Written Exam at the Department of Economics summer 2017

Microeconomics III

Final Exam

June 13, 2017

(2-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 4 pages in total (including the current page)

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.

1. Consider the following game G, where Player 1 chooses the row and Player 2 simultaneously chooses the column.

		Player 2		
		D	E	F
	A	$7,7$	$0,1$	$0,3$
Player 1	B	$2,2$	$3,3$	$0,0$
	C	$8,-1$	$2,0$	$1,1$

   (a) Show which strategies in G are eliminated by following the procedure of 'Iterated Elimination of Strictly Dominated Strategies'.

   (b) Find all Nash equilibria (NE), pure and mixed, in G. Show which NE gives the highest payoff to *both* players, and denote this equilibrium strategy profile by $e(1)$.

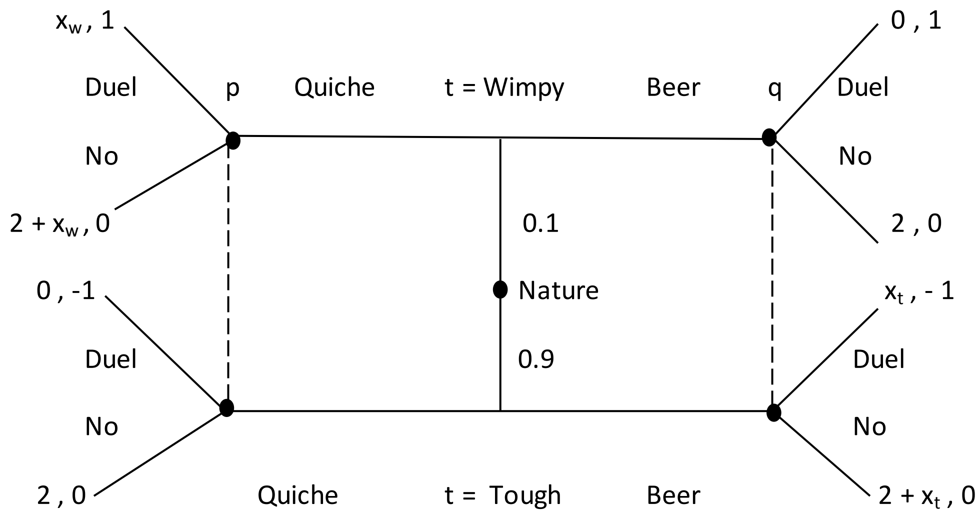
   (c) Now consider the game $G(2)$, which consists of the stage game G repeated two times. Assume that players discount period-2 payoffs with factor $\delta \geq 1/2$. Define the average payoff of player $i \in \{1,2\}$ in $G(2)$ as $(\pi_{i,1} + \pi_{i,2})/(1+\delta)$, where $\pi_{i,t}$ refers to player i's payoff in period t.

   Find one pure strategy Subgame Perfect Nash Equilibrium (SPNE) where *both* players earn an average payoff that is strictly higher than their payoff in $e(1)$. (NOTE: make sure to consider deviations in any subgame). Denote the equilibrium strategy profile you found by $e(2)$.

   (d) Now consider the game $G(\infty)$, which consists of the stage game G repeated infinitely many times. Continue to assume that players discount future payoffs with factor $\delta \geq 1/2$. Define the average payoff of player $i \in \{1,2\}$ as $(\sum_{t=1}^{\infty} \delta^{t-1}\pi_{i,t})(1-\delta)$, where $\pi_{i,t}$ refers to player i's payoff in period t.

   Find one pure strategy SPNE where *both* players earn an average payoff that is strictly higher than they earned in $e(2)$.

2. Consider the following signaling game. At each terminal node, the first number refers to the payoff of the Sender, and the second number refers to the payoff of the Receiver.



In words, the Sender must decide what to have for breakfast: quiche or beer. The Sender is either wimpy or tough. All else being equal, a wimpy type prefers quiche over beer, where $x_w > 0$ captures the intensity of this preference. Similarly, the tough type prefers beer over quiche, where $x_t > 0$ captures the intensity of this preference. The values of x_t and x_w are common knowledge. The Receiver observes what the Sender has for breakfast, and must then decide whether to challenge him to a duel. The Receiver only benefits from challenging (i.e. he wins the duel) if the Sender is wimpy. The Sender never benefits from being challenged, regardless of his type.

(a) Suppose for this subquestion that $x_w = 1$ and $x_t = 1$. Does a separating PBE exist in this game (yes or no)?

(b) Explain for what values of $x_w > 0$ and $x_t > 0$ does a pooling PBE exist where both Sender types have beer, and find one such equilibrium. Explain for what values of $x_w > 0$ and $x_t > 0$ does a pooling PBE exist where both Sender types have quiche, and find one such equilibrium. Intuitively, why can the intensity of the Sender's preference over breakfast be important in a pooling equilibrium?

(c) Now suppose again that $x_w = 1$ and $x_t = 1$. Using your answers in part (a) and (b), and referring to Signaling Requirements 5 and 6, what equilibrium do you think is the most likely to be played? What will the Sender have for breakfast? Will the Receiver to end up challenging the Sender to a duel?

3. Two consumers are considering whether to buy a product that exhibits network effects. The payoff from buying depends on the choice of the other consumer. That is, for each consumer $i \in \{1, 2\}$, the payoff U_i from buying depends on three terms: the consumer's type, θ_i, which represents his intrinsic valuation of the product; a potential network payoff $\lambda > 0$, which consumer i only obtains if consumer $j \neq i$ also buys; and the price p. Specifically, buying yields $U_i = \theta_i + \lambda - p$ if consumer j also buys, or $U_i = \theta_i - p$ if consumer j does not. Not buying the product gives a payoff of zero. Each consumer's type is drawn from a uniform distribution on $[0, 1]$ and is private information. For all parts of this question, you can assume the following parameter values: $\lambda = 1/4$ and $p = 1/2$.

(a) Suppose consumers must simultaneously decide whether or not to buy, so the strategic situation they face can be seen as a static game of incomplete information. The Bayesian-Nash equilibrium of this game will be characterized by a threshold value of

$\theta \in (0, 1)$, which you can label as θ^*. What is the equilibrium probability that each consumer buys the product, in the Bayesian-Nash equilibrium of this game?

(b) Now consider the following modified situation. Consumer 1 is given the product for free. Consumer 2 knows this, and understands that his own payoff from buying is $U_2 = \theta_2 + \lambda - p$ for sure. Think of the strategic situation facing consumer 2 as a static game (with only one player). What is the equilibrium probability that consumer 2 buys the product, in the (Bayesian-Nash) equilibrium of this game? Briefly comment on any difference with your answer in part (a).

(c) One way to interpret part (a) is that the firm selling the product follows a 'standard' marketing approach, where it releases the product simultaneously to both consumers. One way to interpret part (b) is that the firm follows a 'seeding' marketing approach, giving away the product to one consumer for free, in the hopes of convincing the other consumer to buy. Given these interpretations, and using your answers in parts (a) and (b) to calculate firm revenues, argue whether a 'standard' or a 'seeding' approach is more profitable in this situation, and briefly explain why this is the case.