Written Exam at the Department of Economics winter 2019-20

Micro III

Final Exam

2 January 2020

(2-hour closed book exam)

Answers only in English.

This exam question consists of 3 pages in total

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

Exam

Autumn 2019

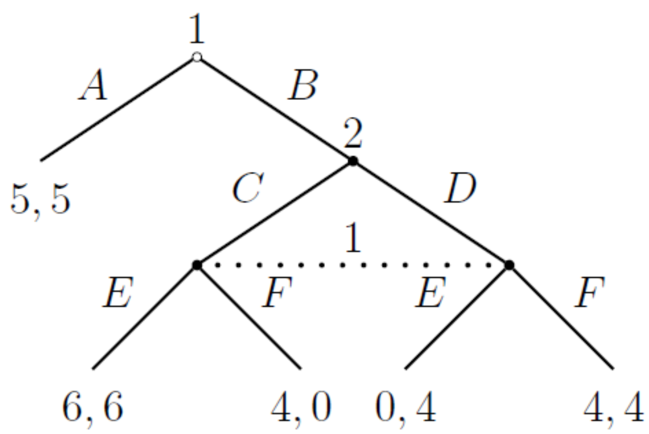
Important: Please make sure that you answer all questions and that you properly explain your answers. For each step write the general formula (where relevant) and explain what you do. Not only the numerical answer. If you make a calculation mistake in one of the earlier sub-questions, you can only get points for the following subquestions if the formula and the explanations are correct!

1. Short questions.
   (a) "You have taken a game theory class and have learned that the Nash Equilibrium of the Beauty Contest Game is to say 0. Now you have the chance to play the game in Berlingske with the Danish population." Should you say "0" to win the game? Explain in 2-3 sentences.
   (b) Two identical firms compete in quantity in a market. Explain the consequences of changing from the static game (Cournot) to the dynamic game (Stackelberg): who wins, who loses and why.
   (c) In a finitely repeated game one can always find a SPNE in which the payoffs are Pareto optimal. Is that statement true or false? Why?
   (d) Show how the phenomena of overfishing can be represented as a Prisoners' Dilemma. (hint: set up the game with two players, each of which can undertake low or high fishing activity). Explain your set-up and the Nash equilibrium.
   (e) Distinguish simultaneous-move games and dynamic games in terms of the types of information we have discussed in class. Explain why in dynamic games Nash equilibria may not be subgame perfect. Using examples, show how non-credible threats are ruled out using backward induction.

2. Find all Nash equilibria (pure and mixed) in the following game:

		P2 X	P2 Y	P2 Z
P1	A	$2,-1$	$4,2$	$2,0$
	B	$3,3$	$0,0$	$1,1$
	C	$1,2$	$2,8$	$5,1$

   (a) Have a look at the following game:



(b) Find all the pure-strategy Nash equililibira of this game.

(c) Which of these are sub-game perfect?

(d) Look at the SPNE and try to come up with an argument for why one of them should be eliminated. Remember, players believe that other players are rational. Past actions need to be rational and future actions need to be rational. Briefly explain your argument.

3. A first edition book by Kirkegaard is being auctioned off. The auction is held as a first-price sealed bid auction. Jens values the book at v1 and Mikkel at v2. Their values are distributed independently and identically distributed" with uniform distribution over [0, 1] $v_i, i = 1, 2$

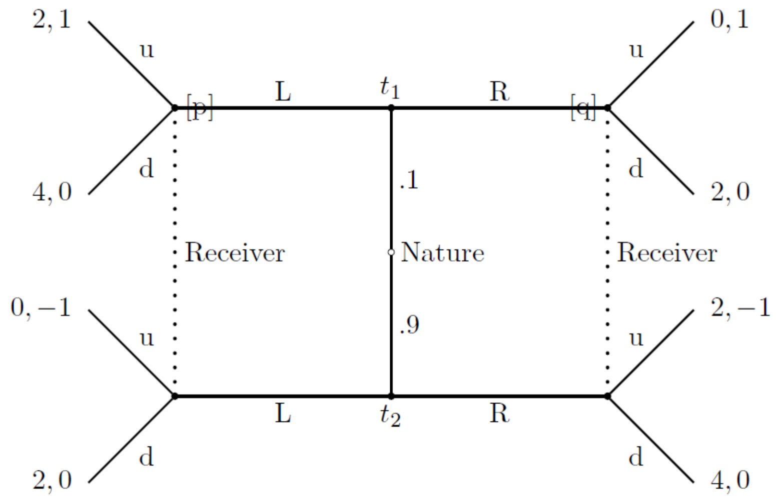
   (a) Assume that both bidders use linear strategies, i.e. $b_i(v_i) = a_i, v_i, i = 1, 2$, where a_i is a positive constant. Find the equilibrium bidding strategies (i.e. the values of $a_1; a_2$).

   (b) Now assume that the seller uses a descending auction format: the price goes down from one and the first buyer to stop it buys the object at this price. Find the equilibrium bidding strategies.

   (c) Now assume that Mikkel is entitled to buy at the price offered by Jens, i.e., Jens submits his bid of choice, say: b, and Mikkel either buys at this price or steps out (in which case Jens purchases the object at price b). Find optimal strategies for both players.

   (d) Compare the expected revenues obtained by the seller under point a) and c) Does the Revenue Equivalence Theorem result hold? If not, why not?

4. Consider the following game G':



   (a) Is G' a dynamic or a repeated game?

   (b) Find a separating equilibrium in G' , and find a pooling equilibrium where both sender types play L. Show the steps of how to get to the solution. Explain your process.

   (c) Describe a hypothetical real-world strategic situation that could correspond to G', and explain why this is the case (3-4 sentences).

   (d) Imagine now messages have no direct effect on payoff. Only sender type and action of the receiver matter. What do we call those types of games? What would need to change in the description of the game? You can draw a new game as an example.