Problem Set 1 Solution

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17.881/882

1 Gibbons 1.1 (p.48)

'The **Normal-form representation** of an n-player game specifies the players' strategy spaces $S_1, S_2..., S_n$ and their payoff functions $u_1, u_2...u_n$.

We denote this game $G = \{S_1, S_2..., S_n \ ; \ u_1, u_2...u_n\}$' (Gibbons, p.4). In such a game, players choose their actions simultaneously.

(The timing issue is important and contrasts the normal-form representation of the game with an extensive-form representation).

A **Strictly Dominated strategy in a Normal-Form Game** is a strategy s_i' such that there exists another strategy s_i'', with $s_i', s_i'' \epsilon S_i$, with the property that for each feasible combination of the other players' strategies, i's payoff from playing s_i' is strictly less than i's payoff from playing s_i'', ie

$u_i(s_1, s_2, ..., s_{i-1}, s_i^{'}, s_{i+1}, ..., s_n) < u_i(s_1, s_2, ..., s_{i-1}, s_i^{''}, s_{i+1}, ..., s_n) \ \forall \ (s_1', s_2', ..., s_{i-1}, s_{i+1}, ..., s_n')$ $\epsilon \ (S_1, S_2, ...S_{i-1}, S_{i+1}, ...S_n)$

A **Pure-Strategy Nash Equilibrium in a Normal-Form Game** is the solution $(s_1^*, ..., s_n^*)$ to a normal-form game in which, for each player i, s_i^* is (at least tied for) player i's best response to the strategies specified for the $n-1$ other players (Gibbons, p.8)