Written Exam at the Department of Economics summer 2017

Microeconomics III

Final Exam

August 23, 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 3 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	$2,2$	$0,1$	$0,3$
Player 1	B	$3,5$	$-1,3$	$2,4$
	C	$2,1$	$2,0$	$2,1$

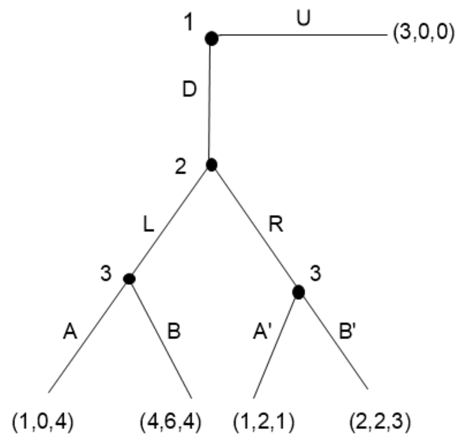
   (a) Show which strategies in G are eliminated by the procedure of 'Iterated Elimination of Strictly Dominated Strategies'.

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

   (c) Now consider the game $G(\infty)$, which consists of the stage game G repeated infinitely many times. Assume that players discount future payoffs with factor δ which is very close to one. 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.

   Describe, either graphically or in words, the set of average payoffs that can be achieved as part of an SPNE of $G(\infty)$ (*NOTE: here you should consider all possible SPNEs, but you do not need to explicitly solve for them*). Does an SPNE exist that gives an average payoff to both players that is at least as high as their payoff from e(1) in part (a)? If so, solve for such an SPNE.

2. Consider the following game:



   (a) Is it a dynamic or a static game? Is it a game of complete or incomplete information?

   (b) How many pure strategies does each player have to choose from? (*i.e. what is the cardinality of each player's strategy set?*)

   (c) Find all pure strategy Subgame Perfect Nash Equilibria (SPNE).

(d) Find one pure strategy Nash Equilibrium (NE) that is not subgame perfect.

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 either $\theta^L = 0$, $\theta^M = 2$, or $\theta^H = 5$, where each type is equally likely. Type is private information. For all parts of this question, you can assume the following parameter values: $\lambda = 3$ and $p = 9/2$.

   (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. Find the Bayes-Nash equilibrium of this game. (*HINT: do any types have a strictly dominant strategy*?).

   (b) Now consider the following modified situation. Consumer i moves first by deciding whether or not to buy the product. Consumer j observes the decision of consumer i, and then decides whether to buy the product herself. As a result, the strategic situation the consumers face can be seen as a dynamic game of incomplete information. Find the Perfect Bayesian equilibrium of this game.

   (c) One way to interpret part (a) is that the firm follows a 'sprinkler' marketing approach, where it launches the product simultaneously in multiple markets. One way to interpret part (b) is that the firm follows a 'waterfall' marketing approach, where it launches the product sequentially across markets. Given these interpretations, and using your answers in parts (a) and (b), argue whether a 'sprinkler' or a 'waterfall' approach is more profitable in this situation, and briefly give the intuition why this is the case.