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Course name:	Economic Strategic Thinking
Course code:	EC2109
Type of exam:	Main
Examiner:	Robert Östling
Number of credits:	7.5 ECTS
Date of exam:	March 20, 2019
Examination time:	9:00-12:00
Aids:	No aids are allowed.

Write your identification number on each answer sheet (the number stated in the upper right hand corner on your exam cover). Use the multiple question answer sheet for all questions in Part A and regular answer sheets for Part B, start each new question on a new answer sheet.

Explain notions/concepts and symbols. If you think that a question is vaguely formulated, specify the conditions used for solving it. Only legible exams will be marked.

The exam consists of 8 questions. Each question is worth 8 to 30 points, 100 points in total. For the grade E 45 points are required, for D 50 points, C 60 points, B 75 points and A 90 points.

Your results will be made available on your Ladok account (www.student.ladok.se) within 15 working days from the date of the examination.

Good luck!

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PART A: Multiple-choice questions

Indicate one alternative per question only. Correct answers give 8 points, incorrect answers minus 2 points.

QUESTION 1 (8 POINTS)

During the lecture about mixed strategies we played a game called the *lowest unique positive integer* (LUPI) game. If there are only two players and three numbers to choose from, the simultaneous-move LUPI game can be represented by the payoff table below. What is true about the Nash equilibria (NE) of this two-player LUPI game?

		Player 2		
		1	2	3
Player 1	1	0,0	1,0	1,0
	2	0,1	0,0	1,0
	3	0,1	0,1	0,0

(A) The game only has a mixed-strategy NE.
(B) The game has a unique pure-strategy NE.
(C) The game has two pure-strategy NE.
(D) The game has three pure-strategy NE.
(E) The game has five pure-strategy NE.

QUESTION 2 (8 POINTS)

Suppose two hamburger restaurants, Bob's Burgers (BB) and McBob (MB), simultaneously choose how much to charge for a burger. Let BB's price be denoted p_{BB} and MB's price p_{MB}. Demand for BB's burgers is given by 240 – 4*p_{BB} + 2*p_{MB} and demand for MB's burgers is given by 240 – 4*p_{MB} + 2*p_{BB}. Suppose the marginal cost to produce a hamburger is zero so that the profit of each restaurant is simply the price multiplied by the demanded quantity. What price does the firms charge in the Nash equilibrium of this game (assuming both firms maximize profits)?

(A) 20
(B) 30
(C) 40
(D) 50
(E) None of the above alternatives.

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QUESTION 3 (8 POINTS)

In soccer it sometimes happens that players from different teams try to reach out for the ball at the same time with a risk of colliding if one of them does not back down. Suppose such a situation can be represented by the payoff table below. If both players back down, someone else will take the ball and it is equally likely to be someone else from either team that catches it, so we assume the payoff is 0 for both players. If one player runs for the ball, the one that runs for it earns 1 and the other loses 1. If both run for the ball, there is a risk that they are seriously injured, and they both lose 10. This game has two pure-strategy Nash equilibria and one mixed-strategy Nash equilibrium. What is the mixed-strategy Nash equilibrium of this game?

		Player 2	
		Run for the ball	Back down
Player 1	Run for the ball	-10,-10	1,-1
	Back down	-1,1	0,0

(A) Both players run for the ball with 10% probability.
(B) Both players run for the ball with 20% probability.
(C) Both players run for the ball with 50% probability.
(D) Both players run for the ball with 90% probability.
(E) This is a trick question, there is no mixed-strategy Nash equilibrium.

QUESTION 4 (8 POINTS)

In one class experiment we played a game called the weak-link game in which everybody chose an effort level 10, 20, 30, 40, 50, 60 or 70. The payoff was determined by the minimum effort level in the class and the own effort provided. Call the minimum effort among all players X. Then the payoff from providing effort E was given by:

$$10 + 2*X - E.$$

Now consider another game, the strongest-link game, in which the only change is that the maximum rather than the minimum effort determines the payoff. In other words, the payoff from providing E is given by the same formula as above, but X now denotes the maximum choice among all players (including your own). Which statement is true about the pure-strategy Nash equilibria (NE) of the strongest-link game?

