Written Exam at the Department of Economics summer 2021 R

Micro III

Final Exam

11 August 2021

(2-hour closed book exam)

Answers only in English.

This exam question consists of 4 pages in total

Falling ill during the exam
If you fall ill during an examination at Peter Bangsvej, you must:

- 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:

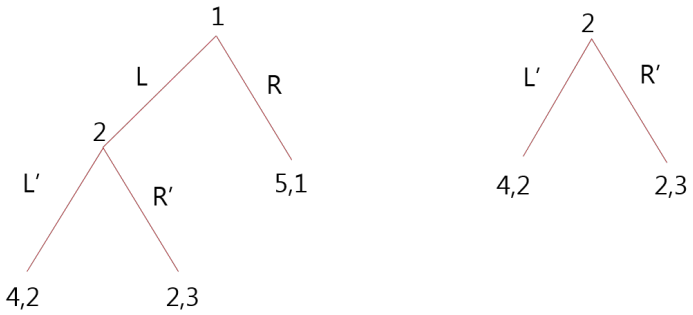
- Make use of exam aids that are not allowed
- Communicate with or otherwise receive help from other people
- Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text
- Use the ideas or thoughts of others without making use of source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

Re-Exam

Spring 2021

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!
60 points

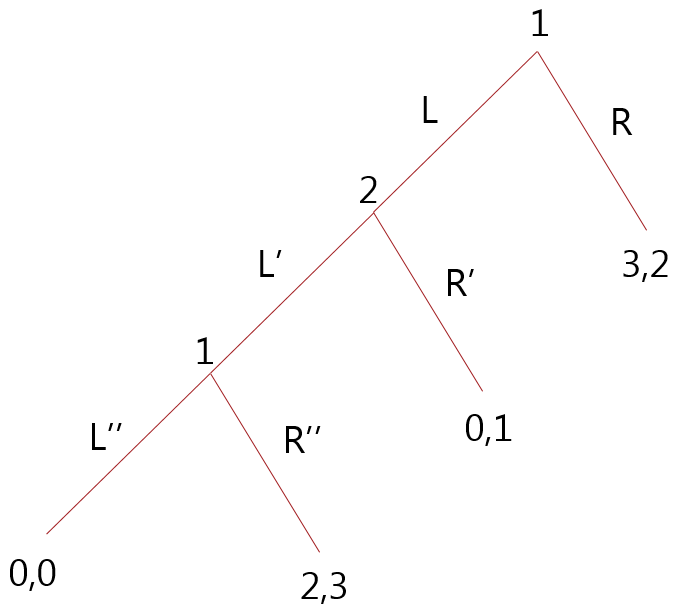
1. Short questions (10 points total)
   (a) What are the four criteria for something to be a costly signal (as for example, white shoes signaling wealth). (4 points)
   (b) Elisa and Sofie play a game called "Race to 100". Elisa goes first and then the two players take turn choosing numbers between 1 and 9. On each turn they add the new number to a running total. The player who brings the number to exactly 100 wins the game. If both players play optimally, who will win the game? Does this game have a first mover advantage? Explain your reasoning. (3 points)
   (c) In Lecture 12, we talked about that people don't always act in a payoff maximizing way. They might be maximizing utility, with part of their utility comining from their beliefs and the beliefs of others. Have a look at the following two games. a) What is the SPNE of each game if players only maximize their montary payoff? b) Now assume that each game is played by 100 people. Assume that the players have reciprocal preferences. They do not only care about their monetary payoff. They also care about reciprocity. In which game (left or right) should we empirically observe the higher share of player 2's choosing L', if they get to play? Explain in 2-3 sentences. (3 points)



2. Three buyers compete in a sealed-bid auction. Their valuations of the object are known to be distributed independently and uniformly on [0, 1]. It so happened that their actual values are v1 = .7; v2 = .2; v3 = .9, but everybody only knows her own value. Assume that bidders are risk-neutral. (9 points total)
   (a) Using the appropriate formulas determine what bids will be submitted, who will win the auction at which price and what will be the seller's revenue if the auction mechanism is:
      - first-price
      - second-price
      - second-price with reserve price .8 (reserve price=minimum price that the seller requires to give up the object)

(b) What problem can occur in real life auctions when the auction is a sealed-bid first price auction with common values? Why does this happen? Why would this not happen if the players played the BNE? 2-3 sentences.

3. Consider the following game written in extensive form (11 points total):



(a) Is this a game of complete or incomplete information? (1 point)

(b) Write down the strategy sets for Player 1 and Player 2, and find all pure strategy Subgame Perfect Nash Equilibria. (6 points)

(c) Find all pure strategy Nash equilibria of this game. (4 points)

4. Consider a two player game between FastBike and EasyBike. Each of them produces and sells electric bicycles. Each firm can set either a high or a low price for their standard model bicycle. If they both set a high price, each receives profits of \$64,000 per year. If one sets a low price and the other sets a high price, the low price firm earns profits of \$72,000 per year while the high-price firm earns \$20,000. If they both set a low price each firm receives profits of \$57,000. (22 total)

(a) Verify that this game has a prisoner's dilemma structure by looking at the ranking of the payoffs associated with the different strategy combinations. What are the equilibrium strategies and payoffs in the simultaneous-move game if the players make the price decisions only once? (6 points)

(b) If the firms decide to play this game for a fixed number of one-year periods, say for 4 years, what will each firm's total profit be at the end of the game (don't discount). Explain how you arrived at your answers. (4 points)

(c) Suppose that the firms play the game repeatedly forever. Let each of them use a grim strategy in which they both price high unless one of them defects, in which they price low for the rest of the game. What is the one time gain from defecting against an opponent playing such a strategy? How much does each firm lose, in each future period, after it defects once? If $\delta = 0.8$, will it be worthwhile for them to cooperate? Find the range of values for δ for which this strategy is able to sustain cooperation between the two firms. (5 points)

(d) Suppose the firms play this game repeatedly year after year, with neither expecting any change in their interaction. Surprisingly, the world ends after four years with neither

firm anticipating this. How is this situation different and how is it similar to c)? (3 points)

(e) Suppose now that there is a 10% probability that one of them will go bankrupt in any given year. If bankruptcy occurs, the repeated game between the firms end. Will this knowledge change the firms' actions when $\delta = 0.8$? What if the probability of a bankruptcy increases to 35% in any given year? (4 points)

5. Suppose electricians come in two types, competent and incompetent. Both types of electricians can get certified, but for the incompetent types, certification takes extra time and effort. Competent ones have to spend C months preparing for the certification exam. Incompetent ones take twice as long. Certified electricians can earn 100 (thousand DKK) each year working for professional contractors, uncertified ones can only earn 25 (thousand DKK) working freelance. Uncertified ones won't get hired by professional contractors. Each type of electrician gets a payoff of $\sqrt[S]{-M}$, where S is the salary measured in thousands of kroners and M is the number of months getting certified. What is the range of values of C for which a competent electrician will choose to use get certification to show his type, but an incompetent one will not? (Tip: No need to write a game tree to answer this) (8 points)