**ECON 2200: Problem Set 6**

Due 12/5/08

1. Consider Crawford and Sobel's (Ecta. 1982) cheap-talk model. Suppose the sender's type $t$ is uniformly distributed between 0 and 1; the action space is the interval from 0 to 1; and payoffs are given by $U_R = -(t-a)^2$ and $U_S = -(t+b-a)^2$.

   (a) For what values of $b$ does a three-step equilibrium (i.e. an equilibrium where the various types of senders are sorted into three distinct groups, with each group sending different messages) exist?

   (b) Is the receiver's expected payoff higher in a three-step or a two-step equilibrium?

   (c) Which sender types are better off in a three-step rather than a two-step equilibrium?

2. Consider an infinitely-repeated game where the stage game is:

| | $L$ | $R$ |
|---|---|---|
| $U$ | $9,9$ | $1,10$ |
| $D$ | $10,1$ | $7,7$ |

   Player 1 chooses the row and player 2 chooses the column. Players discount the future using the common discount factor $\delta$.

   (a) What outcomes in the stage-game are consistent with Nash equilibrium play?

   (b) Let $v_1$ and $v_2$ be the repeated game payoffs to player 1 and player 2 respectively. Draw the set of feasible payoffs from the repeated game, explaining any normalization you use.

   (c) Are all the payoffs in the feasible set obtainable from mixed-strategy combinations in the stage game? (That is, for every point in the feasible set, can you find a mixed strategy $p$ for player 1 ($0 \leq p \leq 1$) and a mixed strategy $q$ for player 2 ($0 \leq q \leq 1$) that will give those expected payoffs from a single play?)

   (d) What are the players' minimax values? Show the individually rational feasible set of payoffs.

   (e) Find a Nash equilibrium in which the players obtain the (9, 9) payoff each period forever. What restrictions on $\delta$ are necessary?

3. Find all Nash, trembling-hand perfect, and proper equilibria of the following game:

| | $L$ | $R$ |
|---|---|---|
| $U$ | $4,4$ | $4,4$ |
| $M$ | $6,6$ | $3,0$ |
| $D$ | $0,0$ | $2,2$ |