

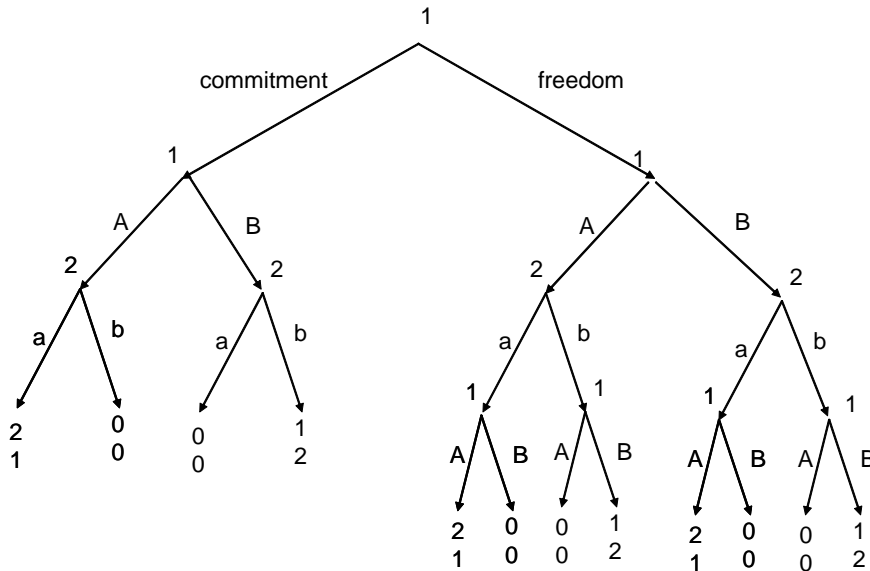
MA Game Theory

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Homework 3

Due Weds 22nd February

Question 1 Consider the following extensive-form game:



1. Solve the game by backward induction.
2. Write down the normal form of the game. Find all pure strategy Nash equilibria of this extensive-form game.

Question 2 There are n firms: $1, 2, \dots, n$. Each firm has zero marginal cost. In the given order firms choose their production level, knowing what the previous firms have chosen. That is, Firm 1 chooses $q_1 \geq 0$ first; Firm 2 observes q_1 and chooses $q_2 \geq 0$; Firm 3 observes q_1 and q_2 and chooses $q_3 \geq 0$, and so on. They sell their good at market price $P = 1 - (q_1 + \dots + q_n)$.

Each firm i gets the payoff of $q_i P$. Compute a Nash equilibrium of this game using backward induction for the following two cases:

- $n = 3$.
- For an arbitrary n .

Question 3 Consider the following variant of the Bach or Stravinski game in which each player gets 3 if they co-ordinate on their preferred action and 1 if they co-ordinate on their less preferred action. First, the 'Bach' player moves. This player can choose either to (a) burn a dollar (and therefore reduce all the subsequent payoffs of the Bach player by 1) or (b) not burn a dollar. Having observed this decision, the players then play a simultaneous version of the BoS game.

1. Draw the game tree for this game
2. Find the set of subgame perfect Nash equilibria
3. Write out the Normal form of the game. Does the SPNE survive the iterated deletion of weakly dominated strategies?
4. What would the outcome of the game be if we applied the intuitive notion of forward induction introduced in the lectures?
5. Show that there exists a sequence of deletions of weakly dominated strategies which leaves this as a unique outcome
6. Consider a variant of the game where, after observing the money burning action of the Bach player, the Stravinski player decides whether or not to set fire to a dollar. After which the players play a BoS game. Find one strategy which survives IDWDS in this game.