

Programming Assignment 3: solving a small poker-like game (due before class Nov. 13)

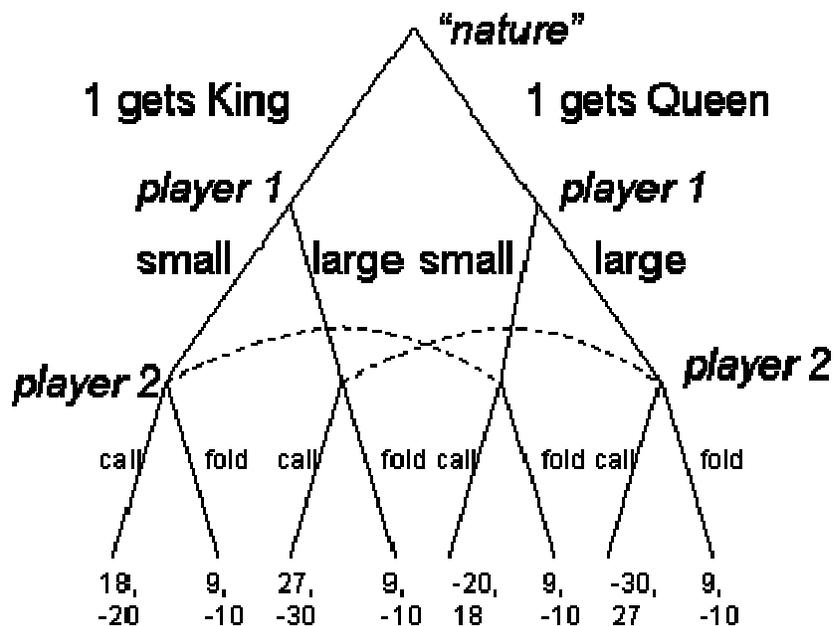
Please read the rules for assignments on the course web page. Contact Mingyu (mingyu@cs.duke.edu) or Vince (conitzer@cs.duke.edu) with any questions.

We will consider a modified version of the poker-like game studied in class. In this modified version, both players initially put 10 into the pot. Then, player 1 draws a King or a Queen. Player 1 then must make either a small bet (10) or a large bet (20). Player 2 then must either call this bet, putting the same amount of money into the pot; or fold, in which case player 1 wins the pot. If player 2 calls, then player 1 wins if she has a King, and loses if she has a Queen.

An additional twist is that the casino will take 5% of the total money in the pot (with the exception of player 1's bet, if player 2 folded). As a result the game is not zero-sum.

For example, if 1 gets a Queen, then places a large bet, and player 2 calls, then the total money in the pot is 60 (30 from each player). The casino will claim 5% of this, which is 3; the remainder goes to player 2, who hence has a profit of 27. As another example, if player 2 folds, then (regardless of the bet of player 1) the casino takes 5% of the initial pot of 20, namely 1, so that player 1 has a profit of 9.

The extensive form of the game is given below.



You should:

- Convert the game to normal form.
- Create a .mod file (from scratch) that uses the mixed integer programming formulation from class to find a Nash equilibrium of this (normal-form) game. As always, your .mod file should use the general formulation, and then put the specific size of the game and data at the bottom.

If you want to check your answer, you can try to solve the game by hand, but this is not required.

Instructions for turning in your homework: Download the files that you have created, using webfiles.duke.edu, then email them to mingyu@cs.duke.edu. Alternatively, you can also e-mail the files directly from godzilla.acpub.duke.edu (type `pine` for a simple e-mail program). Give your files descriptive names, e.g. “`poker_game.mod`” and “`poker_game.out`” (similarly for variables and parameters that you define). You are welcome to go to Mingyu and Vince’s office hours or to send them e-mail with questions.