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Economics 220B

MIDTERM EXAM

<u>INSTRUCTIONS</u>: Answer all of the following three questions. Each of the various subparts (indicated by letters in parentheses in the left-hand margin) will be give approximately the same weight.

1. The following series of questions explores the relationship between single product and multiple product cost concepts:

(a) Give a precise definition of the concept of <u>decreasing ray average cost</u> (DRAC). (This could be a mathematical expression or a carefully drawn diagram.)

(b) Suppose that DRAC holds for a multiproduct technology at all output levels. Further suppose the firm's products are produced in fixed proportions. In this situation can we conclude that the firm is a natural monopoly (i.e., the technology is cost subadditive)? Explain.

(c) Turning to the more plausible case in which products are produced in variable proportions, DRAC does not ensure cost subadditivity. In words, what features of the multiproduct technology are not captured by DRAC that are needed for cost subadditivity? State a cost condition that, in combination with DRAC, will ensure cost subadditivity.

2. Consider a firm that produces two products: 1 and 2. Let $C(y_1, y_2)$ represent the cost of producing quantities y_1 and y_2 of the two products. Finally, let $D_1(p_1)$ and $D_2(p_2)$ be demand for the two products at prices p_1 and p_2.

(a) Using this notation, give expressions indicating that product 1 passes both the incremental cost test and stand alone test. If both conditions are satisfied, can we conclude that the firm's prices "subsidy-free"? Explain.

(b) Set up the Ramsey pricing problem in this situation (but do not solve the problem). Write down an expression that characterizes prices that solve this problem given demand and cost conditions assumed above.

(c) These Ramsey prices may not be subsidy-free. Give intuition as to why this is the case. State conditions under which Ramsey prices will be subsidy free.

3. Listed below are three different schemes designed to regulate natural monopolies:

   (i) Rate-of-return regulation

   (ii) Price cap regulation

   (iii) Demsetz franchise auction

   Choose one policy off of this list.

(a) Describe how the policy is designed to work in theory being sure to state all assumptions made about market conditions.

Next, evaluate its effects of the policy you chose in terms of each of the following three criteria:

(b) short-run allocative efficiency;

(c) incentives to invest in cost-reducing innovations;

(d) pricing over the long run.

For each of the three criteria, describe the policy's effects in the case of (i) the theoretical ideal and (ii) given how the policy is typically implemented in the U.S. in practice.