Problem Set 3

The **due date** for this homework is **Mon 4 Feb 2013 8:59 AM CET**.

Question 1

Iterated removal of strictly dominated strategies

Normal	1/2	1/2	1
1 \ 2	L	M	R
U	3,8	2,0	1,2
~~D~~	0,0	1,7	8,2

1. playing L and M with 1/2 and 1/2 → (4, 3.5) dominates R
2. D is dominated by U
3. M is dominated by L ⇒ (U, L)

We say that a game is *dominance solvable*, if iterative deletion of strictly dominated strategies yields a unique outcome. True or false: Is the previous game dominance solvable? Consider both pure strategies and mixed strategies.

✓ a) True;

○ b) False.

Question 2

1 \ 2	L	M	R
U	4,3	3,5	3,5
D	3,4	5,3	3,4

↑ different

Iterated removal of weakly dominated strategies

In order to illustrate the problem that arises when iteratively eliminating **weakly** dominated strategies, consider the following game:

Normal			
1 \ 2	L	M	R
U	4,3	3,5	3,5
~~D~~	3,4	5,3	3,4

1) M is weakly dominated by R
2) D is w.d by U
3.) L is w. dom by R

(U,R)

1) L is w. d. by R
2.) U is w.d by D
3) M is w.d by R

(D,R)

True or false: in the above game the order of elimination of **weakly** dominated strategies does not matter (that is, the final outcome is the same regardless of the order in which weakly dominated strategies are eliminated.). [Hint: start the process of iterative elimination of **weakly** dominated strategies by eliminating different strategies at the beginning of the process.]

- a) True;
- b) False. ✓

Question 3

$\text{Arg}\left(\max_{s_1' \in S_1} \min_{s_2 \in S_2} u_1(s_1', s_2)\right)$

Minimax

Consider the matching-pennies game:

1\ 2	Left	Right
Left	2,-2	-2,2
Right	-2,2	2,-2

Which is a maxmin strategy for player 1:

- a) Play Left.
- b) Play Right.
- c) Play Left and Right with probability 1/2. ✓
- d) It doesn't exist.

1 plays L: 1 gets 2 if 2 plays L
1 gets -2 if 2 plays R ← different!

1 plays R: 1 → -2 if 2 pl L
1 → 2 if 2 pl R

⇓

if pl 2 wants to min pl1 payoff it would play the ~~same~~ diff. value from pl1.

the only way to do this is to randomize (it's a sadde points)

Question 4

Minimax

Consider the matching-pennies game:

1\ 2	Left	Right
Left	2,-2	-2,2
Right	-2,2	2,-2

Apply the Minimax theorem presented in lecture 3-4 to find the payoff that any player must receive in any Nash Equilibrium:

the sadde point in the video is (0,0)

- a) 2;
- b) -2;
- c) 1;

d) 0.

Question 5

p=0,5 p=0,5

1 → play B

2 → play F

$2\cdot 0{,}5 + 1\cdot 0{,}5 = 1{,}5$

Correlated Equilibrium

1\ 2	B	F
B	2,1	0,0
F	0,0	1,2

Consider the following assignment device (for example a fair coin):

- With probability 1/2 it tells players 1 and 2 to play B, and with probability 1/2 it tells them to play F.
- Both players know that the device will follow this rule.

What is the expected payoff of each player when both players follow the recommendations made by the device? If one of players follows the recommendation, does the other player have an incentive to follow the recommendation as well?

- a) Expected payoff $= 2$; player has an incentive to follow the recommendation.
- b) Expected payoff $= 1$; player does not an incentive to follow the recommendation.
- c) Expected payoff $= 1.5$; player has an incentive to follow the recommendation. (noone wants to deviate) (otherwise it wouldn't be coordinated)
- d) Expected payoff $= 1.5$; player does not have an incentive to follow the recommendation.

payoff, P(Heads), P(tails)

$p = 2\cdot 0{,}5 + 1\cdot 0{,}5 = 1.5$

In accordance with the Honor Code, I certify that my answers here are my own work.

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