Midterm exam   PS 30   May 2004

Name:

TA:

Section number:

This is a closed book exam. The only thing you can take into this exam is yourself and writing instruments. Everything you write should be your own work. Cases of academic dishonesty will be referred to the Dean of Students office, which has the power to suspend and expel students. Partial credit will be given: math mistakes will not jeopardize your grade. There are four sections of this exam. Each section is weighted equally (12 points for each section). Please show all steps of your work and explain what you are doing at each step. Correct answers alone are worth nothing without a clear and correct explanation of where the answers come from. Clarity and legibility are factors in the grade.

If you have a question, raise your hand and hold up the number of fingers which corresponds to the section you have questions about (if you have a question on Section II, hold up two fingers). When you hand in your exam, please write your name down on the log. Please write all answers on this exam—if you write on the reverse side of pages, please indicate this clearly. Good luck!

Part I. Consider the following game.

Player 2

	Left	Middle	Right
Top	4 , 2	3 , 4	11, 3
High	6 , 6	4 , 1	7 , 5
Low	3 , 3	6 , 5	13, 4
Bottom	6 , 7	7 , 6	10, 8

Player 1

(a) Find all pure strategy Nash equilibria of this game (4 points).

(b) Use the method of iterative elimination of (strongly or weakly) dominated strategies to eliminate as many strategies as possible (4 points).

(c) Find all mixed strategy Nash equilibria of the reduced game (4 points).

Part II.

The President, who is a Democrat, and the House, which is controlled by Republicans, decide over the new tax rate. The House can first either propose a new tax bill or not propose a new tax bill. If it does not propose, the previous tax bill maintains, which is called the Status Quo (SQ). If it proposes a new bill, it will be sent to the President. The President can sign the new tax bill or veto that bill. If the President signs the bill, the new tax rate will be implemented, which is called the New Tax Bill (NTB). If the president vetoes the bill, the House can override the president's veto or accept the veto. If the House overrides the bill, a revised tax bill will be implemented, which is called the Revised Tax Bill (RTB). If the House accepts the veto, the Status Quo (SQ) tax bill will be kept.

For the House, the best outcome is the Revised Tax Bill, the second best outcome is the New Tax Bill, and the worst outcome is the Status Quo. For the president, the best outcome is the Status Quo, the second best outcome is the New Tax Bill and the worst outcome is the Revised Tax Bill.

   a. Represent this policy-making process as extensive form game. Find the subgame perfect Nash equilibrium (6 points).

b. Represent the above extensive form game as a strategic form game. Find all pure strategy Nash equilibria (6 points).

About the 2000 Primaries in the Democratic party

(Total of 12 points: 2+5+5)

In the wake of the presidential election of 2000, the Democratic Party held primary elections to select it candidate for the general election. In these primaries, Al Gore (then vice-president) ran against Bill Bradley. Running for primaries can be a costly process so candidates have to decide whether they will go fundraising or not.
Both candidates would rather win the primaries without fundraising as fundraising is time-consuming and unrewarding.
Assume that if one candidate fundraises and the other does not, the candidate that raised funds wins the primaries (he can afford more commercials,...).
If they both fundraise or if they both not fundraise, assume that Gore wins (as he has better name recognition,...).
Furthermore, assume that they both want to win.

(A) What are the different outcomes? Give a payoff that is consistent with the desciption of the situation for each player for each outcome (2 pts).

