Stockholm University

Department of Economics

Course name:	**Economic Strategic Thinking**
Course code:	**EC2109**
Type of exam:	**RETAKE**
Examiner:	**Robert Östling**
Number of credits:	**7,5 credits**
Date of exam:	**Sunday 19 April 2015**
Examination time:	**3 hours (9:00-12:00)**

Write your identification number on each paper and cover sheet (the number stated in the upper right hand corner on your exam cover).

Use one cover sheet for all questions in Part A and one cover sheet per question in Part B. 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. **No aids are allowed.**

The exam consists of 8 questions. Each question is worth 5 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 “My Studies” account **(**www.mitt.su.se) on Friday 8 May 2015 at the latest.

Good luck!

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)

Cass and Louie is an old married couple that every year has to independently decide whether they should buy Christmas gifts to each other. If one of them is not buying a gift, it is tempting to impress the other and buy a gift nevertheless (although this is very embarrassing for the one of them that did not buy a gift). However, since gifts are expensive and it is difficult to find gifts the other really wants, they both prefer if none of them buy a gift. Cass and Louie's payoffs are represented by the payoff matrix below. Suppose they play the simultaneous-move game below infinitely many times. What is the highest effective rate of return, *R*, that is required for it to be a subgame perfect Nash equilibrium not to buy gifts? We only consider "grim trigger" strategies, i.e. no-gift play supported by a threat that both will buy gifts forever after if somebody bought a gift at one point in time.

		Louie	
		No gift	Buy a gift
Cass	No gift	2, 2	-2,4
	Buy a gift	4,-2	1,1

(A) *R* cannot be larger than 12.5 percent.
(B) *R* cannot be larger than 25 percent.
(C) *R* cannot be larger than 50 percent.
(D) It is never a subgame perfect Nash equilibrium for positive values of *R*.
(E) It is a subgame perfect Nash equilibrium irrespective of what *R* is.

QUESTION 2 (8 POINTS)

Consider the two-player simultaneous-move game shown below where $X < 3$. Assuming play of the unique Nash equilibrium, by how much does the probability that Player 2 plays A change when *X* increases from 1 to 2?

		Player 2	
		A	B
Player 1	A	X,1	3,0
	B	3,0	1,1

(A) Does not change.
(B) Increases by 25 percentage points.
(C) Increases by 16.7 percentage points.
(D) Increases by 12.5 percentage points.
(E) Decreases by 12.5 percentage points.

QUESTION 3 (8 POINTS)

Consider the following two-player simultaneous-move game. How many pure strategy Nash equilibria does the game have and which are these equilibria?

		Column			
		W	X	Y	Z
Row	A	73,73	20,20	4,9	0,90
	B	60,50	87,70	14,10	0,73
	C	7,10	17,17	50,20	5,6
	D	20,20	87,3	1,2	0,99
	E	19,2	19,5	200,0	7,5

(A) Two pure strategy Nash equilibria: (A,W) and (B,X).
(B) Three pure strategy Nash equilibria: (A,W), (B,X) and (E,Z).
(C) The unique Nash equilibrium is (E,Z).
(D) The unique Nash equilibrium is (A,W).
(E) None of the above alternatives.

QUESTION 4 (8 POINTS)

Suppose there are two gold miners, Sasha and Mickey, who want to mine gold on two neighbouring plots of land. If they start mining this year, the total production of gold will be 6000 pounds of gold, but then it will not be possible to extract gold on any of the two plots in the future. If both of them instead wait until next year and undertake a proper geological investigation before mining, the total production will be 10000 pounds of gold. If they both mine gold in the same year, they get an equal share of the total production. Assuming that Sasha and Mickey want to maximize gold production and that a pound of gold is as valuable today as tomorrow, what is the subgame perfect Nash equilibrium (SPNE) of this game? We restrict attention to pure strategies only and the payoffs are summarized in the tables below.

