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 (resit 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:

> "*Airbus* and *Boeing* are the only makers of widebody (large, two or more aisles) aircraft, whereas they face competition in the narrowbody (smaller, single aisle) aircraft market, for instance, from *Embraer* and *Mitsubishi*. One may conclude that anticompetitively high prices in the latter market are less likely than in the former, though they cannot be ruled out."

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:

> "Product heterogeneity is neither a necessary, nor a sufficient condition for positive profits in markets with two or more firms. By the same token, product homogeneity is neither a necessary, nor a sufficient condition for positive profits in markets with two or more firms."

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

**3.** [45 minutes; 6 points] Two firms, $A$ and $B$, are capable of producing a new gadget whose *lifetime* demand is $q = 10 - p$. They can both produce it at a marginal and average cost of 2. They share the quantity demanded equally if they set the same price. Firms compete in prices, which they set simultaneously and independently.

(i) What price does each firm set? How much will each profit? Compute and briefly explain.

Suppose that firm $A$ is contemplating filing a lawsuit against firm $B$, claiming that it copied from firm $A$ patented technology that proves essential for the gadget's functioning. If successful, the lawsuit would force firm $B$ to leave the market. Filing the lawsuit costs $f > 0$ and defending against it also costs $f$ in lawyers' fees.

(ii) Will firm $B$ defend itself from the lawsuit if firm $A$ files it? Briefly explain.

(iii) Will firm $A$ file the lawsuit? Compute and explain.

Suppose now that firm $B$ can also file a lawsuit against firm $A$. In this case, if both firms file a suit, both have an equal probability of winning, in which case the losing firm must leave the market. Filing a lawsuit while defending from the other firm's costs $2f$. Firms decide simultaneously and independently whether or not to file a lawsuit.

(iv) Will each firm file a lawsuit? Will both do so? None? Compute and briefly explain.

(v) How are consumers affected by firm $B$'s ability to also file a lawsuit? Explain.

**4.** [45 minutes; 6 points] Two firms sell a fertilizer that they both produce at a constant marginal and average cost of 2. There are 10 consumers, all with a *yearly* valuation of 10 for it. Firms choose prices simultaneously and independently at the beginning of each year. They share the market equally if they quote the same price. They expect to serve this market forever. All this information is common knowledge. [Note: denote the discount factor by $\delta$.]

(i) Can the two firms tacitly collude? Under what condition? If so, what is the optimal collusive price? How much will each then sell? How much will each then profit? Compute and explain.

Suppose that the fertilizer's technology has evolved such that it only needs to be applied every other year. In other words, an application made in a year is effective for two years. Consumers are now willing to pay twice as much for the fertilizer, 20, since its effect lasts for two years. In other words, their *two-years* valuation equals 20. The new fertilizer has a marginal and average cost of 4, i.e., it costs twice as much to produce as the old one. All this information is common knowledge.

(ii) Does this technological evolution facilitate or hinder tacit collusion? Compute and explain. [Note: $1 + \delta^2 + \delta^4 + \cdots = \frac{1}{1-\delta^2}$.]

(iii) What price will firms quote if they are able to tacitly collude around the optimal collusive price? Explain.

Assume that firms are able to tacitly collude around the optimal collusive price in both cases.

(iv) Do firms benefit from this technological evolution? Compute and explain intuitively. [Note: $1 - \delta^2 = (1 - \delta)(1 + \delta)$.]