PROBLEM SET 7

due **Thurs., December 1st by 3PM**
(In my mailbox)

DECISIONS, GAMES & RATIONAL CHOICE

Exercise 1 (5 pts.) Consider this game: First, Row chooses an amount of either \$1 or \$2 for Column to distribute. Then Column chooses how to distribute that amount between Row and Column (Column may only divide the money up in dollar increments, and it is possible to give all the money to one player). Put this game into extensive form. (Don't forget: label choice nodes with player names, terminal nodes with utilities, and branches with names of choices.)

Exercise 2 (15 pts.) Assume that the arguments justifying the importance of Nash equlibria in one-off games are sound. In class we discussed the importance of the availability of mixed strategies: they secure the existence of Nash equilibria in a wide variety of games. In the game of matching pennies we saw that almost all forms of randomization are easy, since you have plenty of time and a coin to use to help randomize your choices. But there can obviously be many strategic situations where

(a) assumptions mandating Nash equilibrium plays are satisfied,

(b) the only Nash equilibria involve only mixed strategies, and

(c) a special device of randomization isn't available, and time is a constraint on moving.

In 2-3 paragraphs, comment. For example, in such cases, do you think we can we randomize our choices still, somehow? If so how? If not, how should we think of what counts as rational behavior in such games (consider that *both* players may lack special tools for randomization).

Exercise 3 (20 pts.) There are 5 bloodthirsty mercenaries Van, Wells, Xan, Yates, and Zelda. They find fifty bars of gold in a raid and must decide how to distribute them. The mercenaries have a strict hierarchy: Zelda is the leader who is superior to Yates, who is in turn superior to Xan, who is superior to Wells, who is superior to Van.

The mercenaries have an inviolable code for how to distribute goods from a raid. In this case, first the leader proposes a distribution of bars of gold among everyone (suppose you can't divide a bar into smaller parts). Then every mercenary, including the leader, votes on whether to accept this distribution. If the proposal is approved by a majority or a tie vote, it is enacted. If not, the leader is killed, and the next most senior mercenary makes a proposal for how to distribute the gold among the remaining members. Again, all vote, and with a majority or a tie, it is enacted. Otherwise they kill the proposer, so the next most senior mercenary makes a proposal for the survivors, and so on...

Assume the mercenaries have the following preferences (which are common knowledge). Each mercenary wants most to survive. Provided they survive, the mercenaries want to get as much gold as possible. Lastly, if the only difference between two choices is that in one of the choices another mercenary dies, they'll make the choice that involves killing the mercenary (they're really bloodthirsty!). Assume the mercenaries can't make any promises or contracts, and suppose we can apply conventional backwards induction here. What then will Zelda's initial proposal be? Explain your answer.