

Written Exam at the Department of Economics summer 2021

Micro III

Final Exam

7 June 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 Bangs Vej, 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

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 total

1. Short questions (10 points total)

- In a bargaining game like the one we have seen in class the player with the higher discount factor is at an advantage. True or False. Explain in 2-3 sentences. (3 points)
- In a two-player matrix game, the process of iterated elimination of strictly dominated strategies will always lead to a pure-strategy Nash equilibrium. True or false? Explain in 2-3 sentences. Give an example. (4 points)
- In each of the following examples, do bidders have private values, common values or both? Explain your answer. In each case, imagine the object is auctioned off to Wall Street investors. (3 points)
 - Shares of a stock in Mystery Enterprises Agricultural Technologies (MEAT), a fictional biotech start-up that sells "Mystery Meat" under the tagline "There is no mystery - it tastes like beef".
 - A lifetime supply of Mystery Meat
 - A hamburger

2. Consider the following model of price competition. Firm 1 and 2 choose prices, $p_1 \leq 0$ and $p_2 \leq 0$ respectively. Total sales volume of firm $i = 1, 2$ is given by $q_i = 1 - p_i + p_j$, where j is the other firm's price. (If $1 - p_i + p_j < 0$, then the firm's sales are equal to zero.) Assume that the costs are equal to zero (which implies that the profit of firm i is equal to $p_i q_i$) and that both firms are profit maximizers. Firm 1 chooses p_1 without knowing p_2 but firm 2 has two options: (1) Choose p_2 without learning p_1 ; (2) Choose p_2 after learning p_1 . Which option is better for firm 2? (Assume that the option chosen by firm 2 becomes common knowledge before the firms set their prices.) (10 points)

3. Kim and Tim have to submit their homework assignment, but it is tedious to upload it to Absalon. Since they only need to upload one they hope that the other will do it. If both of them don't submit, they will fail the assignment. (13 points total)

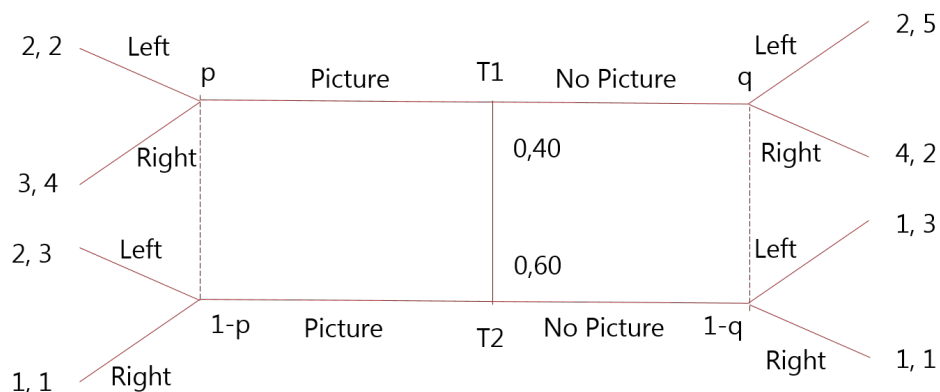
Game A:

		Tim	
		S	W
Kim	S	0, 0	-1, 1
	W	1, -1	-2, -2

Game B:

		Tim	
		S	W
Kim	S	0, 0	-1, 1
	W	1, -1	-10, -10

- (a) Find the pure and mixed Nash equilibria for game A. What are the probabilities that the players are mixing with? (3 points)
- (b) Because they have failed a previous assignment, not submitting the next one would lead to them not being able to take the exam. This new situation is modeled in Game B. What is the mixed strategy equilibrium in Game B? Do they play "Wait" more or less often than in Game A? (2 points)
- (c) What is the expected payoff for each player in the mixed strategy equilibrium in Game B? (2 points)
- (d) Kim and Tim have several courses together, so they play Game B repeatedly. They don't want to fail so they decide to alternate between the two pure strategy equilibria. Assuming they have to submit an even amount of assignments what is the average payoff to both of them? Is this better or worse than what they can expect from playing the mixed-strategy equilibrium? Why? (Players to not discount over time.) (3 points)
- (e) In the next semester Kim and Tim have forgotten which PSNE they played last time and neither of them realizes this until last minute. They both decide to throw a coin to decide whether to submit or not. What are the expected payoffs to Kim and Tim when they mix 50/50? How do these payoff compare with their expected payoffs when they play mixed strategies? Explain why these payoffs are the same or different from those in part c). (3 points)
4. Consider the following game between two sellers and a continuum of identical buyers. The sellers produce a homogenous good that the buyers value at v : The sellers contact the buyers by making simultaneously a price offer of p_i for each firm $i \in 1, 2$. The buyers observe the offers and buy from the seller with the lower price if that price does not exceed v : If the two prices are equal, then the market is equally split between the sellers. Find the pure strategy Nash equilibrium of this pricing game. Show how you get to the results by reasoning through your steps (proof). Tip: Think about the different types of prices each seller can charge and whether anyone has an incentive to deviate. (11 points)
5. Consider the following game G' . There are two types of senders on a popular dating app. T1 is a great cook, T2 only orders take-out. The receiver has to decide whether to swipe right on the sender after looking at their pictures. Some senders have pictures of themselves cooking in their fancy kitchen, some don't. The sender wants to score a date with the receiver. Possible messages are: P (Picture) and NP (No Picture). Possible actions for the receiver are: Swipe Left (L) and Swipe Right (R). (16 points total)



- (a) Is G' a game of complete or incomplete information? Is it a dynamic or a static game? (2 points)
- (b) Find a separating equilibrium where T1 plays P and T2 plays NP. Show the steps of how to get to the solution. Explain your process. (5 points)

- (c) Is there a pooling equilibrium on PP? Explain how you get to the solution. (5 points)
- (d) What if instead the sender writes "I love to cook". What do we call these types of games? (1 point)
- (e) What are the three conditions that need to be fulfilled for the message "I love to cook" to be effective and improve coordination? Explain what all three conditions mean in this dating example. (3 points)