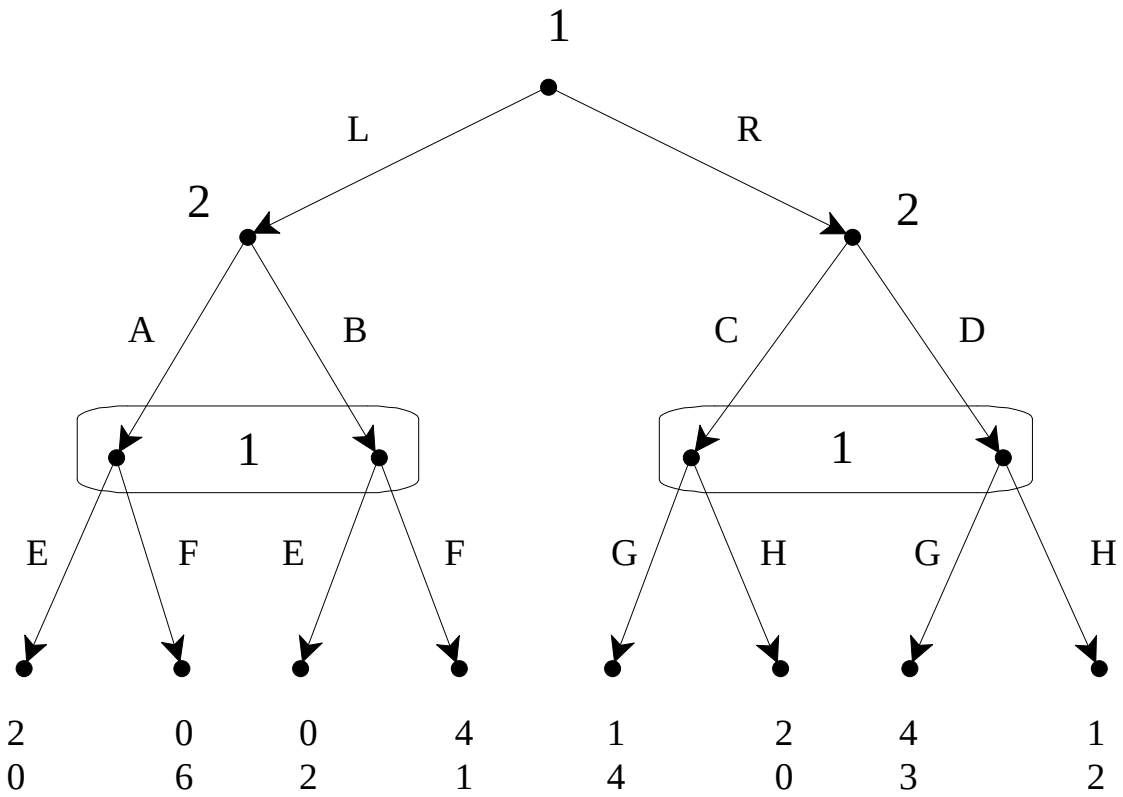
PRACTICE PROBLEMS 12
Topic: mixed-strategy equilibria

VERY IMPORTANT: do **not** look at the answers until you have made a VERY serious effort to solve the problem. If you turn to the answers to get clues or help, you are wasting a chance to test how well you are prepared for the exams. I will **not** give you more practice problems later on.

