Econ 711 Homework 3 Solutions

February 3, 2014

1. 1

Solution

The subgames are of the form

\[
\begin{array}{cc}
L & R \\
U & 2,1 & 0,0 \\
D & 0,0 & 1,2
\end{array}
\]

Nash Equilibria of these proper subgames are UL and DR. The strategies are of the form \(s_0s_1s_2\) for player 1 and \(s_1s_2\) for player 2, corresponding to the message, strategy after u and strategy after d for player 1, and strategy after u, strategy after d for player 2. Suppose the strategies are \(uUD\) and \(LR\), respectively. In the subgame after u, UL is indeed an NE, as is DR after d. The actual actions played are UL, since that is most favorable for the sender. This game structure is in some ways analogous to the Stackelberg game we saw before. The message allows player 1 to signal their move, essentially letting them move before player 2 and choose the most favorable NE in the static game.

2

The subgames are of the form

\[
\begin{array}{cc}
L & R \\
U & 1,1 & 3,0 \\
D & 0,3 & 2,2
\end{array}
\]

Nash Equilibrium of these proper subgames is UL. The strategies are of the form \(s_0s_1s_2\) for player 1 and \(s_1s_2\) for player 2, corresponding to the message, strategy after u and strategy after d for player 1, and strategy after u, strategy after d for player 2. There are no SPNE
with strategies where different actions are played after different messages, since only 1 pair of actions can be supported as a NE in the static game.

2. 1

Solution

The set of pure strategy NE is \{AA, BB\}.

2

Solution

Denote a strategy \((k_i, a) \in \mathbb{N} \times \{A, B\}\). Then \{\((k_1, B), (k_2, B)\)\} is an NE, because the payoff matrix is now

\[
\begin{array}{cc}
A & B \\
A & p_1(k_1, k_2), p_2(k_1, k_2) & 0, 0 \\
B & 0, 0 & 1, 1 \\
\end{array}
\]

Of which (B, B) is a NE. However, there are no other NE, because, for the other NE in the original coordination game, each player benefits from choosing the highest k. Thus, for any finite k, the best response is to pick a \(k' > k\). Thus, there is no pair of finite k’s that are mutually best responses, since either they will tie and neither will be a best response, or one k is larger, in which case the other k is not a best response.