NOVA SCHOOL OF BUSINESS & ECONOMICS

Mariana Costa
Rúben Bento
Vasco Santos

January 11, 2025
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:

> "Entry of a new firm may destroy tacit collusion among incumbents, but only if the entrant is more efficient."

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:

> "When firms compete in prices, a negligible fixed cost may lead to only one firm operating (in the long run)."

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

3. [45 minutes; 6 points] An incumbent, denoted I, has been selling a software app for some time, and is now faced with an entrant, denoted E. The demand functions for the apps of these two firms are as follows:

$$q_I = C + 10 - p_I + p_E$$
$$q_E = 10 - p_E + p_I.$$

Firm I's demand consists of two parts: (1) consumers who have previously purchased its app and are now stranded with it, i.e., they are captive due to extremely high switching costs; (2) new customers who are not affected by these switching costs and can choose between firm I's app and firm E's based on price. Both firms produce their apps at a constant marginal and average cost of 2. Firms compete in prices, which they set simultaneously and independently.

(i) Which part of I's demand function depicts the demand of captive (stranded) consumers and which part depicts the demand of new, non-stranded consumers? Briefly explain.

(ii) What is the relationship between the apps supplied by the two firms from the consumers' viewpoint? Briefly explain.

(iii) Compute both firms' best-reply functions.

(iv) What prices will they charge? Compare them and intuitively explain the difference.

Suppose instead that both firms had been in the market for some time, each having captured half of the previous demand C (keep denoting them I and E as before to avoid having to change notation). These consumers are now stranded with the software app that they bought previously.

(v) Write down both firms' demand functions.

(vi) What prices will they charge? Quantify.

(vii) Compare the prices obtained in (iv) and (vi), and explain the difference.

(viii) Can we say that all consumers are better off or worse off in (iv) versus (vi)? Explain.

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 price that they wish to quote each year. Both firms produce at a constant marginal and average cost of 6, a fact that is common knowledge, as is the fact that both firms expect to serve this market forever. [Denote the discount factor by δ.]

(i) Under what condition can the two firms tacitly collude? Quantify and explain.

(ii) What is the optimal collusion price? What profit will each then make? Quantify.

A third firm, denoted 3, is about to enter this market, while also competing through price. It can produce the commodity at a constant marginal and average cost of 4, and expects to serve the market forever, too. The three firms set prices simultaneously and independently. All this is common knowledge.

(iii) Will firm 3 tacitly collude with the incumbents at the pre-entry optimal tacit collusive price? Quantify and explain.

(iv) Does society benefit from firm 3's entry? Quantify.

(v) Can we say that firm 3 became a monopolist? Explain.