

Mariana Costa Rúben Bento Vasco Santos May 5, 2025 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 a 'big' firm—that is, a firm that achieves a large market share—enters a perfectly competitive market, we end up with the market structure depicted by the dominant firm model."

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 merger between two firms will *always* increase the equilibrium price."

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

3. [45 minutes; 6 points] A firm specialized in selling counterfeit bicycles operates in a neighborhood, distributing them through informal networks and hidden online marketplaces. The authorities, unable to identify and shut down the firm, nevertheless try to seize the counterfeit bikes. The probability of seizure by the authorities is as follows:

$$p = \begin{cases} \frac{n}{100} & \text{if } n \le 100 \\ 1 & \text{if } n > 100, \end{cases}$$
(1)

where p denotes the probability of the authorities seizing the counterfeit bikes and n represents the number of counterfeit bikes distributed in a given time period. The firm earns 100 per counterfeit bike when these are not seized by the authorities. Assume that the firm's costs are zero: this allows us to focus on the revenue side, through which the interaction with the authorities takes place.

- (i) Verbally explain (1).
- (ii) Write down the firm's problem.
- (iii) How many bikes will the firm distribute per time period? How much will it earn? Quantify.

Another firm dealing in counterfeit bikes has started to operate in the neighborhood. Denote the number of bikes distributed by the original firm by n_1 and the number of bikes distributed by the entrant by n_2 .

- (iv) Modify (1) to take into account the presence of two firms, rather than one. Briefly explain.
- (v) Write down each firm's problem.

Assume that they decide simultaneously and independently how many bikes to distribute.

- (vi) How many bikes will each distribute? Quantify.
- (vii) How much will each firm earn? Quantify.
- (viii) Do the two firms maximize industry profits? Quantify.
- (ix) Is there an externality affecting the firms' activity? Is it positive or negative? Explain.





4. [45 minutes; 6 points] An incumbent produces an homogeneous good whose demand equals q = 10-p, doing so at a constant marginal and average cost of 2. An entrant is about to start supplying the good, also producing it at a constant marginal and average cost, but its efficiency is not known for sure by the incumbent. The incumbent expects the entrant's marginal and average cost to be 7 with probability 1/3, 6 with probability 1/3, and 1 with probability 1/3, a distribution that the entrant knows. The two firms compete in prices, which they set simultaneously and independently.

- (i) What price did the incumbent charge before entry? What will its profit be? Quantify and explain intuitively.
- (ii) What price will the incumbent quote after entry has taken place? Quantify and explain.
- (iii) Can the incumbent deduce the entrant's marginal and average cost after entry has taken place and they have both competed against each other? Explain intuitively.
- (iv) What is the incumbent's *expected* profit? Quantify and explain.
- (v) And the entrant's *actual* profit? Quantify and explain.