate and why? (10 points)

Part III: 15 points each

1. An administrator for the Food Stamps program calls you up to say, "I heard that you learned in 14.03 that in-kind transfer programs are less efficient (in terms of consumer utility) than cash transfer programs. Given this information, we are considering converting Food Stamps to a cash transfer program. However, we are going to do this in an unusual way. Rather than simply giving cash, we will give recipients 50 cents back for every dollar they spend on food. We call this 'the rebate plan.' Since we are no longer restricting what recipients can buy, we assume that this program is just as efficient (in terms of consumer utility) as writing them an equivalent check each month, right?"

   Is the administrator correct? Consider a person with convex, well-behaved indifference curves who has an initial budget of $200 and was originally receiving $50 in food stamps. On the rebate plan, assume that this person buys $100 worth of food, meaning that he also receives a $50 rebate. A pure cash-equivalent transfer program would provide him a check for $50.

   a) Draw a carefully labeled, appropriately scaled diagram that shows the consumer's budget set for each of the three programs (food stamps, rebate, and cash). Label the Y axis "food" and the X axis "all else." For reference, you may also want to draw the consumer's budget set without any subsidy. Label the consumer's choice under the rebate program as point "R", and draw an indifference curve labeled U^0 that would be consistent with the consumer's choosing this point. (Note that you do not know the consumer's choices for the food stamp program or the cash plan.) (5 points).

   b) Explain whether (and why) this particular consumer is better off, worse off, indifferent, or indeterminate with the rebate plan relative to the pure cash transfer program (5 points).

   c) Explain whether (and why) this consumer is better off, worse off, indifferent, or indeterminate with the rebate plan relative to the food stamp program (5 points).

2. A consumer has the following expenditure function: $E(P_x, P_y, V) = 2(P_x^{0.5} P_y^{0.5} V)$

(A) Write down the Slutsky equation which expresses the effect of a change in the price of X on the uncompensated demand for X and provide an interpretation for each term. You do not need to solve for any of the terms right now. Simply write down the Slutsky equation. (3 points)

(B) Compute Hicksian $h_x(P_x, P_y, V)$ and Marshallian $d_x(P_x, P_y, I)$ demand for this consumer for good X. (If you are unable to obtain Hicksian demand from the expenditure function, you should explain in words how you would obtain Marshallian if you *did* know Hicksian demand.) (3 points)

(C) Referring to the Slutsky equation, what is the necessary condition for demand for good X to be Giffen? Be specific about the sign and magnitude of each term. (3 points)

(D) Now use the Slutsky equation to calculate the effect of a change in the price of X on the uncompensated demand for X (hint: you can check your answer by calculating this effect directly from Marshallian demand). Is good X normal, inferior, or Giffen? (If you were unable to solve (B), you can still provide a partial answer by explaining how you would solve this problem *if* you knew Hicksian and Marshallian demand.) (3 points)

(E) We said in class that we never observe Hicksian demand, only Marshallian demand. However, looking at the Slutsky equation, you can see that this statement is not quite true. When might a real world situation arise (not necessarily for this particular example) where we could observe the substitution effect directly (i.e., independently of the income effect)? (3 points)