(A) The strongest-link game has seven NE in which all provide the same effort.
(B) The strongest-link game does not have pure-strategy NE.
(C) The unique NE of the strongest-link game is for all players to choose 70.
(D) The unique NE of the strongest-link game is for all players to choose 10.
(E) None of the above alternatives is correct.

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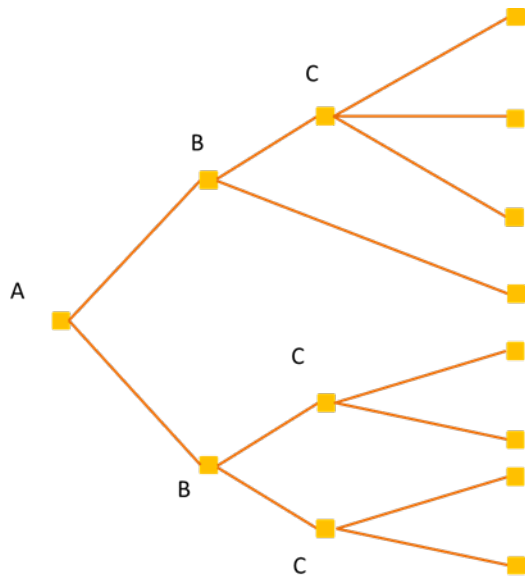
QUESTION 5 (8 POINTS)

Consider the following game tree with three players (A, B and C). How many strategies does player C have?



(A) 3
(B) 6
(C) 7
(D) 8
(E) 12

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PART B: Open-ended questions
Clearly motivate your answers to the following questions and explain any calculations that you make!

QUESTION 6 (30 POINTS)
Facebook currently has more than two billion active users. Over the years, several new social media platforms have tried to outcompete Facebook without much success. The most recent new competitor that there has been a lot of fuzz about is MeWe. MeWe is free to use, free of advertisements and guarantees your privacy by not sharing data with third parties, so it appears to be a superior product compared to Facebook. The only catch is that MeWe as of now only has a few million active users.

Suppose 2400 million people choose between using Facebook or MeWe. The utility from using MeWe is $2*m$ where m is the number of people (in millions) using MeWe. The utility from using Facebook is simply equal to the number of people (in millions) using Facebook, i.e. $2400 – m$.

(A) (7 POINTS) Draw a diagram showing the utility from using MeWe and Facebook as a function of the number of players using MeWe. Put the utility on the vertical axis and the number of players using MeWe, *m*, on the horizontal axes.
(B) (7 POINTS) Suppose all 2400 million people independently and simultaneously make a choice between Facebook and MeWe. What are the pure-strategy Nash equilibria of this game?
(C) (2 POINTS) Which of the equilibria is socially optimal?
(D) (7 POINTS) Which equilibrium do you think is most likely to prevail if you imagine that all current user accounts were deleted and all 2400 million people would have to make a renewed choice between Facebook and MeWe? Which equilibrium would you consider least likely?
(E) (7 POINTS) The founder and CEO of MeWe, Mark Weinstein, claims that the number MeWe users grew by 400% during 2018 and he is very optimistic about continued growth. Do you think his optimism is warranted in light of the analysis above? Can you think of any advice you would give to him based on the analysis above?

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QUESTION 7 (6 POINTS + 1 BONUS POINT)
(A) (1 BONUS POINT) You can now make a choice between Facebook and MeWe. If at least 90% of the students that answer this question on the exam answer Facebook and you do so as well, you receive 0.5 bonus point. If at least 90% of the students that answer this question on the exam chooses MeWe and you also choose MeWe you get 1 bonus point. What do you choose?

(B) (6 POINTS) Motivate your answer to part A of this question.

QUESTION 8 (24 POINTS)
Some collective actions problems are coordination problems whereas other are cooperation problems. First define the distinction between cooperation and coordination problems and then discuss whether the following three situations primarily are problems of coordination or cooperation. For each of the three examples, provide at least one argument for why it is a problem of coordination and one for why it is a problem of cooperation.

1. An old couple that regularly give each other gifts although they would be both be better off if they never bought any gifts.

2. Students that regularly come a few minutes late to class so that the teacher always must start a few minutes late.

3. People spend time and money using make-up although it might be better if everybody stopped using make-up.