STATE UNIVERSITY OF NEW YORK AT ALBANY

Department of Economics

Ph.D. Comprehensive Examination in Microeconomics

August 16, 1995

Answer three of the following four numbered problems. Justify your answers and, whenever possible, show why they are correct. Partial credit will be awarded in proportion to the difficulty of the parts of the problems you solve. You will get more credit by answering all parts of a single numbered problem than by answering half of each of two problems. Write each numbered problem answer in a separate bluebook. On the cover of each bluebook, beside "SUBJECT", write the number of the problem answered. Beside "NAME" write the identification number distributed with your exam, but **DO NOT WRITE YOUR NAME**. The exam lasts three hours.

1. A firm periodically buys parts for a machine. The manager of the firm knows that each part has a 1% chance of being defective. Installing a defective part causes damage that the firm will not be fully compensated for. The manager can have a part tested before installation, but the test is costly. If the part is good and the test not performed, the outcome is denoted G_n. If the part is bad and the test is performed, the outcome is B_t. The other two possible outcomes are G_t and B_n. The manager is indifferent between the outcome G_t (the part is good, but the test is performed) and a random situation in which outcome G_n occurs with probability $p > 0$ and B_n with probability $(1-p) > 0$. The manager is also indifferent between the outcome B_t and the random situation G_t with probability $q > 0$ and B_n with probability $(1 - q) > 0$. Assume that the manager wishes to maximize the expected profit of the firm. a) Show that this last assumption does not conflict with the other information given above. b) Show how the profits that the firm obtains from each of the four possible outcomes are related. c) Suppose that the manager prefers to test every part that is bought rather than testing none of the parts. What does this imply about p and q? d) Under what condition(s) on p and q would the manager prefer to test some of the parts, rather than testing all or none of the parts? Give an intuitive justification for your answer.

2. If a monopoly firm decides to produce a unit of a particular good, then with probability γ the unit will be of high quality and will cost c_H to produce. With probability $(1-\gamma)$, the good will be of low quality and cost c_L to produce. A risk-neutral consumer wants at most one unit of the good, but cannot observe its quality before buying it. The consumer's valuation (in dollars) of a high quality unit is v_H and of a low quality unit is v_L. The firm's output price in dollars is fixed by a regulator at p, with $v_H > p > v_L > c_H > c_L$. All the above information is common knowledge. a) Find the weakest condition(s) under which the good is produced and

the consumer buys one unit of it. b) Evaluate the efficiency of the final allocation, depending on the level of p. Explain carefully the meaning of "efficiency" in this situation. c) Suppose that before deciding whether to produce, the firm knows what quality it will produce. Before the consumer decides whether to buy, the firm can advertise. The advertising conveys no direct information, but the consumer observes the firm's advertising expenditure. Formulate the game played by the firm and consumer. Can there be an equilibrium in which the consumer rationally expects the advertising expenditure to vary depending on the quality of the good? Can there be an equilibrium with no advertising?

3. Section 2(a) of the Clayton Act, as amended by the Robinson-Patman Act, states that "It shall be unlawful... to discriminate in price between different purchasers of commodities of like grade and quality... where the effect of such discrimination may be substantially to lessen competition or tend to create a monopoly in any line of commerce, or to injure, destroy, or prevent competition with any person who either grants or knowingly receives the benefit of such discrimination, or with customers of either of them."

Suppose a manufacturer sells a product to one group of retail stores at a price p_1 and to a second group of retail stores at a price p_2, where $p_1 < p_2$. Suppose the first group of stores cannot resell the product to the second group of stores. a) How is the second group of stores harmed by this practice? Does the answer depend on how competitive the retail market is? b) How would you measure the damages to the second group of stores? For example, is $p_2 - p_1$ an appropriate measure? Is $(p_2 - p_1)q$ an appropriate measure, where q is the quantity that the second group of stores purchases from the manufacturer?

4. a) In a competitive pure exchange economy, consumer i has utility function u_i. Define an excess demand vector for consumer i at the price vector p. Define a competitive equilibrium for the economy. Be sure to define any notation you introduce. b) Use an Edgeworth box diagram to give an example of a pure exchange economy in which the aggregate excess demand (the sum of the excess demand vectors of the consumers) is not a continuous function of the prices, and in which competitive equilibrium fails to exist. Explain why the aggregate excess demand is discontinuous and why there is no equilibrium. c) Let $\bar{z}$ be an aggregate excess demand vector for the above pure exchange economy at the price vector p. What restriction does Walras' Law place on $\bar{z}$? d) Use an Edgeworth box diagram to give an example of a pure exchange economy in which aggregate excess demand is a continuous function of the price vector, but there is no competitive equilibrium. (One possibility is to let Walras' Law be violated.) Explain carefully why competitive equilibrium fails to exist in your example.