1. Find the mixed-strategy Nash equilibrium of the following game:

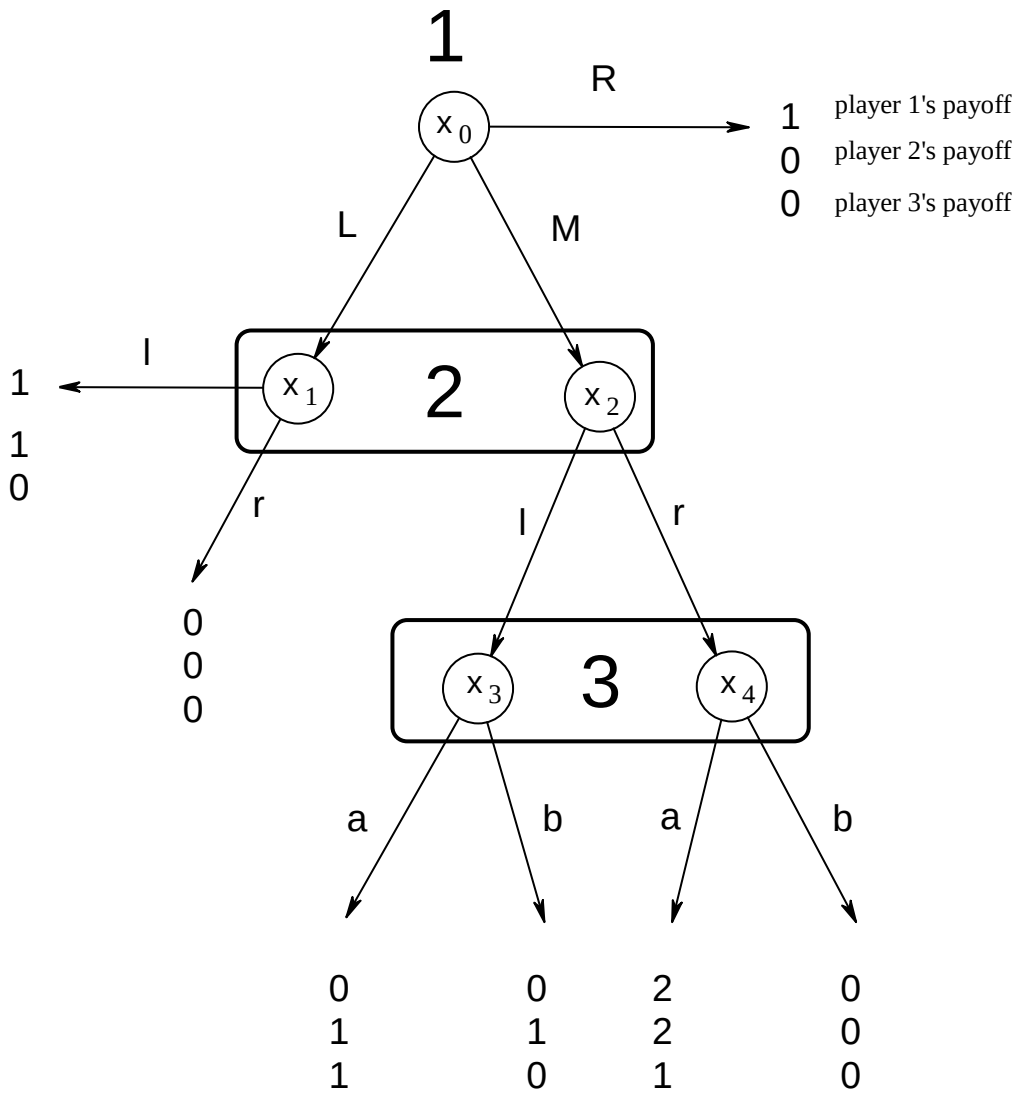
		Player 2 L	Player 2 R
Player 1	T	1 , 4	4 , 3
	C	2 , 0	1 , 2
	B	1 , 5	0 , 6

2. Consider the following imperfect-information game:



(a) Write down the corresponding normal form game (the matrix).
(b) Find all the pure-strategy equilibria.
(c) Find the unique mixed strategy subgame-perfect equilibrium (express it in terms of behavior strategies).

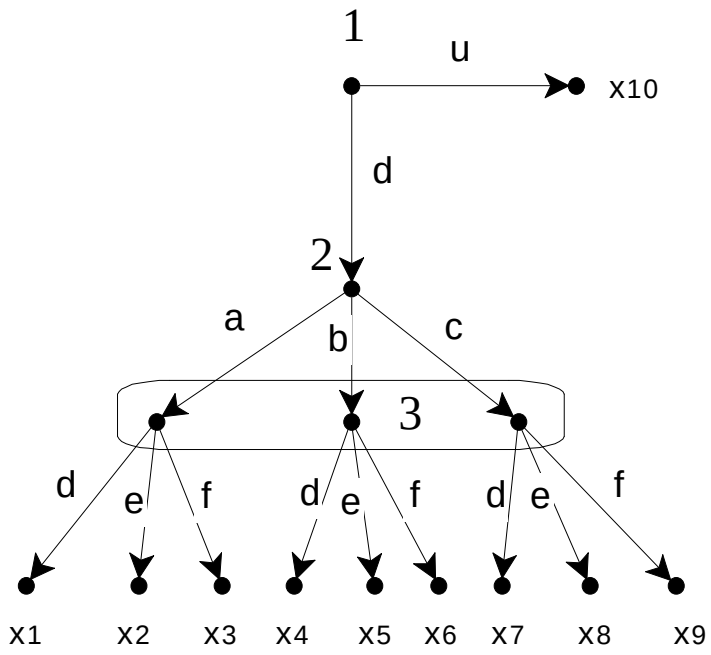
3. Consider the following extensive game.



(i) Find all the pure-strategy Nash equilibria. Which ones are also subgame-perfect?

(ii) Prove (without doing a lot of calculations: just look intensely at the extensive form and try to base your reasoning on what you see) that there is no mixed-strategy equilibrium where player 1 plays M with probability p with $0 < p < 1$.

4. Find the subgame-perfect equilibrium of the following game:



All the players satisfy the axioms of expected utility. They rank the outcomes as indicated below (if outcome *w* is above outcome *y* then *w* is strictly preferred to *y*, and if *w* and *y* are written next to each other then the player is indifferent between the two):

$$\textit{Player } 1: \begin{pmatrix} x_7, x_9 \\ x_1, x_2, x_4, x_5 \\ x_{10} \\ x_3, x_6, x_8 \end{pmatrix}, \quad \textit{Player } 2: \begin{pmatrix} x_1, x_3 \\ x_4, x_5 \\ x_2, x_7, x_8 \\ x_6 \\ x_9 \end{pmatrix}, \quad \textit{Player } 3: \begin{pmatrix} x_2, x_7 \\ x_8 \\ x_1, x_4, x_9 \\ x_3, x_5, x_6 \end{pmatrix}.$$

Furthermore, player 2 is indifferent between x_4 and the lottery $\begin{pmatrix} x_1 & x_2 \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$ and player 3 is indifferent between x_1 and the lottery $\begin{pmatrix} x_2 & x_5 \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$.