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:

> "When the competitive fringe is composed by extremely inefficient firms (firms with very high production costs), the dominant firm may act like a monopolist. This may be the case even if there are some quantities for which consumers' maximum willingness to pay lies above the fringe's supply curve."

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 low value of the Instability Index *necessarily* implies lack of technological progress, i.e., low dynamic efficiency."

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 a homogeneous good's market whose demand is $q = 10 - p$ by simultaneously and independently choosing the quantity that they wish to produce. Both firms produce at a constant marginal and average cost of 4, a fact that is common knowledge.

(i) Compute and draw each firm's best-reply function.

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

Firm 1 is considering investing in new machinery that lowers its marginal and average cost to 2. If it does so, the investment decision becomes common knowledge since the new machinery is readily observable.

(iii) What is the value of the investment for firm 1, i.e., what is the maximum amount that firm 1 is willing to pay for the new machinery? Quantify.

(iv) What is the investment's *direct effect*, i.e., what is the value of investment to firm 1 if firm 2 were unaware of it? Quantify and explain.

(v) What is the investment's *strategic effect*, i.e., what is the value of the investment resulting from firm 2 becoming aware of it and both firms adjusting their quantities accordingly? Quantify and explain.

(vi) Are there any externalities involved in this investment decision? Are they positive or negative? Explain.

4. [45 minutes; 6 points] An incumbent, denoted I, produces a homogeneous good whose yearly demand equals $q = 10 - p$, at a constant marginal and average cost of 4. An entrant, denoted E, that is investing to improve its productive efficiency, can do so at a constant marginal and average cost which decreases yearly, beginning at 5 in 2024, decreasing to 4 in 2025, to 3 in 2026, and staying equal to 3 thereafter. This market will operate for the last time in 2028, when the good will be banned by an EU regulation. Firms compete in prices, which they set simultaneously and independently at the beginning of each year. Do not discount money flows earned in different years.

(i) What is the value of E's investment to its shareholders? Quantify and explain intuitively.

(ii) What is the value of E's entry to consumers? Quantify and explain intuitively.

(iii) What is the value of E's entry to society as a whole? Quantify and explain intuitively.

Firm I will be able to reverse engineer, i.e., copy (at a cost) E's technology in 2028.

(iv) Will it do so? Quantify and explain intuitively.

(v) Is I's decision socially desirable? Quantify and explain.