Assignment on 0-sum games

0-Sum1. Show that if a matrix game A has two saddle points then their values must be equal.

(Remark: The value of a saddle point is defined to be the value of the game. This exercise shows the consistency of this definition.)

0-Sum2. Show that if a 2x2 matrix game has a saddle point then it either has a dominated row or a dominated column.

(Remark: This result only works for 2x2 game. It is easy to show this result is not true for bigger games.)

0-Sum3. Given the matrix game $\begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & -1 \end{pmatrix}$, (i) Find a BR to Player I's strategy of (0.5, 0.5), (ii) Find the set all BR to (0.5, 0.5), (iii) Find a BR to Player II's strategy of (1/3, 1/3, 1/3).

(Remark: This is just a simple exercise getting you familiar with the concept of BR.)

0-Sum4. Given a matrix game A, let p be a mixed strategy of Player I. Show that the set of BR to p is a convex set. (A set C is called a convex set if $p,q \in C$ implies $\lambda p + (1-\lambda)q \in C$ for any

$\lambda \in [0,1]$.)

(Remark: Convexity is a good property. You will see many similar results in this course.)