HW5 - Additional Problems

Andrea Brose, Math 167/1, F05

Due 4. November 2005

AP(viii) Prove the Best Reply Test for player two from the lecture on the 24th of Octobe

Theorem 5 Let $\pi : \Sigma_{\mathrm{I}} \times \Sigma_{\mathrm{II}} \to \mathbb{R}^2$ be a strategic game played with mixed strategies $E : P \times Q \to \mathbb{R}^2$. Let $m = |\Sigma_{\mathrm{I}}|$, $n = |\Sigma_{\mathrm{II}}|$, let $\mathsf{B} \in \mathrm{Mat}_{m\times n}$ be the payoff matrix to player II and let $\boldsymbol{p} \in P$. Then define

$$\boldsymbol{b} = \boldsymbol{p}\mathsf{B} \text{ and } b_{\max} = \max\{b_i : i = 1, \ldots, n\},$$

where $\boldsymbol{b} = \begin{pmatrix} b_1 & \ldots & b_n \end{pmatrix}$. Then $\boldsymbol{q} = \begin{pmatrix} q_1 & \ldots & q_n \end{pmatrix}$ is best reply to $\boldsymbol{p}$ if and only if $q_i = 0$ for all $i \in \{1, \ldots, n\}$ for which $b_i < b_{\max}$.

AP(ix) Prove the following propostion from the lecture on 24th of October:

Proposition 8 Given an n-player, finite stratgeic game $\pi : \Sigma_1 \times \cdots \times \Sigma_n \to \mathbb{R}^n$, $\boldsymbol{c}^* \in \Sigma_i \times \cdots \times \Sigma_n$ is a NE if and only if $\boldsymbol{c}^*$ is fixed point of the total best reply correspondence of π.