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Fall 2008

Economics 208: Problem Set II
Due: November 5, 2007

1. Let G be an I-player game in which player i has n_i pure strategies. Think of G as an element of $\mathbf{R}^K$, where $K = In_1 \cdots n_I$. That is, the game is characterized by a payoff for each player and each pure strategy combination. Let $\mathcal{S}$ be the set of mixed strategy profiles. An equilibrium correspondence is a mapping $\mathcal{E} : \mathbf{R}^K \to \mathcal{S}$, that assigns to each game a set of equilibrium strategy profiles.

   (a) Show that the Nash equilibrium correspondence is upper-hemi continuous.

   (b) Show that the Trembling hand perfect equilibrium correspondence is not upper-hemi continuous.

   (c) Show that the Nash equilibrium correspondence is not lower hemi continuous.
   [For the last two parts you only need to supply an example.]

2. Trembling hand equilibria are, in a sense, Nash equilibria that are robust to a certain kind of perturbation. The previous problem demonstrates, however, that the trembling-hand equilibrium correspondence is not robust to some perturbations. As precisely as possible formulate the two different continuity results (definition of perfect equilibrium and upper hemi continuity of the Nash correspondence) and contrast them.

3. Consider the following game. First, player 1 decides whether to throw away d dollars ($d = 0$ or 2, that is player one can either throw about \$2 or throw away nothing). Then players 1 and 2 play:

	s_j^1	s_j^2
s_i^1	$5-d, 1$	$-d, 0$
s_i^2	$-d, 0$	$1-d, 5$

   (a) Find the Nash equilibria of the game.

   (b) Find the equilibria that survive iterative deletion of strictly dominated strategies.

   (c) Find the equilibria of the game assuming that are robust to all perturbations.

4. Return to problem 2 of the first problem set. Assume that bids must be either 0 or 100. For $N = 4$ and $N = 5$ characterize the symmetric mixed-strategy equilibria. In particular, when $N = 4$ prove that it is not an equilibrium for each agent to place probability .75 on 100.

5. Two litigants are involved in settlement bargaining. The first (defendant, D) must make a settlement offer (s) to the second (plaintiff, P). If P accepts s, her payoff is s and D receives $-s$. If P rejects, then the judge orders D to pay the true damages t to P. In addition, D incurs court costs c. Hence net payoffs are t and $-t-c$ for P and D respectively. The judge and D know t. P believes t is equally likely to be 0 or H (assume $H > c > 0$).

   Characterize the set of (Bayesian) Nash Equilibria of the game. If possible make a selection from the set of equilibria (clearly describe and justify your selection criteria – weak dominance, trembling hand perfection, etc).

   I think that the analysis is simpler when the set of possible settlement offers is the interval $[0, t]$, but you may assume that only a finite number of offers are permitted.

6. Given a game G, let $\underline{v}_i$ be the lowest Nash equilibrium payoff of player i and $\bar{v}_i$ the highest Nash equilibrium payoff of player i.

   (a) Is it possible for player i to receive a lower payoff in a correlated equilibrium of G than $\underline{v}_i$?

(b) Is it possible for player i to receive a higher payoff in correlated equilibrium of G that $\bar{v}_i$?

[Supply proofs or examples.]