GENERAL INSTRUCTIONS: Write your name 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 put all of your answers in the bluebooks.

I. TRUE or FALSE or UNCERTAIN and EXPLAIN: Choose 3 of the following 4 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. Each question is worth 7 points for a total of 21 points.

1. If the costs of producing two goods, 1 and 2, individually and jointly, are given by the cost functions:
   \[ C(q_1, 0) = 75,000 + \frac{1}{2} q_1^2 \]
   \[ C(0, q_2) = 100,000 + \frac{1}{2} q_2^2 \]
   \[ C(q_1, q_2) = 125,000 + \frac{1}{2} (q_1 + q_2)^2 \]
   then the average incremental cost 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:

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

II. MULTI-PART QUESTIONS: For each of the following two questions, answer all parts. Point assignment for each subpart is given in [square brackets]. They are worth 55 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 \( P_A \leq 80 \), 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 same price 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:

\[
\begin{align*}
P_1(q_1, q_2) &= 120 - q_1 - bq_2 \\
P_2(q_2, q_1) &= 120 - q_2 - bq_1
\end{align*}
\]

where \( 0 \leq b \leq 2 \). 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 same economic market.

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 \( \frac{1}{2} \), 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. INDUSTRY STUDIES: Answer each of the following two questions about the industry studies. Note that you choose just one of two industries in the second question.

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 concentration over the course of the second half of the 20th 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 auto or breakfast cereal industry, but not both, describe one significant entry threat 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 one major response by the incumbents.