HOMEWORK 1 GAME THEORY Ph.D. 2023

December 5, 2022

1 Exercise 1

Consider the extensive form games pictured in figure 1 and in figure 2.
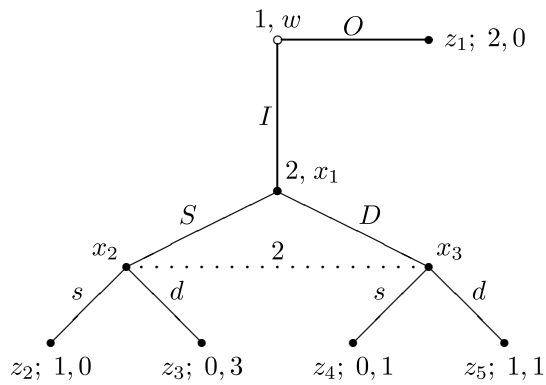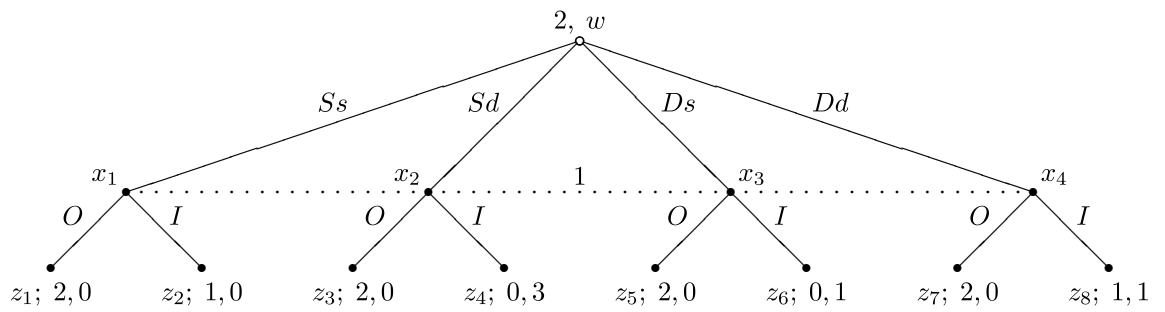

Figure 1

Figure 2

1. Describe formally all the elements of the extensive form game represented in the tree of figure 1;

2. Describe formally all the elements of the extensive form game represented in the tree of figure 2;

3. Find the strategic and the reduced strategic forms associated to the games of figure 1 and of figure 2;

4. Describe the sets of pure, mixed and behavioral strategies for the extensive form games of figure 1 and of figure 2;

5. If possible, for both games find a mixed strategy profile that has no outcome equivalent behavioral strategy profile. Explain the reasons of your result;

6. For the game of figure 1 find the set of rationalizable strategies;

7. For the game of figure 2 find the set of iteratively undominated strategy.

2 Exercise 2

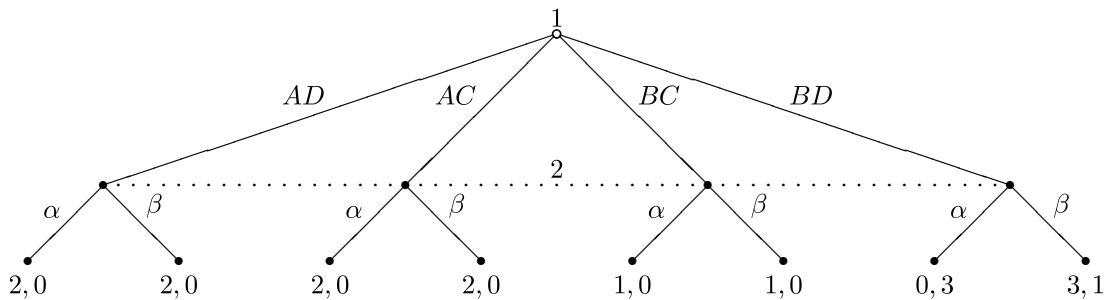Consider the extensive form games in figure 3 and in figure 4
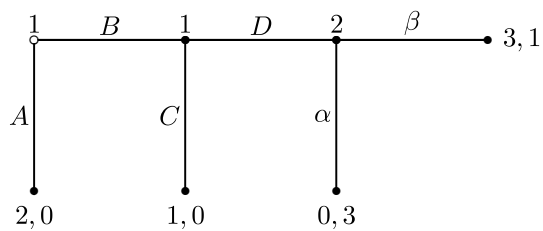

Figure 3

Figure 4

1. Find the strategic and reduced strategic forms associated to the games of figure 3 and of figure 4 and discuss the result;

2. For the game of figure 3 find the set of rationalizable strategies;

3. For the game of figure 4 find the set of iteratively undominated strategy.

3 Exercise 3

Consider the following perfectly competitive market:

- there is a continuum of producers indexed by the parameter i distributed with a density $f(i)$ on the interval $[i_0, i_1] \subseteq \mathbf{R}^{++}$ such that $\int_{i_0}^{i_1} i\, f(i)\, di = K$;

- the producers choose the quantity $q(i)$ before the market opens;

- the cost function of each firm i is $C(q, i) = \frac{q(i)^2}{2i}$;

- the demand curve for this market is $D(p) = max\{0, a - bp\}$;

- the timing is such that first the firms simultaneously choose the production quantities, then the price clears the market.

1. Find the Walrasian equilibrium of this economy;

2. Describe formally the strategic form game associated to this perfectly competitive economy;

3. Find the set of rationalizable strategies of the game described at point 2;

4. Find the set of iterated strictly undominated strategies of the game described at point 2.