Written Exam at the Department of Economics summer 2020

Microeconomics III

Final Exam

23rd of June 2020

(2-hour open book exam)

Answers only in English.

This exam question consists of 4 pages in total

The paper must be uploaded as <u>one PDF document</u>. The PDF document must be named with exam number only (e.g. '127.pdf') and uploaded to Digital Exam.

This exam has been changed from a written Peter Bangsvej exam to a take-home exam with helping aids. Please read the following text carefully in order to avoid exam cheating.

Be careful not to cheat at exams!
You cheat at an exam, if you during the exam:

• Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text. This also applies to text from old grading instructions.
• Make your exam answers available for other students to use during the exam
• Communicate with or otherwise receive help from other people
• 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
• Use parts of a paper/exam answer that you have submitted before and received a passed grade for without making use of source referencing (self plagiarism)

You can read more about the rules on exam cheating on the study information pages in KUnet and in the common part of the curriculum section 4.12.

Exam cheating is always sanctioned with a warning and dispelling from the exam. In most cases, the student is also expelled from the university for one semester.

Exam

Spring 2020

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. Amalie, Bente and Cecilie live together during Corona lockdown. They know they will need to spend much time at home, so they want to make their balcony nice. If two of them contribute it will be a nice balcony. If only one of them contributes, it will look sad. There are four possible outcomes from each of their perspectives:

   1. The other two contribute and she doesn't: Payoff = 4
   2. She and one or both of the others contribute: Payoff = 3
   3. She doesn't contribute and only one or neither of the others: Payoff = 2
   4. She is the only one who contributes: Payoff = 1

   (a) Write up this game in a bimaxtrix with 3 players (hint: Amalie chooses the matrix). Find the Pure Strategy Nash Equilibria.

   (b) Draw this game as a dynamic game. Amalie goes first, then Bente, then Cecilie. It is not necessary to upload the drawing, but you might need to draw it for yourself to answer the following questions.

   (c) How many strategies does each of the players have in the dynamic game?

   (d) What is the SPNE outcome of the dynamic game? What actions will each of the girls take on the equilibrium path of the dynamic game?

   (e) Why do we need to specify which moves someone would take "off the equilibrium" path?

   (f) Consider your solution for d). What might change if we would model this as a psychological game and introduced reciprocity as a motivating factor for choosing an action. Do you think the outcome would be the same? Why? Why not? Explain in 2-3 sentences.

2. Danish society is playing the following stage game G during corona. We simplify the situation into a two player game. The actions are "S" (staying home) vs. "G" (going out). It is best to go out alone because you cannot get sick and everyone staying home is better than everyone going out. The game is repeated indefinitely. Every day is one period of the game. Everyone is impatient to get back out, so their discount factor is β with $0 < \beta < 1$.
   The following strategies are available for the two players:

   - "Go Out" = Always go out
   - "Stay in" = Always stay in
   - "Trigger" = Stay in until the other one goes out and then always go out
   - "Tit for Tat" = Start by staying in. After that play what the other one played in the previous round.

   The Stage Game G:

Society

		S	G
You	S	$2, 2$	$-1, 3$
	G	$3, -1$	$0, 0$

(a) Calculate the payoffs for the strategy profiles (Tit for tat, Tit for tat) and (Trigger, Trigger)

(b) Show that neither (Go out, tit for tat) nor (Go out, Trigger) are SPNE. Explain briefly.

(c) Show that (Go out, go out) is a SPNE. Explain briefly.

(d) Show that (Stay in, stay in) is not a SPNE. Explain briefly.

(e) For which value of β is (Trigger, Trigger) a SPNE?

(f) If the lockdown was announced to last exactly 14 days, what would be the unique SPNE of the game? Write a short proof for your answer.

3. In the height of the pandemic there were several bottles of hand sanitizer up for auction on auction sites such as eBay.

(a) What is the benefit for the seller to sell the sanitizer in an auction vs. selling it with a fixed price? Explain briefly.

(b) Hand sanitizer can be argued to have "private value" or to have "common value". Define what these terms mean and then give one argument for why hand sanitizer should be treated as a private value good and one for why it should be treated as a common value good.

(c) eBay uses an ascending first price auction format with purely private values. Explain what a bidder i's best strategy would be in an ascending first price auction. How should the bidder determine his maximum bid be and when should he bid? Why? 4-5 sentences.

(d) How would the strategy be different in an ascending second price auction with purely private values? What should the maximum bid be and when should you bid? Why?4-5 sentences.

(e) What problem can occur in a sealed-bid first price auction with common values that is not a problem in a sealed-bid first price auction with private values? Why does this happen? 2-3 sentences.

4. Consider the following game G'. There are two types of senders. T1 has tested positve for Covid-19, T2 is healthy. The receiver has to decide whether to meet up with their sender friend after they talk on the phone. They either hear the friend coughing or not. The receiver is sad if they miss out on meeting their friend, but they are very happy when they avoid getting sick from Covid. The sender with Covid (T1) is very lonely and wants to meet their friend. Possible messages are: C (Cough) and D (Don't Cough). Possible actions for the receiver are: Avoid (a) and Meet (m).
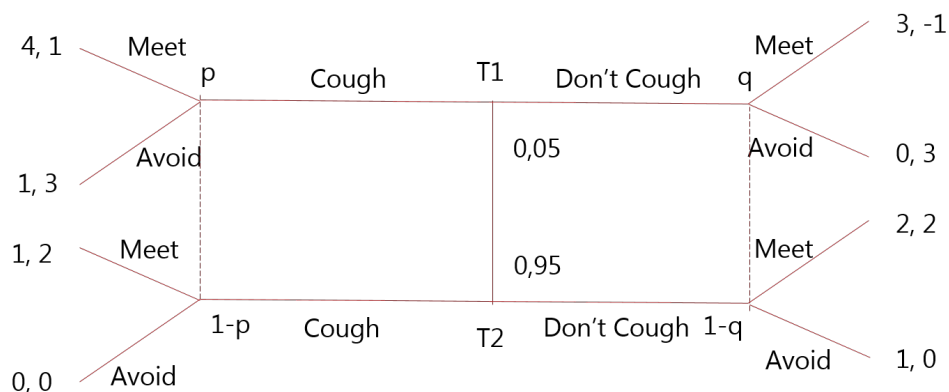
(a) Is G' a game of complete or incomplete information?

(b) Find a pooling equilibrium where both sender types play D. Show the steps of how to get to the solution. Explain your process.

(c) Show that there are no seperating equilibira. Which type wants to deviate?

(d) There is a sick and a healthy sender type. Explain intuitively, by interpreting the payoffs, why there are no separating equilibira in the case shown in the game. Explain intuitively (without showing it formally) how the payoffs of the sender would need to change in order for both sender types to prefer a separating strategy.

(e) Now imagine a situation where the sender says "I am not sick". This message is costless to send. What do we call these types of games?

(f) What are the three conditions that need to be fulfilled for this message to be effective? Explain what all three conditions mean in this Covid example.

5. In the UK at the beginning of the lockdown, there were some food shortages in the supermarkets. The supermarkets decided to design a policy that would allow older citizens to shop first. For the first hour of the day, only individuals over 65 were allowed to shop. What unintended consequence do you think could result from this policy. Suggest one possible fix to the problem you have mentioned.