14.03 Exam 1 Fall 2000

DO NOT OPEN THIS EXAM UNTIL TIME IS ANNOUNCED!

There are 80 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. If you are uncertain of the answer to a problem, move on to the next problem and return to the question at the end of the exam, time permitting.

There are three parts to the exam:

Part I is TRUE-FALSE-UNCERTAIN AND WHY.

Part II is short answer.

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

For all questions, you __must__ explain your answers with one or two sentences or graphs. Answers without explanations will receive zero credit.

NOTE: When we refer to "well-behaved" indifference curves, we mean the following properties: convex, diminishing MRS, differentiable. In other words, the standard indifference curves drawn on the blackboard.

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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. 5 points each.

1. A consumer with convex, 'well-behaved' indifference curves is indifferent between two bundles of X and Y: (4,1) and (2,9). She therefore prefers the bundle (3,8) to either of the first two.

2. If employers have monopsony power in the labor market in Hawaii, lowering the minimum wage in Hawaii will reduce employment.

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

4. The "new goods bias" is unlikely to be an important element of the bias in the Consumer Price Index, since very few consumers purchase new goods at the initially high prices at which they are offered. [Your answer should define the new goods bias and be specific about why this statement is or isn't a valid evaluation of why it is important!]

5. In the first period, $P_x = 5$ and $P_y = 10$ and the consumer buys 10 units of X and 5 units of Y. In the second period, $P_x = 12$ and $P_y = 5$ and the consumer buys 6 units of X and 7 units of Y. By the Weak Axiom of Revealed Preference, the consumer is at least as well off in the second period.

6. Julie was maximizing her utility subject to her budget constraint. Then prices changed, but her income stayed fixed. After the price change, she chose a new bundle, and she found herself better off. Therefore the new bundle costs more at the old prices than the old bundle did.

Part II: 9 points each

1. 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, can we 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).

2. Suppose that a utility-maximizing consumer buys two goods, X and Y. What conditions ensure that in general the quantity of X demanded increases as the price of X falls, holding income constant? Explain your answer, using an algebraic formula as well as a diagram that illustrates when the proposition fails. Match the terms of the formula with the diagram.

Part III: 16 points each

1. A consumer has the following indirect utility function:

$$V(P_x, P_y, I) = -\frac{P_x + 2\sqrt{P_x \cdot P_y}}{I} - \frac{P_y + \frac{1}{2}\sqrt{P_x \cdot P_y}}{I}$$

(a) Compute the consumer's expenditure function.

(b) Suppose that income is fixed at I=100. Suppose that prices were $P_x = 4$ and $P_y = 9$. Suppose that the government puts in a tax of $5 on good X, but rebates enough to the consumer so that the consumer is as well off as he was before the tax.

Illustrate this scenario with a carefully labeled graph. Your graph should show: (1) the consumer's original budget set, indifference curve, and consumption bundle; (2) the 'taxed' budget set; and (3) the 'rebated' budget set that leaves the consumer as well off as the pre-tax budget. (Note: don't worry about drawing the price ratios exactly to scale.)

(c) Calculate the deadweight loss of taxation in this example. That is, what is the difference between the revenue collected by the government and the amount of the rebate?

(d) How would your answer to (b) change if the government also taxed good Y by $11.25, keeping the tax on X at $5? [Hint: think before you start calculating.]

2. **PLEASE READ THE ENTIRE QUESTION BEFORE YOU BEGIN!**

MIT's President Vest wants to study the benefits of converting the MIT meal plan from an in-kind system – 3 Cafeteria Meals per day – to a cash plan – $15 a day in Cash to spend as you like. The incoming class of undergraduates is randomly assigned to the two plans: half to Cafeteria, half to Cash. In addition, each student receives $15 in cash per day from his or her parents. (Cash Plan students can also buy Cafeteria Meals for $5 each.)

After one semester, a team of UROPs reports the figures below to President Vest. Note that these figures only include Cash expenditures – the Cafeteria Plan expense is not included.

Average Daily Expenditures

	Cafeteria Plan Students	**Cash Plan Students**
Food	$5	$12
All Other Goods	$10	$18

a. (3 points) Draw a carefully labeled diagram that shows: (1) the budget sets and (2) the chosen bundles of the two groups (Cafeteria plan and Cash plan). Make sure you label your Y-axis "Food" and your X-axis "All Other Goods." Do not draw indifference curves at this point.

b. (3 points) Assume that the two groups have identical preferences (reasonable due to random assignment). What should President Vest conclude about the relative well being of Cash vs. Cafeteria students, or is it indeterminate? You must justify your conclusion.

c. (3 points) After studying the data, President Vest says, "There seems to be a paradox! The Cash Plan students spent less than $15 on food but the Cafeteria Plan students spent more than $15 (counting the cost of their Cafeteria Meals). Since they have identical preferences, this violates consumer theory." Explain why these facts appear to violate consumer theory and state any axiom(s) that are violated. [You can refer to your diagram in A, and you can add indifference curves at this point.]

d. (3 points) Now consider that not all "food" is the same: some students don't like Cafeteria Meals. Explain how this resolves the paradox in (c).

e. (4 points) Dean of Student Life, Margaret Bates, learns that the Cafeteria Plan students are running a large underground market that sells Cafeteria Meals for $3.00 apiece. She says, "Since the treatment and control groups were contaminated by the underground market, we cannot draw any conclusions about whether students prefer the Cafeteria or Cash Plan on average." Is this conclusion correct? Explain why or why not.