Queen Mary
University of London

Main examination period 2024

ECN 385 Industrial Economics Duration: 2 hours

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Answer ALL questions.
Explain clearly your answers.

You are permitted to bring 20 x A4 pages of notes into your examination (i.e. 10 double sided pieces of paper). These can be typed or handwritten and can include graphs and images. They can include material from any source. Your notes must be stapled together and include your student ID number and the module code on the first page. You must submit your notes at the end of the examination with your answer booklet.

Non-programmable calculators are permitted in this examination. Please state on your answer book the name and type of machine used. Complete all rough workings in the answer book and cross through any work that is not to be assessed.

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EXAM PAPERS MUST NOT BE REMOVED FROM THE EXAM ROOM

Examiner: Aniol Llorente-Saguer

Question 1 [26 marks]

Consider a situation where two firms, Crunchy Delights (C) and Sweet Treats (S), sell differentiated products. They compete in **quantities** and their inverse market demand functions are given by

$$p_C = 130 - 2q_C - q_S$$
$$p_S = 130 - 2q_S - q_C,$$

where q_C and q_S are Crunchy Delights' and Sweet Treats' quantities, respectively. Both firms face a constant marginal cost of $c = 10$, and they do not incur any fixed costs.

(a) Find the equilibrium prices, quantities and profits. **[7 marks]**

(b) Suppose now the firms conspired to form a cartel and collude. Find the price, quantities and profits for this market if firms want to maximize joint profits. **[6 marks]**

(c) Compute the Lerner index of each firm in parts (a) and (b), and discuss the difference. **[6 marks]**

(d) Suppose now that the two firms play this game repeatedly infinitely many times, and that firms discount the future by the discount factor $\delta < 1$. Assume that both firms play the following grim trigger strategy: they play the collusive agreement (from part (b)), and if either member of the cartel deviates from the cartel agreement, they revert to the Nash equilibrium strategy of the stage game forever (from part (a)). For what values of δ does this grim trigger collusive agreement constitute a subgame perfect Nash equilibrium? (If you did **not** find the solution of parts (a) and (b), assume that the collusion payoffs are 150, the deviation payoffs are 200 and the Nash equilibrium payoffs of the stage game are 100) **[7 marks]**

Question 2 [26 marks]

Consider a continuum of potential consumers of a new communication network service. Consumers are denoted by x and are uniformly distributed along the line segment $[0, 100]$. Denote by n the number of actual users of the network service and by p the subscription price charged by the monopolistic provider of the communication network service. The utility of a consumer with location x is given by

$$U_x = \begin{cases} (n+1)(100-x) - p & \text{if s/he buys the network service} \\ 0 & \text{if s/he does not buy the service} \end{cases}$$

(a) Explain briefly (no more than three sentences) why this is an example of a good with network externalities. **[6 marks]**

(b) Find the aggregate demand function for the new communication network service. **[6 marks]**

(c) Assume that the subscription price charged by the monopolistic firm is $p = 198$. Find all the equilibria of the network service subscription and explain which of them are stable. **[7 marks]**

(d) Suppose that the subscription price is instead is $p = 90$. Would consumer located at $x = 0$ be willing to pay for the service (assume no one else buys the service, i.e., $n = 0$)? Without the need of solving the model again, discuss the number of equilibria that there will be at the new price and their stability. **[7 marks]**

Question 3 [26 marks]

Consider a monopolist that sells durable goods during two periods, $t = 1$ and $t = 2$. The market demand for the services in each period is given by $p_t = 60 - Q_t$ and the total cost function of the monopolist in each period is given by $TC(Q_t) = 12Q_t$. Consumers that buy a good in the first period can also enjoy it in the second period. The discount factor for consumers and the firm is given by $\delta = \frac{1}{2}$.

a) Assume that the monopoly can commit not to lower prices in the second period. Find the optimal price and quantity produced in each period and the total discounted sum of profits. **[7 marks]**

b) Assume now that the monopoly cannot commit not to lower prices in the second period. Given a quantity q_1 produced in period one, what would be the optimal price, quantity and profits in the second period? **[6 marks]**

c) Using the previous result, find the optimal price and quantity for the first period, and the total discounted sum of profits. Compare the total discounted sum of profits to the ones obtained in part (a). **[7 marks]**

d) Relate your findings to the Coase conjecture. [Note: you should try to answer this question even if you did not complete the previous parts] **[6 marks]**

Question 4 [22 marks]

Answer the following questions. If your answers are focused and precise, they need not be very long.

(a) The latest data from the main companies in car rental markets suggests that there is substantial variation in the rental rates charged to different customers of the same firm. Rates vary considerably across a number of dimensions: across locations, across days of the week, over the length of the rental period, and across car models. Explain the potential reasons for non-uniform pricing in this market. **[11 marks]**

(b) Discuss whether a higher market concentration index necessarily implies higher welfare. **[11 marks]**

End of Paper