Problem set for Lecture G-10: Repeated Games
Readings: Osborne and Rubinstein Ch 11

Exercise 1: Consider the game form in figure 216.1 in the book.

Find the behavioral strategy of player 1 that is equivalent to his mixed strategy in which she plays (B, r) with probability 0.4 , (B, l) with probability 0.1 and (A, l) with probability 0.5.

Exercise 2: Consider the zero sum game with imperfect recall in Figure 217.1. Show that player 1's best behavioral strategy assures his payoff of 1 with probability $1/4$, while there is a mixed strategy that assure him the payoff 1 with probability 1.

Exercise 3: Let Γ_2 be an extensive game with imperfect information in which there are no chance moves, and assume that the game Γ_1 differs from Γ_2 only in that one of the information sets of player 1 in Γ_2 is split into two information sets in Γ_1. Show that all Nash equilibrium in pure strategies in Γ_2 correspond to Nash equilibria of Γ_1. Show that the requirement that there be no chance moves is essential for the result.

Exercise 4: Formulate the following parlor game as an extensive game with imperfect information. First player 1 receives a card that is either H or L with equal probabilities. Player 2 does not see the card. Player 1 may announce that his card is L, in which case he must pay $\$1$ to player 2, or may claim that his card is H, in which case player 2 may choose to concede or to insist on seeing player 1's card. If player 2 concedes then he must pay $\$1$ to player 1. If player 2 insists on seeing player 1's card then player 1 must pay him $\$4$ if his card is L and player 2 must pay player 1 $\$4$ if his card is H.

Exercise 5: Consider an absent-minded driver who, in order to get home, has to take the highway and get off at the second exit. Turning at the first exit leads into a bad neighborhood (payoff 0). Turning at the second exit yields the highest reward (payoff 4). If he continues beyond the second exit, he will have to go a very long way before he can turn back home (payoff 1). The driver is absent-minded ad is aware of this fact. When reaching an intersection, his sensed do not tell him whether he is at the first of the second intersection; that is, he cannot remember how many intersections he has passed.

Formulate the situation as a one player game.

Show that the best behavioral strategy is better than the best mixed strategy.

Show that the best behavioral strategy is not time consistent.