(B) Assume that Gore gets to decide whether to fundraise or not first. Fill up the tree below (1 pt) and find the equilibrium using backward induction (you can draw the equilibrium on the tree or write it below the tree) (3pts). Describe the outcome (1 pt).
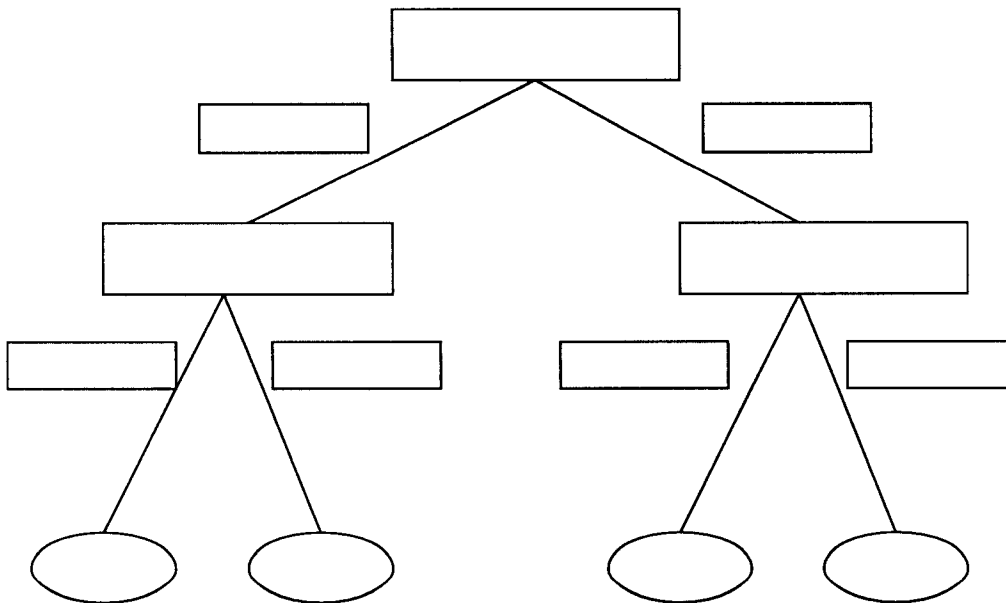
(C) Now assume that Bradley gets to decide whether to fundraise or not first. Fill up the tree below (1 pt) and find the equilibrium using backward induction (you can draw the equilibrium on the tree or write it below the tree)(3 pts). Describe the differences in outcome if any (1 pt).
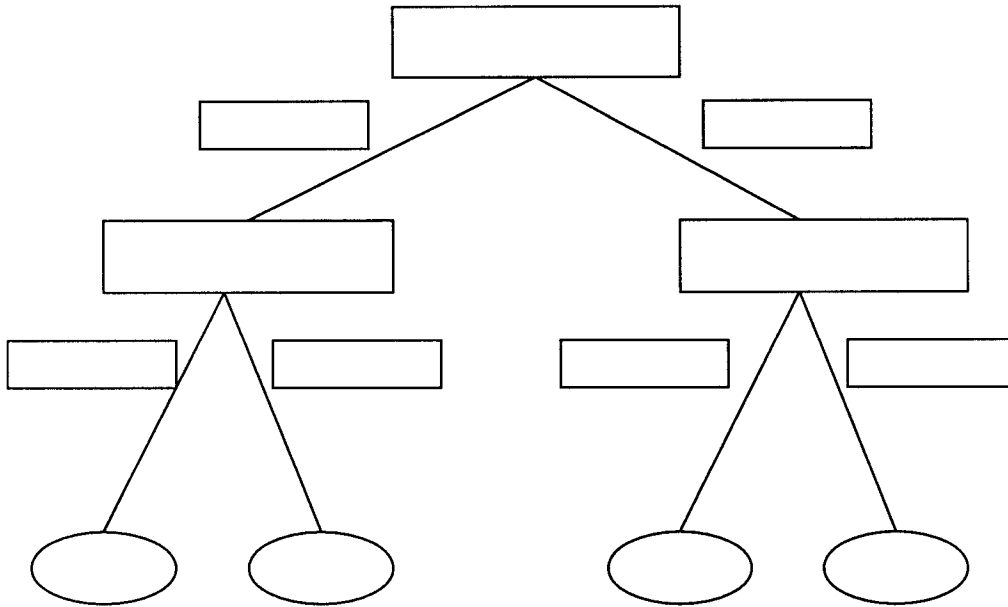
Part IV.

Boyfriend and Girlfriend are on a 7 day cruise, which starts on Monday and goes until Sunday. Both know that this cruise is their last hurrah. Both know that once Sunday comes around and the cruise ends, if they are still together, the game ends because Boyfriend will be forced to dump Girlfriend (because otherwise he would be disowned by his wealthy parents).

On Monday evening, Boyfriend decides whether to break up or continue in the relationship. If Boyfriend decides to continue, then on Tuesday evening, Girlfriend decides whether to break up or to continue. If Girlfriend decides to continue, then on Wednesday evening, Boyfriend decides whether to continue. The game continues like this, with Boyfriend and Girlfriend taking turns deciding whether to continue or to break up (Boyfriend gets to decide on Monday, Wednesday, and Friday, and Girlfriend decides on Tuesday, Thursday, and Saturday). If anyone decides to break up, the game is immediately over. If no one decides to break up, then they make it to Sunday, and Girlfriend is left heartbroken.

Each person enjoys the other's company, and gets a payoff of 5 for every day the relationship continues. However, no person wants to be dumped; if a person breaks up the relationship, the other person (the dumped one) gets –10 added to her payoff. For example, if they make it all the way to Sunday, Boyfriend's payoff is 35 and Girlfriend's payoff is 25.

(a) Draw the game (4 points).

(b) Find the subgame perfect Nash equilibrium (4 points).

(c) Find all pure strategy Nash equilibria (4 points).