Econ 602b-Albert Banal-Estanol Due date: March 9, 2005

Problem Set 6

1.- Consider an infinitely repeated Cournot duopoly with discount factor $\delta < 1$, unit costs $c > 0$, and inverse demand function $p(q) = a - bq$, with $a > c$ and $b > 0$.

a) Under what conditions can the symmetric joint monopoly outputs $(q_1, q_2) = (q^m/2, q^m/2)$ be sustained with strategies that call for $(q^m/2, q^m/2)$ to be played if no one has deviated yet and for the single period Cournot (Nash) equlibrium to be played otherwise? Is it easier or more difficult to sustain cooperation than in (Bertrand) price competition? Why?

b) Derived the minimal level of δ such that output levels $(q_1, q_2) = (q, q)$ with $q \in [\frac{a-c}{4b}, \frac{a-c}{3b}]$ are sustainable thorugh Nash reversion strategies. Show that this level of δ, $\delta(q)$, is a decreasing, differentiable function of q.

2.- Consider an infinitely repeated Bertrand duopoly with identical firms, discount factor $\delta < 1$, and constant unit costs of $c > 0$. Determine the conditions under which Nash reversion sustains the monopoly price in each of the following cases:

a) Market demand in period t is $Q_t(p) = \gamma^t Q(p)$, where $\gamma > 0$.

b) At the end of each period, the market ceases to exist with probability λ.

c) It is possible to observe the other firm's price only after a delay of K periods.

3.- Consider the following game in normal form:

	L	C	R
U	$5,3$	$5,5$	$3,4$
M	$4,10$	$9,9$	$4,11$
D	$3,3$	$11,4$	$5,5$

a) Suppose that this game is repeated a finite number of times, and that the discount factor (δ) is unity. Characterize the set of subgame perfect equilibria.

b) Suppose that the game is repeated infinitely, and that δ is less than unity. For what values of δ can the players sustain the cooperative choice (M, c) in every period through Nash reversion?

4.- Suppose the following stage-game is infinetely repeated.

	DC	C
DC	$3,3$	$0,4$
C	$4,1$	$1,0$

a) Can player 1 be forced to play anything else than C through Nash reversion?

b) For this example, could you construct a SPNE in which (DC, DC) is chosen on the equilibrium path? Either use the average payoff criterion, or assume an appropriate value for δ.