## **NOVA** SCHOOL OF BUSINESS & ECONOMICS

Mariana Costa Rúben Bento Vasco Santos December 12, 2024 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:

"Prices will be higher if *all* consumers *always* remain faithful to their 'usual' store, rather than search for the best price. Active search for the lowest price on the part of consumers, if absent, reduces the profit decreasing effect of competition."

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:

"Explicit collusion, though illegal, always yields a higher profit than tacit collusion. It will thus be implemented by firms that are almost sure that they wont't be caught."

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

**3.** [45 minutes; 5 points] Two towns are located on opposite margins of a river, right in front of each other. The two towns are totally separated from each other since there is no bridge connecting them. Thus, travelling from one town to the other is currently impossible.

Each town has a home-delivery pizza shop. Neither shop is a restaurant. They both exclusively home deliver. The demand for pizzas *in each town* is q = 6 - p. The two shops are identical and their pizzas are perfect substitutes. The marginal and average cost of a pizza is also equal at both shops, 2. Firms quote the price of a pizza, which they set simultaneously and independently.

(i) Which price will each firm quote for each pizza? What profit will each firm make? Quantify and explain.

A brand new bridge connects the two towns. Crossing it is free and takes almost no time.

(ii) Which price will each firm quote for each pizza? What profit will each firm make? Quantify and explain.

The owners of both pizza shops have decided to add a delivery charge for out-of-town deliveries, i.e., to any delivery to the other town, even though crossing the bridge is free. Thus, out-of-town deliveries imply paying the delivery charge in addition to the pizza's price. They have both chosen to set the delivery charge slightly above 4 per pizza.

- (iii) Which price will each firm quote for each pizza? What profit will each firm make? Quantify and explain.
- (iv) How much will the out-of-town delivery fee generate in revenue? Compute and explain intuitively.
- (v) Why was it implemented? Explain intuitively.

**4.** [45 minutes; 7 points] A carmaker, *C*, holds a yearly auction for 10000 units of a part. It does not accept bids in excess of 4 monetary units per part. Two parts suppliers, *A* and *B*, bid every year. The parts supplier that bids the lower price wins a contract to supply 10000 parts at that price. If both *A* and *B* bid the same price, *C* awards the contract randomly with probability 1/2 to either of the two parts suppliers. Both parts suppliers produce the part at a constant marginal and average cost of 2. All firms (*A*, *B*, and *C*) expect to operate in this market forever. Denote the discount factor by  $\delta$ .

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- (i) What is the optimal tacit collusion bid price? Quantify and explain.
- (ii) What is the auction winner's *actual* yearly profit when *A* and *B* tacitly collude around the optimal bidding price? Quantify and explain.
- (iii) What is each firm's *expected* yearly profit when they both collude around the optimal bidding price? Quantify and explain.
- (iv) Can the two parts suppliers tacitly collude in their bidding? For what values of the discount factor can they do so? Quantify and explain.

The carmaker decided to award two-year contracts, that is, the winning firm will supply 20 000 units over two years, while delivering 10 000 units per year as would have been the case if the firm had won two yearly contracts in a row.

- (v) Can the two parts suppliers collude in their bidding? For what values of the discount factor can they do so? Quantify and explain.
- (vi) Did the change make it harder or easier for *A* and *B* to collude? Quantify and explain.
- (vii) What is the optimal contract length (1, 2, 3,... years) from the viewpoint of the carmaker? Quantify and explain.
- (viii) How much will *C* pay for each unit of the part if it implements the optimal contract length? Quantify and explain.