Year 1

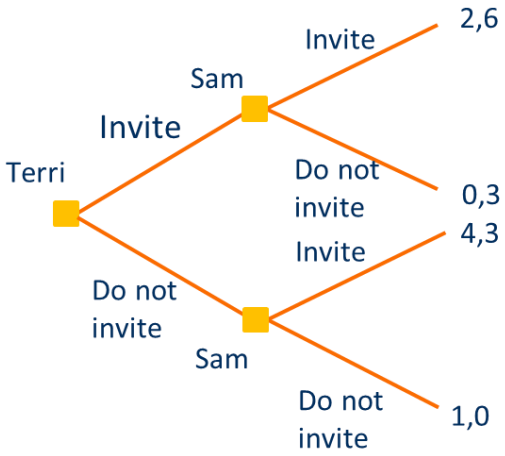
		Mickey	
		Mine gold	Wait
Sasha	Mine gold	3000,3000	6000,0
	Wait	0,6000	See table below

Year 2 (if both decided to wait)

		Mickey	
		Mine gold	Do not mine
Sasha	Mine gold	5000,5000	10000,0
	Do not mine	0,10000	0,0

(A) There are two SPNE: Either they both mine in year 1 or both in year 2.
(B) There are two SPNE in which one mines in year 1 and the other in year 2.
(C) The unique SPNE is that they both mine gold in year 1.
(D) The unique SPNE is that they both mine gold in year 2.
(E) The unique SPNE is that they do not mine gold at all.

QUESTION 5 (8 POINTS)
Terri is considering whether to invite Sam to a party. Terri prefers not to invite Sam, but would like to be invited to Sam's next party. Sam on the other hand both want to go to Terri's party and to invite Terri. The sequential game of this situation is shown in the game tree below.



Which statement is true about subgame perfect Nash equilibria (SPNE) and Nash equilibria (NE) of the game above? (Hint: To find the Nash equilibria, write the game in normal form with one row/column for each strategy of the sequential game and then find the Nash equilibria.)

(A) The game has one SPNE and two NE.
(B) The game has a unique NE which is subgame perfect.
(C) The game has one SPNE and three NE.
(D) The game has two NE, both of which are subgame perfect.
(E) The game has three NE, all of which are subgame perfect.

PART B: Open-ended questions

Clearly motivate your answers to the following questions and explain any calculations that you make!

QUESTION 6 (24 POINTS)

Consider a town with two plumbers, Pat and Ronni, who are considering what hourly rate their respective plumbing companies should charge in the coming year. If they charge a high rate, the profit is 25 SEK per hour whereas the low price only gives an hourly profit of 20 SEK. Each plumber has a contract with a local insurance firm that guarantees that they each get 1,000 hours of work irrespectively of what rate they charge. In addition, the total floating demand for plumbers in the city is 2,000 hours, all of which will go to the plumber that charges the lowest price. If they both charge the same price, they get to provide 1,000 hours each (in addition to the 1,000 hours from the insurance company).

(A) (6 POINTS) Draw the payoff matrix for the simultaneous-move price-setting game and determine the Nash equilibrium.

(B) (6 POINTS) Explain why the game in (A) is a Prisoners' Dilemma game.

(C) (6 POINTS) Now suppose Pat has a contract with the insurance company of 5,000 (rather than 1,000) hours. Profit margins and the floating demand remain the same. Draw the payoff matrix for this game and find the Nash equilibrium. Is this game still a Prisoners' Dilemma game?

(D) (6 POINTS) How does the existence of a Pat's larger contract with the insurance company solve the dilemma? Relate your answer to other examples where similar resolutions of social dilemmas are plausible.

QUESTION 7 (6 POINTS)

Many people seem to have strong preferences whether to use Apple computers or Windows-based computers. In some circumstances, for example when working together in a firm, people are forced to agree on using Apple or Windows-based computers.

(A) (1 POINTS) Please choose Apple or Windows. If you make the same choice as the majority of students taking this exam, you get 1 point, otherwise you get zero points.

(B) (5 POINTS) Motivate your answer to part (A).

QUESTION 8 (30 POINTS)

(A) (15 POINTS) Provide two different 2x2 simultaneous-move games to illustrate the distinction between coordination and cooperation in collective action problems.

(B) (15 POINTS) 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. University students that regularly come a few minutes late to class so that the teacher always has to 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.