

UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Exam: **ECON4240 – Game theory and economics of information**

Date of exam: Friday, May 23, 2008

Grades will be given: Thursday, June 12

Time for exam: 2:30 p.m. – 5:30 p.m.

The problem set covers 3 pages

Resources allowed:

- No resources allowed

The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

The exam consists of six problems. They count as indicated. Start by reading through the whole exam, and make sure that you allocate time to answering questions you find easy. You can get a good grade even if there are parts of problems that you do not have time to solve.

Problem 1 (10 %)

Consider the following normal form game, where player 1 can choose among the strategies a, b, c and d, and player 2 can choose between the strategies e and f. Only player 1's payoff has been depicted, as player 2's payoffs do not matter for the questions posed.

	e	f
a	2, -	1, -
b	1, -	4, -
c	2, -	3, -
d	3, -	0, -

- Which strategy/ies for player 1 is/are strictly dominated? For each such strategy, specify how it is strictly dominated.
- Which strategy/ies for player 1 has/have the property of being a best response to some belief about the behavior of player 2. For each such strategy, specify a belief to which the strategy is a best response.

Problem 2 (10 %)

Consider the following normal form game

		Player 2		
		<i>L</i>	<i>C</i>	<i>R</i>
Player 1	<i>U</i>	3, 2	1, 4	4, 1
	<i>M</i>	2, 2	2, 1	2, 1
	<i>D</i>	3, 2	4, 1	1, 4

- a) Explain how you can determine the set of rationalizable strategies for each player. What strategies are rationalizable for each player?
- b) Determine all pure and mixed Nash equilibrium/a in this game.

Problem 3 (20 %)

Consider the following two normal form games. Assume that only player 1 knows which game is being played, while player 2 thinks that the two games are equally likely.

		Game 1				Game 2	
		<i>L</i>	<i>R</i>			<i>L</i>	<i>R</i>
<i>U</i>	0, 0	4, 2			<i>U'</i>	0, 2	0, 0
<i>D</i>	2, 6	0, 8			<i>D'</i>	2, 0	2, 2

- a) Model this situation in an ex ante perspective by specifying the Bayesian normal form.
- b) For the Bayesian normal form found in part a), determine a Nash equilibrium. Is there more than one Nash equilibrium?

Problem 4 (20 %)

Consider again the strategic situation described in Problem 3, where only player 1 knows which game is being played, while player 2 thinks that the two games are equally likely.

- a) (*Screening*) Assume now that player 2 acts before player 1, and that 2's choice can be observed by 1 before he makes his choice. Show that there is a unique subgame perfect Nash equilibrium.
- b) (*Signaling*) Assume now that player 1 acts before player 2, and that 1's choice can be observed by 2 before she makes her choice. Show that there is a unique separating perfect Bayesian equilibrium. (Is there a pooling equilibrium?)

Problem 5 (30%)

A research institute owns a large body of text in an exotic language, and wants at least parts of it translated. There is only one competent translator available, who could be either slow, translating one page per hour, or fast, translating two pages per hour. In any case, the reservation wage, that is, the lowest wage at which the translator is willing to take the job, is 100 kr an hour.

- a) Believing that she can observe whether the translator is slow or fast, the institute director decides that if the translator is slow, she wants 50 pages translated, paying 5000 kr, but if the translator is fast, she wants 80 pages translated, paying only 4000 kr. Explain why these decisions are reasonable.
- b) It turns out that the director cannot observe whether the translator is fast or slow. After having presented her decisions as described in part a), she asks the translator whether he is slow or fast. What will he answer? Is the answer credible?
- c) The director decides to redo the calculation and offer a different contract menu to the translator. Describe the form this menu will take. Will the director ask for more or less pages from each type? Explain informally how the payments will be determined?

Problem 6 (10%)

Define and describe

- a) the revelation principle,
- b) Nash implementation.