**Homework 1**

1. As we discussed in the class, a game is a tuple

$$Γ=\left(I,\left(u\_{i},S\_{i}\right)\_{i\in I}\right)$$

where $I$ is a non-empty set of players and $u\_{i}:S\rightarrow R$ is the objective of the payer $i$ given that

$$S=×\_{i\in I}S\_{i}.$$

1. Design a simple game $Γ$ where the best response functions of the players are not continuous. This means you should specify the set of players $I$, the strategy set $S\_{i}$, and the objective function $u\_{i}$. Then you want to show that the best response functions are not continuous.
2. Design a simple game $Γ$ where the best response functions of the players are continuous. This means you should specify the set of players $I$, the strategy set $S\_{i}$, and the objective function $u\_{i}$. Then you want to show that the best response functions are continuous.
3. Use the Brouwer’s fixed point theorem to show that your game in part (b) has an equilibrium. (Hint: You want to assume that each $S\_{i}$ is compact and convex).
4. Let $f\left(x\right)$ be a linear function with $f'\left(x\right)=1$ for all $x$. Show that any $x$ is a fixed point of $f$. (This is the corrected version of the homework written on the board).