

# LECON2112 Advanced Microeconomics II

## – Assignment 4 –

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**Deadline:** Monday, March 11, 2024 at 5pm.

**Instructions:** To be submitted via Moodle as a single file (including your name and NOMA).

### Exercises<sup>1</sup>

**9Bd.** Identify all the (pure and mixed strategy) subgame perfect Nash equilibria of the game shown the figure below.

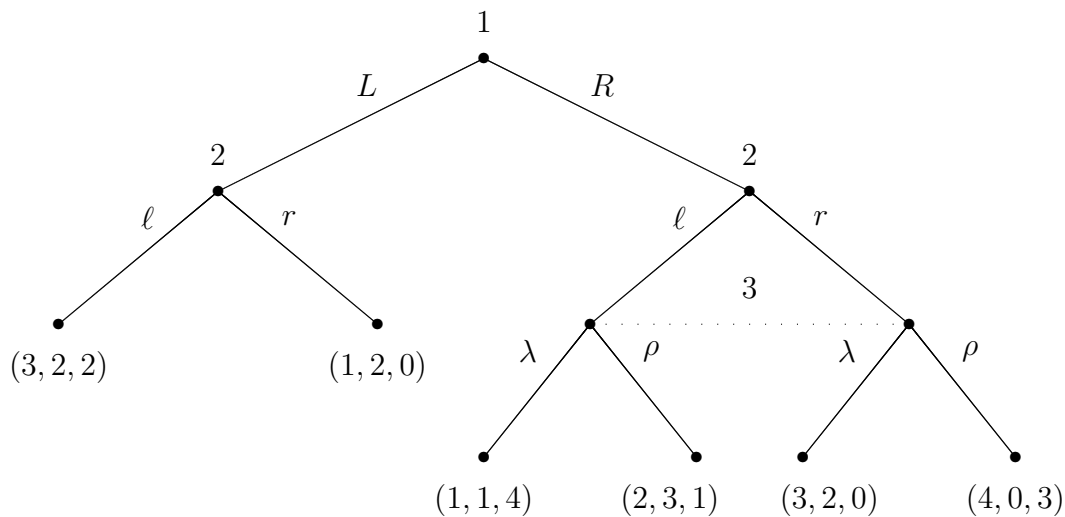


Figure 1: Exercise 9.B.d

**9Bi.** Consider the following game. There are three players. There are two outcomes,  $a$  and  $b$ . All players strictly prefer  $a$  to  $b$ . At stage 1, all players vote for either  $a$  or  $b$ . If there is a unanimity in favor of one outcome, then the game stops and that is the outcome of the game. Without a unanimity, there is a second stage. At stage 2, all players vote again for either  $a$  or  $b$ . The outcome of the game is the outcome having received the largest number of votes.

(a) How many strategies does a player have?

(b) Is there a subgame perfect Nash equilibrium for which the outcome is  $b$ ?

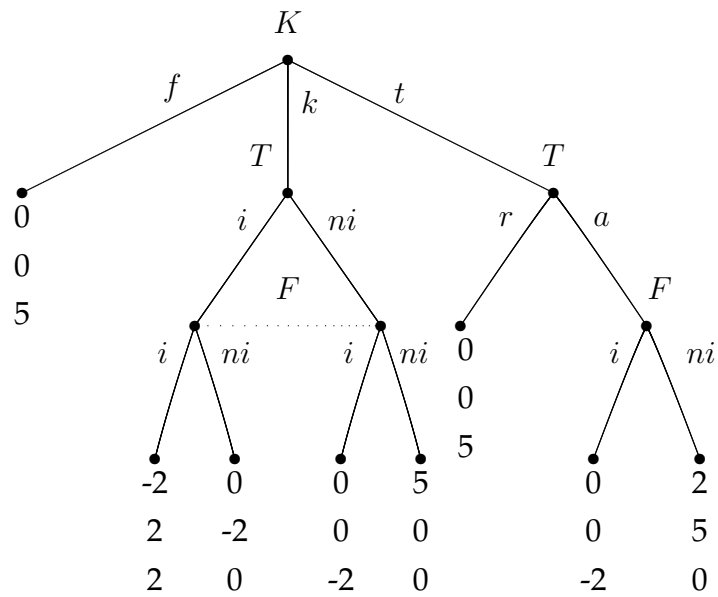
<sup>1</sup>Source: Mas-Colell, Whinston, & Green, 1995. "Microeconomic Theory," Oxford University Press.

**9Bk.** Jane and Kate must share 6 Euros. They have to use the following procedure. First, Jane makes a proposal to divide the money in even integers, with both shares *strictly* positive, that is, she proposes either the division (2,4) or the division (4,2) (the first number refers to Jane's share, the second one to Kate's). In the former case, the game stops and Jane's proposal is the outcome. In the latter case, Kate either accepts the proposal, and it is the end of the game and Jane's proposal is the outcome, or Kate makes a counter-proposal. The counter-proposal is a division in odd integers of 4 Euros. In all cases following Kate's counter-proposal, Jane can either accept the counter-proposal, in which case it is the outcome of the game, or refuse it, in which case the outcome is (0,0). We assume the utility of either player is equal to the quantity of money she gets.

- (a) What is the strategy set of Jane?
- (b) What is the strategy set of Kate?
- (c) Does one of the player have a weakly dominated strategy? A dominant strategy? Explain your answer.
- (d) Can you find an equilibrium of this game by iteratively deleting strictly dominated strategies?
- (e) Can you find an equilibrium of this game by iteratively deleting weakly dominated strategies? Does it depend on the order of deletion of the weakly dominated strategies?
- (f) Does there exist Nash equilibria in pure strategies?
- (g) Briefly comment on the different equilibria you have found, if any.

**9Bn.** A presidential election between three candidates  $K$ ,  $T$  and  $F$  just took place. The rumor is that  $F$  won the election.  $K$  is the person responsible for announcing the results.  $K$  has three options: announcing that the rumor is correct ("f"), announcing that he himself won ("k") or proposing a deal to  $T$  ("t"). Because it is obviously false, announcing that he won might push  $T$  and  $F$  to (simultaneously) decide to start an insurrection ("i"). If they both start an insurrection, they seize power for sure.  $K$  may alternatively propose to  $T$  the following deal: he announces that  $T$  has won the election and  $T$  will guarantee  $K$ 's peaceful retirement. If  $T$  accepts ("a"),  $F$  might start an insurrection, but he might lack enough support to be successful. If  $T$  refuses ("r"), then  $K$  announces that  $F$  has won and  $F$  becomes president.

The extended-form representation of this game is presented below.



- Give an example of a strategy for player F.
- Give a weakly dominated strategy of player F.
- Does a player have a strictly dominated strategy?
- Find all Nash equilibria in pure strategies of the simultaneous subgame that follows move "k".
- Is there a Subgame Perfect Nash equilibrium leading to a payoff of 5 for player K? Motivate your answer.
- Is there a Subgame Perfect Nash equilibrium leading to a payoff of 5 for player T? Motivate your answer.
- Is there a Subgame Perfect Nash equilibrium leading to a payoff of 5 for player F? Motivate your answer.