Stockholm University

Department of Economics

Course name:	**Economic Strategic Thinking**
Course code:	**EC2109**
Type of exam:	**REGULAR**
Examiner:	**Robert Östling**
Number of credits:	**7.5 credits**
Date of exam:	**Sunday 17 March 2013**
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, answer it on a multiple choice form, 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 6 to 25 points, 100 points in total. Credits from the home assignments and class experiment will be added to your exam score. For 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 April 5 2013 at the latest.

Good luck!

PART A: Multiple-choice questions

Indicate one alternative per question only. Correct answers give 6 points, incorrect answers minus 1 point.

QUESTION 1 (6 POINTS)

A child is at a friend's place and is asked by the friend whether she would like fruit or ice-cream as an afternoon snack. At the same time, the kid's parent is at home preparing dinner. The parent prefers pizza over a fish dish (utility 5 vs 4) if the child had fruit to eat in the afternoon. However, if the kid had ice cream in the afternoon, the parent feels terrible giving the child pizza for dinner (too much unhealthy food in a day) and suffers a utility cost of 4. The kid's utility from eating pizza is 5 and fish gives -3. Ice-cream gives the utility 5 whereas fruit gives 3. These utilities are summarized in the following game matrix.

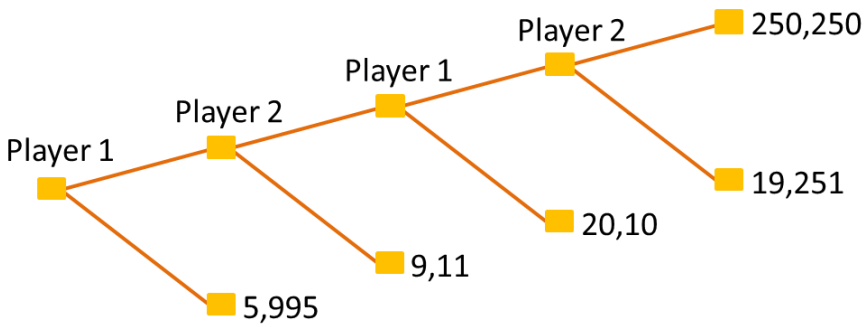
		Parent	
		Pizza	Fish
Child	Fruit	8,5	0,4
	Ice cream	10,1	2,4

Comparing the pure-strategy Nash equilibrium when they choose actions simultaneously to the subgame perfect Nash equilibrium when one gets to choose first (and this is observed by the other), which of the following statements are true about move-order advantages?

(A) Both the parent and child gain when the child moves first.
(B) Both the parent and child gain when the parent moves first.
(C) Only the child gains when the child moves first.
(D) Only the parent gains when the child moves first.
(E) The order of moves is irrelevant.

QUESTION 2 (6 POINTS)

What is the sum of both players' payoffs in the subgame perfect Nash equilibrium of the following game? Payoffs are denoted as usual, i.e. "X,Y" means X to Player 1 and Y to Player 2.



(A) 1000
(B) 500
(C) 270
(D) 30
(E) 20

QUESTION 3 (6 POINTS)
Consider two students, Anna and Benny, who recently took a course in game theory together. After several days of intense preparation for the exam, Anna and Benny decided to go and see a movie together. Anna is a big fan of Bruce Willis and prefers to go to *A Good Day to Die Hard*, whereas Benny prefers to see the Swedish documentary *Searching for Sugar Man*. However, they strongly prefer seeing a movie together to seeing their favourite movie alone. Their payoffs (in utilities) are described in the matrix below. Anna and Benny have completely forgotten about pure strategies, but remember that their teacher told them that this game has a mixed strategy Nash equilibrium. Since their teacher had not taught them at all what people actually do when they play games, they both believed it would be a good idea to play according to the mixed strategy Nash equilibrium and decided to play accordingly. What is the probability that Anna and Benny end up in the worst possible outcome, i.e. when Anna goes to see the documentary and Benny watches the action movie?

		Benny	
		Die Hard	Sugar Man
Anna	Die Hard	30,10	0,0
	Sugar Man	-10,-10	10,30

(A) 64 percent
(B) 24 percent
(C) 16 percent
(D) 4 percent
(E) None of the above alternatives

QUESTION 4 (6 POINTS)
Consider the following three-player game where each player simultaneously chooses A or B. What strategy profiles are pure-strategy Nash equilibria of this game? Payoffs and strategy profiles are denoted as usual, i.e. "X,Y,Z" means X to Player 1, Y to Player 2 and Z to Player 3.

