## V/C31.0010.002. Fall 1999

## Intermediate Microeconomics Midterm 2

Points 70. Time 70 minutes (1.20–2.30pm). The first question carries 30 points; the second 40 points. Questions with parts within them give equal weight to the parts.

**Guide for Time Allocation**: The questions in part (1) should take no more than 5 minutes each to answer. The questions in part (2) should take you no more than 10 minutes each. This schedule will allow you to finish the exam in 70 minutes. Good luck.

(1) (30 points, 6 points per part) Are the following statements true or false? A simple yes-no answer will *not* suffice. Explain, with the use of diagrams where necessary.

[a] If a Cobb-Douglas production function exhibits increasing returns to one of its *inputs*, then it *must* exhibit increasing returns to *scale*.

[b] If the demand curve facing a firm is downward-sloping, then the firm's marginal revenue at any quantity *must* be less than the price (assigned by the demand curve) at that quantity.

[c] Cost minimization is sufficient to show that the ratio of (factor) marginal products must be set equal to the ratio of factor prices. You don't need profit maximization to get this.

[d] The industry supply curve is the sum of individual supply curves. The latter are all upward sloping. So the former must be upward sloping too.

[e] If a machine pays off \$100 each year for the next three years, but costs \$280, then it is worthwhile to buy that machine.

(2) (40 points, 10 points per part) Answer the following questions briefly and clearly. You can put in a diagram, and/or a simple example to illustrate. These are not true-false questions.

(i) A potato farmer has leased 5 acres of land for growing potatoes. On this acreage, the output of potatoes, is given by  $X = \sqrt{L}$ , where L is the number of labor hours applied. If the rental rate on land is \$10 per acre and the wage rate for labor is \$5 per hour, fund exact formulas for the total cost curve, for the marginal cost curve, and the average (variable and total) cost curves in the short run (with land fixed). Should the farm ever shut down in the short run?

(ii) Suppose that capital costs \$10 per unit of use, while labor costs \$10 per hour as long as the total quantity of labor hired is no more than 100 hours. Beyond that limit, overtime rates of \$20 per hour must be paid. (a) Carefully draw the family of isocost curves implied by this situation, with numerical markers where needed. (b) If output X = K + (1.5)L, draw the expansion path (locus of cost minimizing points as output is varied from zero to infinity). Again, use numerical markers where necessary.

(iii) The government places a quota on coffee producers, and tells them they can only produce 70% of what they were producing before. (a) Assuming that earlier production was at the competitive equilibrium, argue that coffee consumers will lobby against the quota, while coffee producers as a group *may* lobby for the quota. (b) If the government's welfare objective is to maximize a weighted sum of consumer and producer surplus, argue that the government's actions *prove* that the two weights *cannot* be equal.

(iv) If a firm is competitive, describe *precisely* its rules for profit maximization.