Game Theory: Exercise 4
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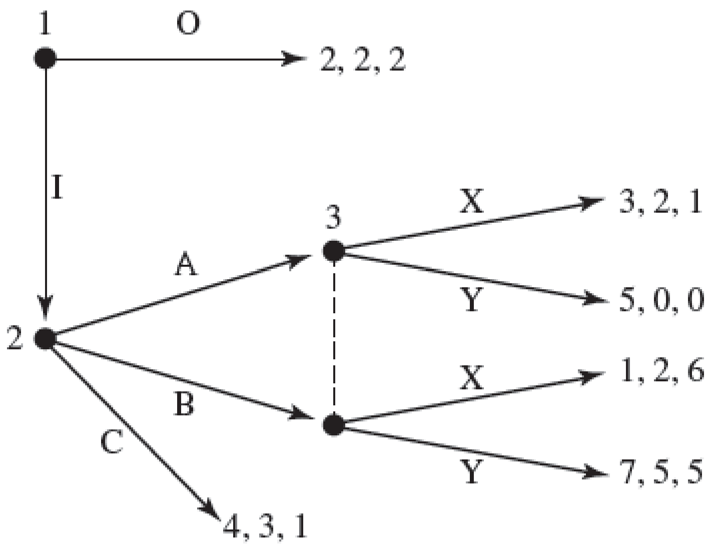
Exercise 1

Consider the following extensive-form games.



Solve the game by using backward induction

Exercise 2

In the envelope game, there are two players and two envelopes. One of the envelopes is marked “player 1,” and the other is marked “player 2.” At the beginning of the game, each envelope contains one dollar. Player 1 is given the choice between stopping the game and continuing. If he chooses to stop, then each player receives the money in his own envelope and the game ends. If player 1 chooses to continue, then a dollar is removed from his envelope and two dollars are added to player 2’s envelope. Then player 2 must choose between stopping the game and continuing. If he stops, then the game ends and each player keeps the money in his own envelope. If player 2 elects to continue, then a dollar is removed from his envelope and two dollars are added to player 1’s envelope. Play continues like this, alternating between the players, until either one of them decides to stop or k rounds of play have elapsed. If neither player chooses to stop by the end of the kth round, then both players obtain zero. Assume players want to maximize the amount of money they earn.

(a) Draw this game's extensive-form tree for $k = 5$.

(b) Use backward induction to find the subgame perfect equilibrium.
(c) Describe the backward induction outcome of this game for any finite integer k.

Exercise 3

Imagine a game in which players 1 and 2 simultaneously and independently select A or B. If they both select A, then the game ends and the payoff vector is (5, 5). If they both select B, then the game ends with the payoff vector (−1, −1). If one of the players chooses A while the other selects B, then the game continues and the players are required simultaneously and independently to select positive numbers. After these decisions, the game ends and each player receives the payoff $\frac{(x_1+x_2)}{(1+x_1+x_2)}$, where $x1$ is the positive number chosen by player 1 and $x2$ is the positive number chosen by player 2.

(a) Describe the strategy spaces of the players.
(b) Compute the Nash equilibria of this game.
(c) Determine the subgame perfect equilibria.