14.03 Midterm

Spring 1996

DO NOT OPEN THE EXAM UNTIL TIME IS ANNOUCED!!!

Please box your answers when possible, so that they are easy to find.

There are 80 total points on this exam, and you have 90 minutes to complete the exam. The points can be used as a guideline for how many minutes to spend on each problem, leaving 10 minutes at the end to come back to problems you found difficult.

There are three parts to the exam. Parts I and II are TRUE-FALSE-UNCERTAIN AND WHY, and you are required to defend your answers (even if you answer true) with one or two sentences and/or graphs. The first set is relatively easy (7 problems at 4 points each, for a total of 28 points), while the second set is a little more difficult (4 problems at 6 points each, for a total of 24 points).

Part III is short answer, with 4 problems of varying difficulty and points (total of 28 points).

Pace yourselves carefully, making sure you leave adequate time for the short answer questions. If you don't see how to answer a question in a Avoid the temptation to write too much on Part I.

Note: When we refer to "well-behaved" indifference curves or utility functions, we mean utility functions which have the following properties: monotonicity, diminishing marginal utility, diminishing MRS, plus differentiability.

<u>Part I</u>

<u>True-False-Uncertain, and Why:</u>

4 points each. Total points = 28.

Instructions: YOU MUST defend your answer with one or two sentences and/or graphs. However, your answers should be CONCISE!

1. If a firm's long run total cost curve is concave in the quantity the firm produces, then the firm faces increasing returns to scale.

2. Consider a firm with two inputs, capital and labor, which sells output on a competitive market. In the short run, capital is fixed but labor may vary. If for every positive quantity, the firm's short run average costs (of capital and labor) are greater than the market price, the firm's short run decision will be to produce zero output.

3. If the demand for abortion decreases when medicaid funding is eliminated, then we can conclude that eliminating medicaid funding will increase the birth rate.

4. Ivan spends his entire income on two goods. One of them is a Giffen good. If the price of the Giffen good rises, demand for the other good must fall.

5. We observe a consumer making choices in two periods. In the first period, $P_x = 2$ and $P_y = 1$, and the consumer buys 2 units of *X* and 6 units of *Y*. In the second period, $P_x = 1$ and $P_y = 2$, and the consumer buys 4 units of *X* and 3 units of *Y*. This consumer's choices violate the weak axiom of revealed preference.

6. Dr. Cyclone has recently discovered a way to clone consumers, and he practices his technique on Silicon dormitory at MIT. Each original resident of Silicon dorm got a clone with exactly the same income and preferences (presumably, he expands the dormitory as well!) All (and only) residents of Silicon eat at the dining hall for dinner each night. We conclude that at every price, the price elasticity of demand for tuna casserole at Silicon dining hall will double after the cloning.

7. According to Milgrom and Roberts, "modern manufacturing" involves (among other things) the following mutually complementary organizational design choices: (a) highly skilled workers, (b) incentives for worker initiative, and (c) highly centralized and hierarchical planning and control.

Part II

True-False-Uncertain, and Why:

6 points each. Total points = 24.

Instructions: YOU MUST defend your answer with two or three sentences and/or graphs. However, your answers should be CONCISE!

1. Jenny was maximizing her utility subject to her budget constraint. Then prices changed, but her income stayed fixed. After the price change, she chooses a new bundle, and she finds herself worse off. Therefore, at the old prices her new bundle must cost less than her old bundle.

2. A company has been operating retail outlets in two different towns for many years. An economist observes that the company uses newspaper advertisements to attract employees in Newsville, while the company relies on word of mouth and a few posters to attract employees in Talksville.

   This scenario constitutes a "natural experiment" (as defined in class and in the readings) which can be used to determine how the method of advertising affects applications for employment.

3. Both Bloomingdales and Kmart sell wadgets, which only come in one variety, but consumers also value service when they are purchasing wadgets. Service may vary between stores and over time. In 1990, 100,000 wadgets were sold at Bloomingdales at $10/wadget, and 50,000 were sold at Kmart at $6/wadget. In 1995, Bloomingdales sold 100,000 wadgets at $10/wadget, while Kmart sold 50,000 wadgets at $4/wadget.

   An economist uses a price index based on Bloomingdales' prices for wadgets, ignoring Kmart's, and thus concludes that consumers of wadgets are as well off in 1995 as in 1990 (holding all other prices and income fixed).

   Based on this information, we can conclude that price index must be biased upward. (In other words, the true cost of living is lower in 1995 than in 1990, holding all else fixed).

4. People use Macintosh and Windows-based computers to do their personal computing. Suppose that from 1992 to 1993, the prices of Macintosh computers rose, while all other prices stayed constant. We use a Laspeyres price index to calculate the resulting change in the cost of living. When the price of Macintosh computers rose, some people switched to the inferior technology of Windows-based computers.

   We conclude that the Laspeyres price index understates the true increase in the cost of living from 1992 to 1993, since a number of people consume lower quality goods in 1993 than they did in 1992.

Part III

Short Answer

(Total points = 28)

1. (5 pts.) The prices of goods X and Y are each \$1. Jane has \$20 to spend and is considering choosing 10 units of X and 10 units of Y. Jane has a well-behaved utility function $U(X,Y)$. The slope of her indifference curve (when Y is on the vertical axis as usual) at the bundle (10,10) is -2.

   In what direction should Jane adjust her choices, or is she at her optimizing point? [Hint: it might help to draw a picture.]

2. (6 pts.) Suppose that an extremist anti-abortion group targets a suburb of Boston for violent protesting and bombing, and their activity grows over the course of a year. As a result, several abortion clinics in that suburb close, and some women travel to other suburbs to have abortions performed. An economist gathers monthly data about prices and quantities of abortions throughout the period of increased activism, and she tries to estimate the suburb's market demand for abortions by fitting a line through the price-quantity data points.

   Explain (briefly) and draw a graph to illustrate why her analysis may be flawed. Is the demand curve she estimates too steep or too flat?

3. (8 pts.) Suppose that a utility-maximizing consumer buys two goods, X and Y. What conditions ensure that the quantity of X demanded increases as the price of X falls? Explain your answer, using an algebraic formula as well as a diagram which illustrates when the proposition fails. Match the terms of the formula with the diagram.

4. (9 pts. total) Consider a utility-maximizing consumer with a well-behaved utility function $U(X,Y)$. Suppose that prices $P_x = P_y =$ \$1 and I=30. The government considers charging the consumer a *lump sum tax* of \$5, which the consumer must pay no matter what. The government then considers a *sales tax* of 50% on good Y. Suppose that under the sales tax regime, if the consumer maximizes utility taking into account the prices and the sales tax, he chooses to consume 10 units of Y.

   a. (3 pts.) Graph the consumer's budget constraints in both regimes (labelling the points where the constraints hit the axes), and label the (X,Y) coordinates of the crossing point of the two lines. [Hint: make your graph reasonably big].

   b. (3 pts.) Draw an indifference curve which illustrates the consumer's optimization decision under the sales tax [Hint: draw it carefully].

   c. (3 pts.) Under which regime is the taxpayer better off, or can you tell? Illustrate your answer graphically.