Exercise sheet 6

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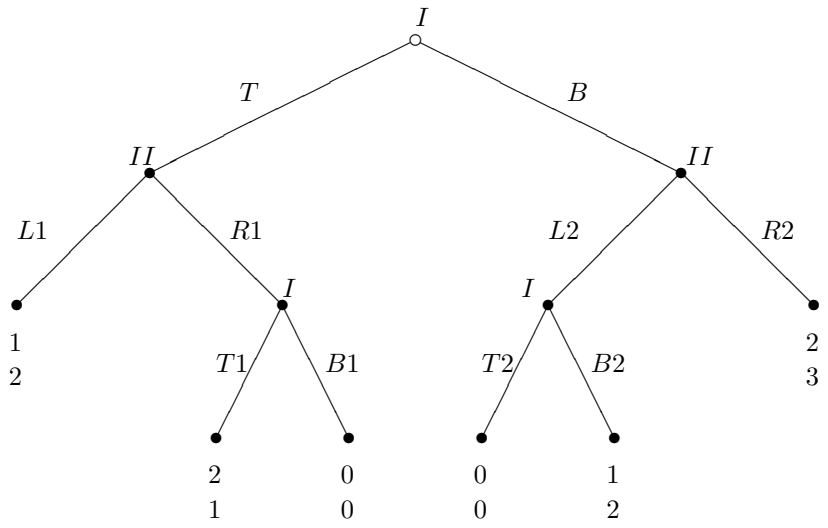
Game Theory, Fall 2015

Exercise 1:

Apply the backward induction to the following game in extensive form:



Answer: Applying the backward induction we have that the solution of the game is given by: I plays BT_1B_2 and II plays L_1R_2 .

Exercise 2: The Centipede Game

Consider the following game in extensive form :

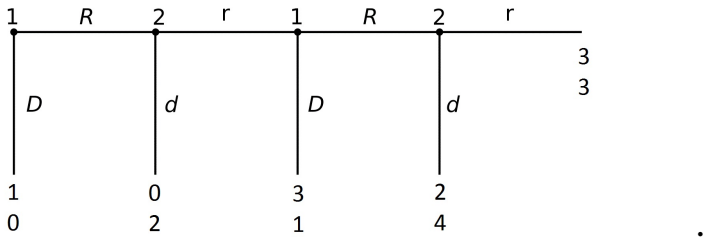
- At stage 1, player 1 chooses between R and D.
  - If he chooses D, player 1 gets 1 and player 2 gets 0;
  - If he chooses R, the game moves to the second round.
- At stage 2, player 2 chooses between r and d.
  - If he chooses d, player 1 gets 0 and player 2 gets 2;
  - If he chooses r, the game moves to the second round.
- At stage 3, player 1 chooses between R and D.

- If he chooses D, player 1 gets 3 and player 2 gets 1;
- If he chooses R, the game moves to the second round.

- At stage 4, player 2 chooses between r and d.
  - If he chooses d, player 1 gets 2 and player 2 gets 4;
  - If he chooses R, both players get 3.

1. Draw the tree representation of the game.

   Answer:



2. What is the outcome predicted by backward induction?

   Answer: (DD,dd)

3. Give the pure strategies of both players and the payoff matrix of the normal form of the game.
   Answer: Player 1: DD, DR, RD, RR, Player 2: dd, dr, rd, rr

	dd	**dr**	**rd**	**rr**
DD	$1,0$	$1,0$	$1,0$	$1,0$
DR	$1,0$	$1,0$	$1,0$	$1,0$
RD	$0,2$	$0,2$	$3,1$	$3,1$
RD	$0,2$	$0,2$	$2,4$	$3,3$

4. Find all Nash equilibria. Which ones are sub-game perfect?
   Answer: The Nash equilibria are: (DD,dd), (DD,dr), (DR,dd) and (DR,dr)

   The only sub-game perfect is (DD,dd)