Player 3 plays A

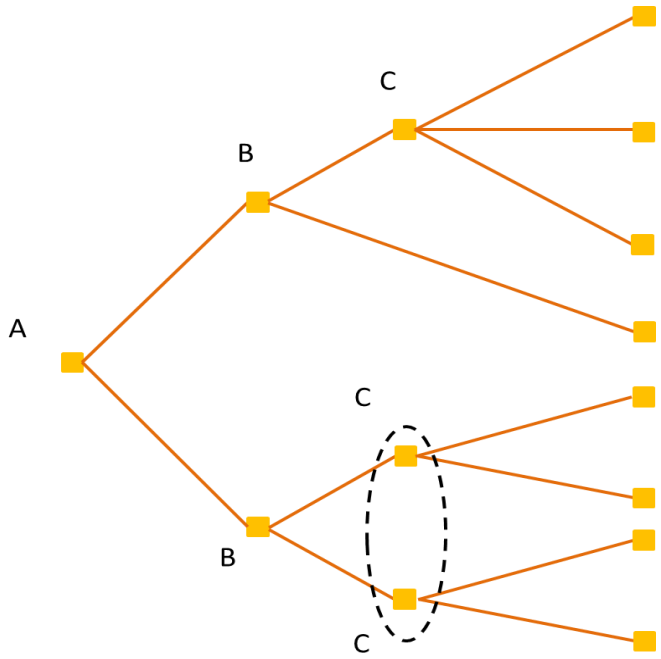
		Player 2	
		A	B
Player 1	A	70,70,70	10,10,23
	B	60,0,0	60,65,10

Player 3 plays B

		Player 2	
		A	B
Player 1	A	70,70,60	10,20,0
	B	80,50,30	60,55,5

(A) (A,A,A) and (B,B,A)
(B) (B,B,B) and (B,B,A)
(C) (A,A,A) and (A,A,B)
(D) (A,A,A), (B,B,A) and (B,B,B)
(E) None of the above alternatives

QUESTION 5 (6 POINTS)
Consider the following sequential game. How many strategies does player C have in this game?



(A) 3
(B) 6
(C) 7
(D) 12
(E) None of the above alternatives

PART B: Open-ended questions

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

QUESTION 6 (20 POINTS)
The CEO of Econ Thinking Inc. recently hired two IT professionals, but unfortunately she did not realize that the IT professionals' communication skills are severely impaired. The two IT professionals are supposed to build up a new IT environment at the company and have to decide whether to buy PC:s and run Microsoft Windows, a free Linux-based operating system or the new Google Chrome OS. As a final and fourth option they are also considering to buy macs and run Apple's OS X instead. Because the two employees cannot communicate, it is as if they take decisions simultaneously and independently of each other. If both choose the same platform, they get to keep their jobs and get a positive payoff. If they choose different platforms, they lose their jobs and get zero payoff.

(A) (8 POINTS) Write down the payoff matrix of the simultaneous-move game between the two IT professionals and find all pure-strategy Nash equilibria of the game.

(B) (8 POINTS) Discuss why focal points are important in a game like this and what you think might be reasonable focal points in this situation (provide at least three examples). Feel free to add any contextual details that you need to answer the question, but state those extra assumptions clearly.

(C) (1 POINT) Now suppose that you and everybody else taking this exam have to make a decision between Windows, Linux, Chrome and OS X. If you pick the same operating system as the majority of the students taking this exam (including you), you get one point for this question, whereas you get zero otherwise.

(D) (3 POINTS) Briefly motivate your answer to part (C).

QUESTION 7 (25 POINTS)
Bob and Francisco both worry that they will not meet the requirement for tenure at Stockholm University. Instead of trying to get a job at a less prestigious university, they are both considering to start factories that produce a herbal drink that is claimed to have some (non-verifiable) health benefits. They first take simultaneous and independent decisions whether to start a factory or not. When they have started the factory (if they do so), they set production quantities to maximize their respective profits. If they do not start a factory, they earn zero profit. (By the way, Bob and Francisco have broken up and no longer talk to each other and therefore make independent decisions.)

Bob's profit function when Bob produces Q_B units is $\Pi_B = P \times Q_B - 10 \times Q_B$ and Francisco's profit when producing Q_F units is $\Pi_F = P \times Q_F - 10 \times Q_F$. The price of the herbal drink when they produce Q_B and Q_F units is $P = 70 - Q_B - Q_F$.

(A) (5 POINTS) Suppose that both Bob and Francisco started factories. Find the Nash equilibrium quantities assuming that they only care about maximizing their own profits.

(B) (5 POINTS) Now suppose that only Bob started a factory. Find the quantity that maximizes his profits.

(C) (5 POINTS) Find the subgame perfect Nash equilibrium of the full game between Bob and Francisco, i.e. their independent investment decisions followed by the choice of quantity (after observing whether the other invested). Assume that there is no cost of starting a factory and that both Bob and Francisco only care about getting as high a profit as possible.

(D) (5 POINTS) Suppose that Bob makes a commitment to start his business before Francisco makes up his mind. What is the subgame perfect Nash equilibrium if Bob's commitment is successful?

(E) (5 POINTS) What advice would you give to Bob in this situation? Which strategic move should he make to improve relative to the subgame perfect Nash equilibrium in (C) and how can he make that move credible? Provide at least two good suggestions!

QUESTION 8 (25 POINTS)
Critically discuss the following argument in light of what you have learned during the course. In particular, discuss whether you see this as a problem of cooperation or coordination and what could be done to solve it (if it is a problem).

"A lot of people spend time and money using make-up. It would be better for all if everybody stopped using make-up. People's relative attractiveness would be unchanged, but everybody would save time and money."