Written Exam at the Department of Economics summer 2019

Microeconomics III

Final Exam

August 19, 2019

(2-hour closed book exam)

Answers only in English.

This exam question consists of 3 pages in total (including the current page)

Falling ill during the exam

If you fall ill during an examination at Peter Bangs Vej, you must:

- contact an invigilator who will show you how to register and submit a blank exam paper.
- leave the examination.
- contact your GP and submit a medical report to the Faculty of Social Sciences no later than five (5) days from the date of the exam.

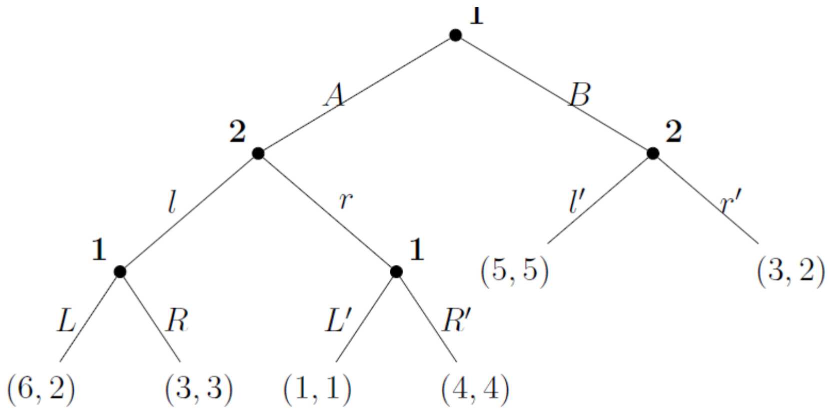
Be careful not to cheat at exams!

You cheat at an exam, if during the exam, you:

- Make use of exam aids that are not allowed
- Communicate with or otherwise receive help from other people
- Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text
- Use the ideas or thoughts of others without making use of source referencing, so it may appear to be your own idea or your thoughts
- Or if you otherwise violate the rules that apply to the exam

PLEASE ANSWER ALL QUESTIONS
PLEASE EXPLAIN YOUR ANSWERS

1. Consider the following game G, where the first payoff is that of player 1, the second payoff that of player 2:



   (a) How many proper subgames are there in G (excluding the game itself)? What are the strategy sets of the players?
   (b) Find all (pure strategy) Subgame-perfect Nash Equilibria in G.
   (c) Suppose now that we modify G, so that player 1 does not observe the move of player 2 when he moves the second time. That is to say, player 1 does not observe whether player 2 chooses l or r.
      i. Draw the resulting game tree for the modified game.
      ii. Is this game of perfect or imperfect information? How many proper subgames are there (excluding the game itself)? What are the strategy sets of the players?
      iii. Show that there is a Subgame-Perfect Nash Equilibrium of the modified game where player 1 has a payoff of 6. Discuss briefly how player 1 benefits from not being able to observe player 2's action (max. 3 sentences).

2. 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 that $\lambda < p < 1$.

   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.

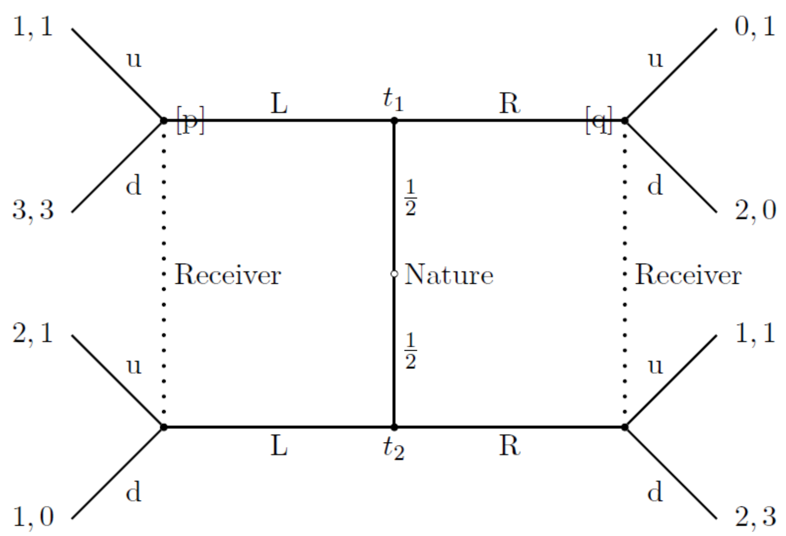
   (a) Argue, in words, why the Bayes-Nash equilibrium of this game must be characterized by a threshold value of type, which we can denote by θ^*. That is, why is it that in equilibrium, a consumer with a high type, $\theta \geq \theta^*$, will buy the product, but a consumer with a low type, $\theta < \theta^*$, will not?

(b) Suppose that consumer j's strategy is to buy the product if and only if $\theta_j \geq \theta^*$. Show that consumer i will find it optimal to buy, given consumer j's strategy, if and only if $\theta_i \geq p - \lambda(1 - \theta^*)$.

(c) Using your answer in part (b), solve for the value of θ^* in the Bayes-Nash equilibrium of this game. Explicitly write down the consumers' equilibrium strategies.

(d) Using your answer in part (c), show how a change in λ will affect the probability that consumers will buy the product. What is the intuition for this result?

3. Now consider the following game G':



(a) Is G' a repeated game? Briefly explain your answer.

(b) Find two pooling equilibria in G': one where both sender types play L, and another where both sender types play R. Do they satisfy Signaling Requirement 6 ('equilibrium domination')?

(c) Find all separating equilibria in G'.

(d) Which of the equilibria you found in parts (b) and (c) seems most reasonable? Explain your answer briefly using concepts from the course (2-3 sentences).