

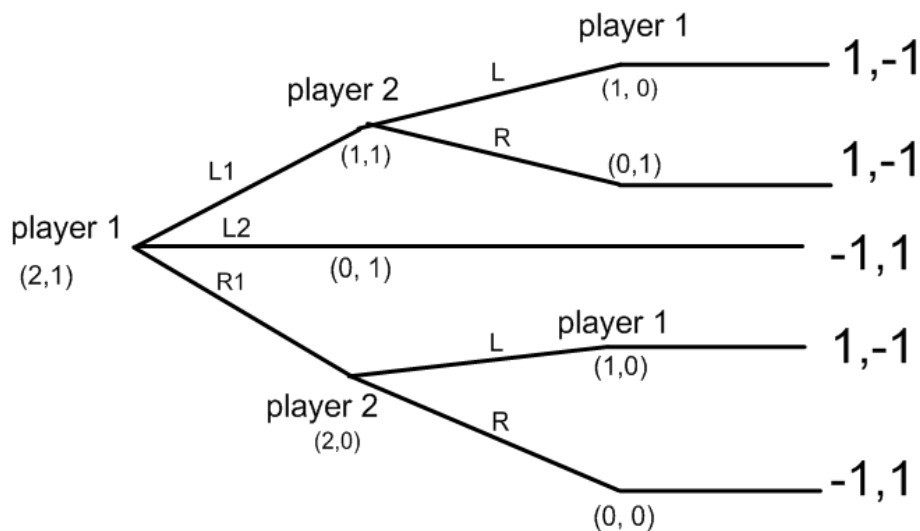
## Game Theory Day 2

### Homework

*Please complete on a separate piece of paper.*

1. Create your own extensive form (pictorial model) of the Nim game discussed in class.
2. Consider the game of tic-tac-toe. If you go first, is there a winning strategy? If so, explain.
3. Consider the following voter preferences.
  - Voter 1:  $A > N > B$
  - Voter 2:  $B > A > N$
  - Voter 3:  $N > A > B$
  - a. What would be the outcome of truthful voting in this case?
  - b. What about strategic voting? Who can change the outcome and how?
4. Consider the following decision situation. You have a choice to make about which two courses to take and you have available four courses, A, B, C, and D.
  - a. Depict this problem in tree form.
  - b. Suppose after deciding which two courses to take you have a further decision to make: which course you will concentrate your efforts on. To keep matters simple, suppose that—if you take courses B and C, for instance—you can either chose to *Work Hard* for B or *Work Hard* for C. Depict the full decision problem.
  - c. Suppose that working hard produces a grade of A while not working hard produces a grade of B. Fill in the payoffs to that decision problem.

Study the scenario depicted below. This represents the Nim game as  $(2, 1)$ . The payoff number associated with winning is 1 and losing is -1. L (left) and R (right) illustrates which pile the player took from and the  $(\#, \#)$  represent the number left in each pile. After you have sufficiently understood the depiction, answer #5.



5. Draw the game tree for Nim with initial configuration  $(3, 2)$ . Assume that the payoff for winning is 1 while that for losing is 0.