**ECON3014 : GAME THEORY**

Exercise 2

1. Consider the following inspection game between a boss and a worker:

| | | Boss | |
|---|---|---|---|
| | | inspect | sleep |
| worker | work | $2, 3-c$ | $2, 3$ |
| | shirk | $1, 6-c$ | $3, 2$ |

$c$ is the cost to the boss of carrying out the inspection.

a) show that if $c > 0$ and $c < 4$, this game does not have pure strategy equilibrium.

b) Solve for a mixed strategy equilibrum either as function of $c$ (when $0 < c < 4$), or for two specific values, $c = 1$ and $c = 2$.

c) How does the behavior of the boss change as $c$ increases? How does the behavior of the worker change, as $c$ increases? What are the implications of these comparative statics results?

2. Two friends, A and B, are at a beach for two days. With probability $\pi$, the water is infested with sharks, and if sharks are present, any swimmer will be attacked. A day's peaceful swim have yields a payoff of 1, being attacked by a shark has a payoff of $-c < 0$, and sitting on the beach yields a payoff of 0. If a swimmer is attacked by sharks on the first day, then any swimmer will surely be attacked on the second day. However, if at least one person swims on day one and is not attacked, then it is clear that there are no sharks, and no attacks will take place on day two. If no one swims on day one, then nothing is learnt, and so the probability of shark infestation remains at $\pi$. Each player seeks to maximize the sum of her expected payoffs over the two days. Assume that $\frac{2(1-\pi)}{\pi} > c > \frac{(1-\pi)}{\pi}$.

a) Consider first the case where only one person is present at the beach over the two days. Solve for an optimal strategy for this person.

b) Consider now the case where both friends are present. Solve for a pure strategy equilibrium of this game.

c) Considering again the case where both friends are present, solve for a symmetric mixed strategy equilibrium of the two period game.