

**Stat/Econ 473 Game Theory**  
Problem Set 6

**Due: Thursday March 3**

**From the Text:** Do problems: 13.10–13.15, 13.16–13.20, 13.21–13.23

**Comments:** On all of the problems make sure you draw information sets carefully and label any moves by chance.

i) in 13.10–13.15, there are 5 players, the committee members A, B, C and the parties Democrats (D) and Republicans (R).

ii) For 13.10–13.15, only draw the game tree once. For each path through the tree write down which version passes if the Republicans have a majority and which version passes if the Democrats have a majority.

iii) For 13.10 you don't have to list all the strategies for D and R, but describe in general what they are. How many strategies are there for D and R?

iv) For 13.12, ignore the part of the question "Define a subgame perfect equilibrium."

v) For 13.16–13.19) Recall that we analyzed the subgame completely in 4.8)-4.11 on problem set 2 and 5.7–5.9 problem set 3. You may use the earlier analysis and may assume that no player will use a dominated strategy or a strategy eliminated in IEDS. For these questions:

a) don't draw the game tree (it is much too big);

b) Find the subgame perfect equilibrium in the full game. Does firm 2 enter the market?

c) do 13.20) as stated in the text.

1) A student (Player 2) has cheated on an exam. The Dean (Player 1) suspect the student of cheating and tries to gather evidence. There is a  $1/2$  chance of finding evidence and a  $1/2$  chance of failing. Once the Dean knows if evidence was found she must decide whether to accuse the student (A) or stay quiet (Q). If the Dean stays quiet, both players get a payoff of 0. If the Dean accuses the student, the student must decide to confess (c) or deny (d). The student makes this decision not knowing if there is evidence. If the Dean accuses and the student confesses, the Dean gets a payoff of 2 and the student -2. If the Dean accuses and the student denies, the payoff depends on whether there is evidence. If there is evidence the Dean gets a payoff of 4

and the student -4, if not, the Dean gets a payoff of -4 and the student gets a payoff of 4.

- a) Draw the game tree for the extensive form of the game.
- b) What are all of the strategies for each player?
- c) Write down the strategic form of the game. Simplify using IEDS and find a Nash equilibrium. Is this a subgame perfect equilibrium?
- d) Change the game by first allowing the student to cheat (C) or not (N). If the student decides not to cheat the payoffs are 0, -1. Draw the game tree for this version and find the subgame perfect equilibrium.