8104

Repeated games

Mid Term Exam, April 2006

Question 1

1. Define the concept of *correlated equilibrium*;

2. Find the set of correlated equilibria of the BoS:

	L	R
T	$4,1$	$0,0$
B	$0,0$	$1,6$

Question 2 Consider the *Coordination game* (CG):

	L	R
T	$3,3$	$0,0$
B	$0,0$	$1,1$

1. Determine the set of feasible and incentive compatible payoffs of the repeated game with discounting and with CG as stage game.

2. Characterize the set NEP for different δ

3. Is $SPEP = NEP$?

Question 3

1. Define the Nash equilibrium operator N^{δ} and prove that it is non-empty valued

2. Find a stage game for which the set of NEP is a singleton

8104

Repeated games

Final Exam, May 2006

Question 1. Consider a repeated game with discounting given by δ.

1. Define the operator SP^{δ}
2. Prove that the set of subgame perfect equilibrium payoffs is a fixed point of SP^{δ}

? **Question 2.** For the game:

	L	R
T	6, 1	0, 0
B	5, 5	1, 6

find:

1. The set of Nash equilibria
2. The set of correlated equilibria
3. The set of individually rational payoffs in the repeated game

Question 3. Consider a repeated game with imperfect monitoring, with $I = \{1, \ldots, n\}$ set of players, action set A^i for every player, Y set of public signals, and repeated game payoff given by

$$(1-\delta)\sum_{\tau=1}^{\infty} u^i(a^i_\tau, y_\tau)$$

In every period τ only y_τ is observed by all players. At the initial period (period 1) the value y_0 is known by all players. Suppose that the probability of the public signal at τ, y_τ, has the form:

$$P(a^1_\tau, \ldots, a^n_\tau, y_{\tau-1}, \cdot) \in \Delta(Y)$$

no autocorrelation, or is there autocorr?

The question asks you to extend the method we have used for repeated games to this situation. Specifically, please:

1. Define the set of Perfect Public Equilibrium Payoffs ($PPEP$) for this game
2. Characterize the set $PPEP$:-)
3. Define the operator of which $PPEP$ is fixed point

?

[illegible] → cont. values

Department of Economics, University of Minnesota
8104, Final Examination
Professor Aldo Rustichini

The rules of the exam. Some of the questions are long, and you may be unable to complete the answer. But I will give credits for partial work. However, please do not write empty statements.

Question 1

1. Define the map NE^{δ} from subsets of the set of feasible and incentive compatible payoffs to subsets of the same set, that we called the Nash equilibrium operator.
2. Prove that if A is a compact subset of the set of feasible and incentive compatible payoffs, then $NE^{\delta}(A)$ is also compact.
3. State clearly the property that a *self-generated* (by NE^{δ}) set enjoys.

Question 2

1. Define the set of correlated strategies and correlated equilibria for a finite game.
2. Prove that the set of correlated equilibrium payoffs is a convex set.
3. Compute the set of Nash and correlated equilibria for the following game:

	L	R
T	$(5,1)$	$(0,0)$
B	$(4,4)$	$(1,5)$

4. Compute the set of Nash equilibrium payoffs and Correlated equilibrium payoffs for the two players. A drawing here may be useful.
5. Explain why in a Repeated Game, even if players can only use mixed strategies, the set of correlated equilibrium payoffs is the relevant set to consider.

Question 3

1. Consider the stage game with two players:

	L	R
T	$(3,3)$	$(0,0)$
B	$(0,0)$	$(1,1)$

   Compute the set of feasible and incentive compatible payoffs. Indicate clearly the minimax values. Prove your statements.

2. Compute the worst Subgame Perfect equilibrium payoff for the Repeated Game with discount δ, for every value of $\delta \in (0,1)$
3. Compute the set of Subgame Perfect equilibrium payoffs for the Repeated Game with discount δ, for every value of $\delta \in (0,1)$.
4. Does the Folk theorem hold for this game?