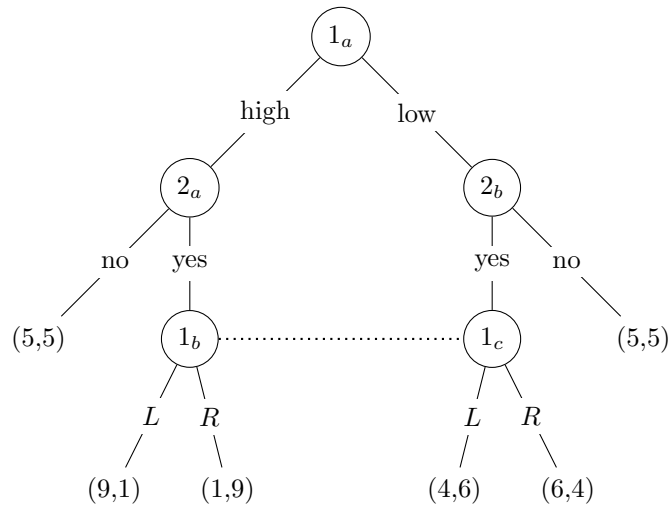# Homework 2

Games in Extensive Form

Due: November 14, 2025, by 18:00

Exercise 1. Consider a game where the two players are two companies, A and B. Company B is currently the leader of the market, and company A is deciding whether to enter the market or to stay out. If company A stays out of the market, company B keeps being the monopolist in the market and it makes profits for 100 (millions of euros), while company A makes 0 profit. If company A enters the market, company B can decide to share the market or to start a competition. Sharing the market implies sharing the profits, while starting a competition leads to 0 profits for either company. Moreover, company A has a fixed cost of 10 for entering the market, to be detracted from its profits.[1]

1. Represent the game as a tree graph, and make sure to include all necessary information. Show the payoff matrix for the corresponding game in normal-form. 1p

2. Find the Nash equilibria of the game from the payoff matrix. Are there any noncredible threats? Justify your answer. 1p

3. Apply Backward Induction to the game, showing all the steps. What are the subgame-perfect equilibria profiles? 1p

Exercise 2. Consider the two-player imperfect-information game represented by the tree below. Player 1 first chooses the type of gamble that would take place (high-risk or low-risk). Player 2 observes the choice of player 1 and decides whether the gamble will actually take place or not. Then, player 1 chooses again between L and R from either of nodes 1_b and 1_c, which are indistinguishable to them.

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[1] A situation with a premise similar to the one described in the exercise occurred at the beginning of 2020 in The Netherlands between Amazon and Bol.com (which would correspond to companies A and B in the description).

(1) What are the information sets of players 1 and 2, respectively? 1pt

(2) Does the game-tree respect the definition of an imperfect-information extensive-form game, in particular with respect to the actions available to player 1? Argue why, or why not. 1pt

(3) What are the strategies of players 1 and 2, respectively? 1pt

(4) Translate the game into normal form and display the payoff matrix. 1pt

(5) What are the pure Nash Equilibria of the game, based on the payoff matrix computed above? 1pt