

Written Exam at the Department of Economics summer 2017

Microeconomics II

Final Exam

August 17, 2017

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language for which you registered during exam registration.

This exam question consists of three pages in total

NB: If you fall ill during the actual examination at Peter Bangsvej, you must contact an invigilator in order to be registered as having fallen ill. Then you submit a blank exam paper and leave the examination. When you arrive home, you must contact your GP and submit a medical report to the Faculty of Social Sciences no later than seven (7) days from the date of the exam.

Please answer all six questions.

1. A store sells chocolate bars. The store has a monopoly and faces two types of customers, “rich” and “poor”. The store knows that half of its consumers are poor, the other half are rich. Each “rich” customer has demand function $D_R(p) = 20 - p$. Each “poor” customer has demand function $D_P(p) = 16 - p$. To simplify, let's assume there is one consumer of each type, and that production is costless (marginal cost is $MC = 0$).
 - (a) If the store does not price discriminate, and simply sets a unit price p for chocolate bars, what price will maximize its profit? Exactly how big is the deadweight loss in the market?
 - (b) Now suppose the profit-maximizing second-degree price discrimination is implemented.¹ Exactly how much chocolate will the poor and the rich consume?
2. Consider a perfectly competitive market. The market demand function is $D(p) = 12 - p$ and the supply function is $S(p) = 2p$. Suppose production generates a positive externality to society. The marginal positive externality benefit equals 3 for each unit of output.
 - (a) If there is no government intervention in this market, how much is produced?
 - (b) How big is the socially efficient output level?
 - (c) Show that the government can restore efficiency by an appropriate Pigouvian subsidy. How big should the subsidy be?
3. The market for widgets is an oligopoly with two firms, A and B. Production takes place under constant returns to scale. Firm A's marginal production cost is 25; firm B's marginal production cost is 10. There are no fixed costs. The market demand for widgets is $D(p) = 100 - p$, where p is the market price. Calculate the equilibrium price under the following kinds of competition (and show your calculations).
 - (a) Cournot competition.
 - (b) Stackelberg competition, where firm A chooses its quantity first.
4. Albert owns the only cafe in a small village. Betsy considers opening a new cafe across the street. The game is sequential-move, with two stages. Albert moves first, and chooses whether or not to renovate his cafe. Then, after observing what Albert did, Betsy chooses whether to enter the market (i.e.,

¹ You can assume the store will serve both types of consumers.

to open a new cafe) or to stay out. Payoffs are as follows. If Betsy stays out then she surely earns 0, while Albert earns 100 if he has renovated and 200 if he didn't. If Betsy enters, payoffs are: If Albert has renovated, Albert loses 10 while Betsy loses 25 (i.e., both earn negative profits); If Albert didn't renovate they each earn a positive profit of 45.

(a) How many pure strategies does each player have?

(b) Find all (pure strategy) Nash equilibria. Explain your reasoning.

(c) Which Nash equilibrium is subgame-perfect? Explain.

5. In an economy with two consumers, A and B, there is a private good which can be transformed into a public good; it costs one unit of the private good to produce one unit of the public good. Consumer A's preferences are represented by utility function $u_A(G, x_A) = 3 \cdot \ln(G) + 6x_A$, where G is the quantity of the public good, $\ln(G)$ is the natural logarithm of G , and x_A is the quantity of the private good consumed by consumer A. Similarly, B's utility function is $u_B(G, x_B) = 6 \cdot \ln(G) + 4x_B$.

(a) Identify the Pareto Optimal level of the public good. Show your calculations.

(b) In a Lindahl equilibrium that generates the Pareto Optimal level of the public good, what are the individual prices for the two consumers ?

6. Coke and Pepsi compete in the market for soft drinks. Each has two options: High Price, or Low Price. If both set the High Price, each firm makes a profit of 100. If both set the Low price, each makes a profit of 50. Finally, if one of them chooses High Price while the other chooses Low Price, the one that sets a Low Price makes a profit of 150 while the other makes 0 profit.

(a) Write down the payoff matrix for the one-shot game (i.e., when they interact only once). Find all the (pure strategy) Nash equilibria. Does there exist a dominant strategy? Explain.

(b) Now suppose the game is repeated infinitely many times. There is a discount factor $\delta < 1$ applied to future payoffs. Coke and Pepsi would like to play a subgame perfect equilibrium such that, in each period, each chooses High Price. What is the smallest δ such that this is possible? Show your calculations.