Economics 121: MIDTERM EXAM

<u>GENERAL INSTRUCTIONS</u>: Write <u>your name</u> on the front cover of your blue book. The exam has 3 parts and is worth a total of 100 points. Point assignments are given in the instructions for each part. You are encouraged to check your calculations on scratch paper but be certain to <u>put all</u> of your answers in the bluebooks.

- I. <u>TRUE or FALSE or UNCERTAIN and EXPLAIN</u>: Choose <u>3 of the following 4</u> statements, decide whether each is true or false or uncertain, and then explain the reasoning behind your answer in a few sentences. *Supply any assumptions you may think necessary to draw your conclusion*. <u>Each</u> question is worth <u>7</u> points for a total of <u>21</u> points.
- 1. If the costs of producing two goods, 1 and 2, individually and jointly, are given by the cost functions: $C(q_1, 0) = 75,000 + (1/2) q_1^2$ $C(0, q_2) = 100,000 + (1/2) q_2^2$

$$C(q_1, q_2) = 125,000 + (1/2) (q_1 + q_2)^2$$

then the <u>average incremental cost</u> of good 2 is given by: $AIC_2 = \frac{25,000}{q_2} + \frac{q_2}{2}$.

- 2. Too many firms will enter an industry if after entry the firms behave as Cournot oligopolists.
- 3. In the below normal form game, both firm 1 and firm 2 have a dominated strategy, but neither firm has a dominant strategy:

Firm 2							
		A2			B2		C2
rm 1	A1		1		0		-1
		1		2		5	
	B1	/	2		3		1
E		0		3		5	
	C1		5		5		4
		-1		1		4	

4. The Bertrand Paradox will arise for a duopoly on the Hotelling line as transportation costs go to zero.

II. <u>MULTI-PART QUESTIONS</u>: For each of the following two questions, answer <u>all parts</u>. Point assignment for each subpart is given in [square brackets]. They are worth <u>55</u> points.

- 1. Alpha, Inc. has a store located at $x_A = 0$ (Store A) on a Hotelling line of length 1 with 100 consumers evenly distributed along it (i.e., N = 100). Each consumer derives value from the good of V = 80 and incurs transportation cost per unit distance equal to t = 50. There are no marginal costs (c = 0) but each store incurs a positive fixed cost (F > 0). Note: it may be helpful to draw this market.
 - a) [6] Verify that the demand realized by Alpha at Store A is: $D(P_A) = 160 2P_A$ when $30 \# P_A \# 80$, and $D(P_A) = 100$ when $P_A < 30$.

- b) [6] Given the demand in part (a), find Alpha's profit-maximizing price and the quantity sold.
- c) [6] Alpha is now considering opening a second store (Store B) located at $x_B = 1$. Find Alpha's profit-maximizing price when it charges the <u>same price</u> at both stores: $P_A = P_B = P$.
- d) [6] Suppose that the government forces Alpha to divest Store B to a second, independent firm, Beta, Ltd. Compared to the two-store monopoly, what will be the direction of the effect of this divestiture on store prices, and on total welfare? Note: no derivations are expected, just give your intuition.
- 2. Firms 1 and 2 each produce a single product, also called 1 and 2, which have the following (inverse) demand curves:

$$\begin{split} P_1(q_1, q_2) &= 120 - q_1 - bq_2 \\ P_2(q_2, q_1) &= 120 - q_2 - bq_1 \end{split}$$

where 0 # b < 2. Each firm faces zero marginal costs and has fixed costs of F = 900.

- a) [4] Explain how you would use information about the value of demand parameter b to decide whether the two products were in the <u>same economic market</u>.
- b) [5] Write down the profit for firm 1 and then verify that firm 1's best response curve to firm 2's quantity is: $r_1(q_2) = 60 \frac{1}{2} bq_2$. Be certain to show each step of your derivation.
- c) [7] Solve for the Cournot-Nash equilibrium quantities for an arbitrary value of b.
- d) [5] As b decreases from 1 down to ½, what happens to equilibrium quantities of the individual firms and to the industry output? Give your economic intuition that explains this result.
- e) [6] Now suppose that firm 1 chooses its quantity first, and firm 2 follows with its quantity taking firm 1's output as given. For b = 1, find firm 1's output level such that firm 2 can at best break even. Compute the associated "limit price."
- f) [4] Without making any further calculations, explain why you would expect this limit price to rise or fall if b was to fall from 1 down to $\frac{1}{2}$.

III. <u>INDUSTRY STUDIES</u>: Answer each of the following two questions about the industry studies. Note that you <u>choose just one of two</u> industries in the <u>second question</u>.

- 1. For the U.S. beer industry, answer each of the following two questions:
 - a) [6] Describe the major changes that took place in industry <u>concentration</u> over the course of the second half of the 20^{th} century.
 - b) [6] Explain the pattern of scale economies over this same period and its role in the changes in concentration that occurred.
- 2. For *either* the <u>auto or breakfast cereal industry</u>, but not both, describe <u>one significant entry threat</u> to this U.S. industry during the second half of the 20th century. In your answer, address each of the following:
 - a) [6] Describe the source of the threat and explain why it was a significant threat to incumbent suppliers.
 - b) [6] Give the impact it had on the industry structure, if any, and <u>one</u> major response by the incumbents.