NOVA SCHOOL OF BUSINESS & ECONOMICS

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Time: 2:00

INDUSTRIAL ORGANIZATION
(B.S. in Economics and B.S. in Management)

Final exam (regular season)

Answer each question on a separate sheet of paper. Good luck!

1. [15 minutes; 4 points] The following statement was recently made by a former student of this course:

> "The equilibrium price resulting from the static Bertrand model (two firms with equal total cost functions) *cannot* arise in an infinitely-repeated Bertrand stage game."

Comment in no more than ten lines (graphs, if any, excluded) while agreeing or disagreeing.

2. [15 minutes; 4 points] Jane Theory, the best student in her class, said:

> "A decrease in the constant marginal and average cost of production affecting equally all firms may not alter the price at which the good or service is sold to consumers."

Comment in no more than ten lines (graphs, if any, excluded) while agreeing or disagreeing.

3. [45 minutes; 6 points] Two firms, A and B, operate in a market for a homogeneous product whose *yearly* demand equals $q = 10 - p$. They do so by competing in *prices*, which they set simultaneously and independently at the beginning of each year. They both produce the good at a marginal and average cost of 2, a fact that is common knowledge. When firms quote the same price they share the associated quantity demanded equally, i.e., have equal market shares. They also expect to serve this market forever. [Note: denote the discount factor by δ.]

(i) Can the two firms tacitly collude? Under which condition? Quantify and explain intuitively.

(ii) What is the optimal tacit collusion price? Quantify and explain intuitively.

Suppose that both firms are able to tacitly collude around the optimal tacit collusion price. A third firm, C, has entered the market. It produces the good at a constant marginal and average cost of 5, a value that is also common knowledge.

(iii) Is firm C able to tacitly collude around firms A and B's optimal tacit collusion price? Under which condition? Quantify and explain intuitively.

(iv) Does firm C's entry make it harder for tacit collusion to emerge in this market? Quantify and explain intuitively.

Suppose that the three firms *do* tacitly collude. Firms A and B have decided to create an industry association, of which they are the only members. Upon its creation, the association's director-general proposes that the good's package starts displaying a Recommended Retail Price label (which is a suggestion regarding the retail price), and suggests that it be set at (slightly below) 5.

(v) Can you explain the director-general's idea when it suggested a Recommended Retail Price of (slightly below) 5? Quantify and explain intuitively.

4. [45 minutes; 6 points] Two firms, 1 and 2, compete in a homogeneous good's market whose *yearly* demand is $q = 10 - p$ by simultaneously and independently choosing the *quantity* that they wish to produce each year. Both firms produce at a constant marginal and average cost of 2, a fact that is common knowledge. Both firms expect to serve this market forever. The two firms can both borrow at interest rate r_1 and r_2, respectively, with $r_1 = r_2 = r$, i.e., they can borrow at the same interest rate. Denote these firms' discount factor by $\delta_1 = \frac{1}{1+r_1}$ and $\delta_2 = \frac{1}{1+r_2}$, respectively.

(i) What quantity will each firm produce if they tacitly collude around the optimal collusion quantity? What profit will each make? Quantify.

(ii) Under which condition can the two firms tacitly collude around the optimal collusion quantity? Quantify and explain.

Firm 1 is doing quite well, and as such the interest rate at which it can borrow is now permanently lower, i.e., $r_1 < r$. On the contrary, firm 2 has faced some issues, which led to a permanent increase in the interest rate at which it can borrow, i.e., $r_2 > r$. However, both still expect to serve this market forever.

(iii) Do these changed circumstances make it harder or easier for the two firms to tacitly collude around the optimal collusive quantity? Briefly quantify and explain.

(iv) If so, which firm is responsible for the change? Explain.