

Multi-Agent Systems

Vakcode : INFOMAS Date : 1 February 2012 Tijd : 17:00-20:00

There are five questions resulting in 10 points in total. Each question can have 2 points.

Question 1

- (a) Give a 2×2 strategic normal-form game which has one Nash equilibrium that is not a Pareto efficient outcome.
- (b) Consider the following game with players A (row) and B (column). The outcome $1 \setminus -1$ means A 's payoff is 1 and B 's payoff is -1.

A \ B	L	R
U	1 \ -1	3 \ 0
D	4 \ 2	0 \ -1

Give the mixed strategy equilibrium of this game (we assume that the mixed strategy assigns positive, non-zero values to strategies L , R , U , and D). What is the expected utility of players A and B for this mixed strategy equilibrium?

Question 2

- (a) Describe the English auction in terms of bidding, clearing, and information rules?
- (b) Does the bidder in the first price sealed auction have a dominant strategy? If yes, which strategy? If no, explain why.

Question 3

Let $N = \{1, 2\}$ be the set of (two) players, $O = \{a, b, c\}$ be the set of candidates (outcomes), and $P = \{b \leq_i a \leq_i c, c \leq_i a \leq_i b\}$ be the set of possible preferences for both players $i \in \{1, 2\}$. Design a non-trivial social choice function for which there is a direct mechanism that truthfully implements it in Nash equilibrium. A non-trivial social choice function is considered as an onto function, i.e., a function that uses all elements in its range O .

Question 4

- (a) Apply the iterated elimination of dominated strategies procedure to the following game and determine the Nash equilibrium of the resulted game.

A \ B	α_1	α_2	α_3
β_1	3, 1	0, 0	0, 0
β_1	1, 1	1, 2	5, 1
β_1	2, 1	4, 0	0, 0

- (b) Give a two players game and show that the order of elimination of dominated strategies is essential for the final game.
- (c) Explain the iterated elimination procedure for strongly dominated strategies. What is the difference between iterated elimination procedures for weakly and strongly dominated strategies?

Question 5 Consider the following voting scenario.

130	120	100	150
a	d	d	c
b	b	b	b
c	c	a	a
d	a	c	d

- Give the winners according to the plurality, majority, Condorcet, and Borda voting systems.
- Which candidate is the winner according to the method of Plurality with Elimination?
- Investigate whether different comparison orders of the candidates result in different winners using the pairwise elimination method.
- Are these preferences single-peaked? Explain your answer.