NOVA SCHOOL OF BUSINESS & ECONOMICS

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Time: 2:00

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

Midterm exam

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 value of the Concentration Ratio is (strictly) negatively related to the number of firms, n, operating in a market."

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 proprietary (for instance, patented) technological improvement may transform a duopoly into a monopoly when firms compete in quantities."

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

3. [45 minutes; 6 points] Two firms, 1 and 2, compete in the market for an homogeneous good whose demand is $q = 10 - p$. Both firms produce at a constant average and marginal cost of 4 per physical unit. Firms compete in quantities, which they set simultaneously and independently.

(i) What quantity will each firm produce? What profit will each make? Quantify.

Each firm can pay for an advertising campaign that will increase the good's demand to $q = 16 - p$. Both firms decide simultaneously and independently whether to advertise. The campaign costs $C > 0$ to any firm that orders it.

(ii) Will both firms order and pay for the advertising campaign? Will one of them do so? Quantify and explain.

Assume that $C \in (0, 12)$. (i.e., 0 < C < 12)

(iii) What is the (private) benefit of the advertising campaign to the firm that does it? Quantify and explain.

(iv) What is the (private) value of the advertising campaign to the firm that does not do it? Quantify and explain.

(v) What is the industry value of the advertising campaign? Quantify and explain.

(vi) What is the social value of the advertising campaign? Quantify and explain.

(vii) Can you identify two externalities involved in the decision to proceed with the advertising campaign? Explain.

4. [45 minutes; 6 points] Two firms, 1 and 2, compete in the market for an homogeneous product whose demand equals $q = 10 - p$. Both firms produce at a constant average and marginal cost of 2 per physical unit. Firms compete in quantities, which they set sequentially as follows: (i) first, firm 1 *provisionally* announces the quantity that it wishes to produce, with the announced choice becoming common knowledge; (ii) then, firm 2 chooses the quantity that it wishes to produce, which becomes common knowledge; (iii) then, firm 1 revises the quantity that it wishes to produce, thus choosing the quantity that it will ultimately produce. It can revise its provisional choice upward or downward without incurring any cost of doing so.

(i) How will firm 1 ultimately choose the quantity that it wishes to produce in stage (iii)? Quantify and explain.

(ii) Which quantity will firm 2 choose in stage (ii)? Quantify and explain.

(iii) Should firm 2 take firm 1's provisional announcement in stage (i) as credible, i.e., should it expect firm 1 to do in stage (iii) what it provisionally announced in stage (i)?

(iv) Which quantity will firm 1 provisionally announce in stage (i)? Explain and quantify.