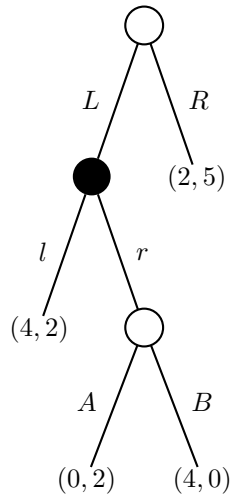


# Game Theory

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## Exercises 3

**Exercise 1** Consider the following 2-player extensive form game given by the game tree



- How many, and which, strategies does player 1 have? How many, and which, strategies does player 2 have?
- Give a completely elaborated plan of playing for player 1 that is not a strategy.
- Determine a normal form for this game.
- Determine for each player the strictly dominant strategies.
- Determine the Nash equilibria.

**Exercise 2** Consider the following game between two (rational and intelligent) players. There is a pillow with 100 matches. They alternately remove 1, 2 or 4 matches from it. (Player 1 begins.) The player who makes the last move wins. Who will win?

Short solutions.

*Solution 1* a. Player 1 has 4 strategies and player 2 has 2 strategies.

b. Playing  $R$ .

c. This is the bimatrix game  $\begin{pmatrix} & l & r \\ LA & 4;2 & 0;2 \\ LB & 4;2 & 4;0 \\ RA & 2;5 & 2;5 \\ RB & 2;5 & 2;5 \end{pmatrix}$ .

d. There are no strictly dominant strategies.

e.  $(LA, l)$  and  $(LB, l)$ .

*Solution 2* The losing positions are those with number of matches that when divided by 3 has remainder 0. As 100 divided by 3 has remainder 1, player 1 will win.