Economics 121: MIDTERM EXAM

<u>GENERAL INSTRUCTIONS</u>: Write <u>your name</u> and <u>your TA's name</u> on the front cover of each of TWO BLUE BOOKS. The exam has 3 parts. Put Parts I and II.1 in one blue book, and Parts II.2 and III in the second. Point assignments are given in the instructions for each part. The exam is worth 100 points. You may check your calculation on scratch paper but be certain to <u>put all of</u> <u>your answers in the bluebooks</u>.

- I. <u>TRUE or FALSE or UNCERTAIN and EXPLAIN</u>: Choose 4 of the following 5 statements, and decide whether each is true or false or uncertain, and then explain the reasoning behind your answer in a few sentences; if appropriate, provide a diagram. Each question is worth 8 points for a total of 32 points.
- 1. If the costs of producing two goods, 1 and 2, individually and jointly, are given by the cost functions:

 $\begin{aligned} & C(q_1, 0) = 125 + q_1^2 \\ & C(0, q_2) = 200 + q_2^2 \\ & C(q_1, q_2) = 250 + q_1^2 + q_2^2 + q_1 q_2 \end{aligned}$

then there are economies of scope between the two products for all levels of production.

- 2. The Lerner Index increases as the number of symmetric Cournot oligopolists increases.
- 3. In the normal form game at the rights, if 2 < X < 3 and 3 < Y < 4, then (B1, B2) is a Nash equilibrium and it is also Pareto Optimal.
- **4.** In Stackelberg duopoly where both firms have constant marginal cost, in equilibrium, the firm with a lower marginal cost will produce a greater amount than the high cost firm.

Firm 2							
		A2		B2		C2	
	A1		2		0		-1
1		1⁄2		2		7	
rm	B1		1		Y		3
Fi		-3		Х		5	
	C1		4		5		-2
		3		1		3	

5. The pattern of "brand proliferation" in the Competitive Strategy Game (*i.e.*, how per-firm sales are affected by the number of sellers in each product market) is better described by Hotelling's model of product differentiation than by the model of monopolistic competition.

II. <u>MULTI-PART QUESTIONS</u>: Answer <u>all parts</u> of the following two multipart questions. The point assignment for each subpart is given in [square brackets].

- 1. Firms 1 and 2 each produce a single homogeneous product in quantities q_1 and q_2 , respectively. Demand for this product is given by the (inverse) demand curve: $P(q_1, q_2) = 180 - q_1 - q_2$. Both firms face zero marginal costs and any fixed costs are entirely sunk
 - a) [4] Show that firms 1's best response curve will be: $r_1(q_2) = 90 \frac{1}{2}q_2$.
 - b) [3] Draw the best response curves for both firms with q_1 on the x-axis and q_2 on the y-axis.
 - c) [5] Solve for the Cournot equilibrium, and indicate this point on your graph.
 - d) [3] Show that the equilibrium price is $P^* = (1/3) (180 + c_1 + c_2)$.

- e) [4] Suppose firm 2's marginal cost rises to $c_2 = 20$, while firm 1's marginal cost remains zero. Draw on your graph what happens to firm 2's best response curve, firm 1's best response curve and the equilibrium quantities. Explain your answer: No calculations are necessary.
- f) [4] Suppose, instead, that marginal costs of both firms rise to \$20. Without any additional calculations, give your reasoning why the increase in the equilibrium price will be more or less than that in part (e)?

- 2. There are 1,000 customers uniformly distributed along the 10 miles of Center Street. Chong's Chow is the monopoly provider of Chinese takeout located at mile 5 (the exact middle of the street). Each consumer derives a value of \$50 from Chinese takeout and buys at most 1 dinner a month. The transport costs are \$2 per mile (round trip). Chong's marginal cost of supplying a dinner is \$10. There are no fixed costs at this location.
 - a) [3] Show that if Chong's were to serve the entire market, it would set P = \$40.
 - b) [3] What are Chong's monthly profits at this price?

A space for lease has opened at the far end of the street at mile 0 for a rent of \$500 per month. Chong's can not move its original store to a new location, but can open a second restaurant. The new restaurant will have the same marginal production cost as the original restaurant (c =\$10). The two locations can set different prices P_{original} and P_{new} for meals.

- c) [5] Give a formula for the marginal consumer (z) who is just indifferent between buying from the new restaurant (mile 0) and the original restaurant (mile 5).
- d) [7] Suppose that Chong fixes the price of the original store (located at mile 5) at P = \$40 so that the entire market is served. Find the profit maximizing price for the new store.
- e) [3] Suppose Chong's allowed the original store (at mile 5) to choose any price (not necessarily such that the entire market were served). Without doing any calculations, would you expect the prices at each store to increase, decrease or stay the same compared to part d? Explain your intuition.

III. <u>INDUSTRY STUDIES</u>: Answer each of the following two questions. Notice that you have some choice in each question. Be brief: a complete answer is possible in <u>less than one blue book page</u> for each part. Point assignments are given in [square brackets].

- 1. **[12]** Choose either the BEER or the AUTO industry.
 - a) Describe the change in concentration in the U.S. industry over the second half of the 20th century.
 - b) Briefly describe two key sources for the observed trend besides changes in economies of scale.
- 2. **[12]** Choose either the AUTO or the BREAKFAST CEREAL industry.
 - a) Give an example of vertical product differentiation in the industry, and an example of horizontal product differentiation.
 - b) Describe how product differentiation in the industry might have the effect of erecting barriers to new entrants into the U.S. market.