

Final Exam second try

21.9.2015

1. General information:

- a. Make sure that your final exam is complete. The final exam consists of 4 problems.
- b. Only use the provided sheet of paper. Write your matriculation number immediately and clearly on each page!
- c. Please do not remove the staples from the provided sheet of paper.
- d. Allowed items at your workplace: Student ID, writing utensils (no red pen, no ink eraser, no pencil case), ruler, set square, non programmable calculator, food and drinks.
- e. Use a permanent pen (no pencil).
- f. Mobile phones have to be turned off and removed from your place!

2. Hints about doing the exam:

- a. Read each task carefully. The tasks could be extended over several pages.
- b. Please work on all tasks and state each on a new page. Please write your answers in a readable way.
- c. You may write your answers in English or in German.
- d. Label the axes of your illustrations.
- e. The exam lasts 90 minutes!

We wish you every success!

Problem 1

Consider a homogenous goods market in which two firms (firm 1 and firm 2) compete. Market demand can be described by the function $q(p) = 12 - p$ where q and p denote quantities and the market price, respectively. The cost functions are of the form $C_i(q_i) = c_i \cdot q_i$.

- a) Assume that both firms compete in quantities. Determine the profit maximization problem of the two firms and derive the equilibrium quantities and profits of both firms.
- b) Consider now that firm 1 can act as a Stackelberg-leader. Both firms now have identical, constant marginal costs of $c = 4$. Determine the equilibrium quantities and profits in this case.
- c) Now consider the case in which one firm, the incumbent I , is already in the market. The entrant E can enter the market by incurring entry costs $F = 1$. In case of entry, the incumbent acts as a Stackelberg-leader. Determine the incumbent's output which is necessary to deter entry. Is it optimal for the incumbent to deter entry? Discuss the assumptions under which deterrence is credible.

Now assume that both firms are capacity constraint at $\bar{x}_1 = \bar{x}_2$ with $q_i \leq \bar{x}_i$. The efficient rationing rule applies. Marginal costs are identical and constant across both firms with $c = 4$.

- d) Given $\bar{x}_1 = \bar{x}_2 = 2$, firm 1 charges a price $p_1 = 12 - \bar{x}_1 - \bar{x}_2$. Show that firm 2 has no incentive to charge a different price than firm 1. Interpret your results.

Problem 2

A monopolist with marginal costs of zero serves two types of consumers. There are 80 type 1 consumers and 240 type 2 consumers. The marginal willingness to pay for x units of the good is $p = 20 - x$ for type 1 and $p = 10 - x$ for type 2. The monopolist knows that there are two types, but he does not know the type of a given consumer.

- a) Derive the aggregate demand function. (2P)
- b) What is the optimal linear price of a monopolist? Will the monopolist serve both types? Given the monopolist offers a two-part tariff and charges a price of zero, calculate fixed fees and profits when the monopolist tries to serve only type 1 and only type 2.
- c) What is the optimal two-part tariff if the monopolist must serve both types, but can only charge one tariff? Would the monopolist serve both types if she is free to choose?
- d) Describe shortly (up to 5 sentences) how second degree price discrimination would look like in the given example (no formal solution necessary, but possible). In your answer, also address the constraints the monopolist has to take into account.

Problem 3

Consider a monopolist who faces an inverse demand of $P(Q, A) = 110 - 5Q + 2\sqrt{A}$ where P and Q denotes prices and quantities, respectively, and A is the advertising expenditure of the monopolist. The total cost function can be described by $C(Q, A) = 10Q + A$.

- a) Calculate the optimal output and advertising expenditure, optimal profits and consumer surplus.
- b) What is the value of the advertising-to-sales-ratio in the profit maximum? Interpret your result.

Problem 4

Describe how the Hotelling model tries to capture horizontal product differentiation. How does (price-)competition affect the location of the firms? How do transport costs influence these results? Illustrate your answers graphically.