Economics 200C: Problem Set III

Due: May 5, 2010

1. Let G' be obtained from G by adding a strictly dominated strategy for Player 1. Can the infinitely repeated version of G' with discount factor δ have a strictly larger set of subgame perfect equilibria than the infinitely repeated version of G with discount factor δ.

2. Suppose that two players play the Battle of the Sexes Game:

	Left	Right
Up	$4, 1$	$0, 0$
Down	$0, 0$	$1, 4$

   four times with no discounting ($\delta = 1$). Show that there is a subgame perfect equilibrium in which the first period outcome is $(Down, Left)$.

3. How many pure strategies does Player 1 have in the four-time repeated battle of the sexes? (Express the number as a power of two.)

4. Suppose that G is a two player game in which Player 1 has k_1 pure strategies and Player 2 has k_2 pure strategies. Write down a formula for the number of pure strategies Player 1 has in the n time repeated version of G.

5. Write down a game G in which the max min values for each player are strictly lower than any Nash equilibrium payoff of G.

6. Consider the prisoner's dilemma:

	Left	Right
Up	$4, 4$	$0, 5$
Down	$5, 0$	$1, 1$

   The tit-for-tat strategy for Player i is the strategies that specifies that Player i cooperates in the first period and any period $t > 1$, Player i plays what Player j played in period $t - 1$ ($j \neq i$). The questions below refer to the infinitely repeated prisoner's dilemma.

   (a) Suppose that Player 1 players tit-for-tat. For what values of δ is it a best response for Player 2 to play tit-for-tat?

   (b) For what values of δ is it a subgame perfect equilibrium for both players to play tit-for-tat.

   (c) Suppose Player 1 plays tit-for-tat and Player 2 cooperates in periods divisible by three and defects in all other periods (independent of history). What are the payoffs? Does either player best respond to the other (your answer may depend on δ)?