Stat 155 Game theory, Yuval Peres **Fall 2004**

Homework 7

Question 1: the game of chicken revisited.

Recall the game of chicken, that has payoff matrix:

II / I	CO	IW
CO	(1,1)	(-1,2)
IW	(2,-1)	(-a,-a)

Modify the game as follows. There is a probability $p \in (0,1)$ such that, even when a player plays CO, the move is changed to IW with probability p. Write the matrix for the modified game, and show that, in this case, the effect of increasing the value of a changes from the original version.

Question 2: a recursive zero-sum game Player I, the Inspector, can inspect a facility on just one occasion, on one of the days $1, \ldots, N$. Player II can cheat, or wait, on any given day. The payoff to I if 1 if I inspects while II is cheating. On any given day, the payoff is -1 if II cheats and is not caught. It is also -1 if I inspects but II did not cheat, and there is at least one day left. This leads to the following matrices Γ_n for the game with n days: the matrix Γ_1 is given by

II / I	Ch	Wa
In	1	0
Wa	-1	0

The matrix Γ_n is given by

II / I	Ch	Wa
In	1	-1
Wa	-1	Γ_{n-1}

Final optimal strategies, and the value of Γ_n.

Question 3: two cheetahs and three antelope. Two cheetahs give chase to one of three antelope. If they catch the same one, they have to share. The antelope are Large, Small and Tiny, and their values to the cheetahs are l,s and t. Write the 3×3 matrix for this game. Assume that $l > s > t$, $l < 2s$, and that

$$\frac{l}{2}\left(\frac{2l - s}{s + l}\right) + s\left(\frac{2s - l}{s + l}\right) < t.$$

Find the pure equilibria, and the symmetric mixed equilibria.