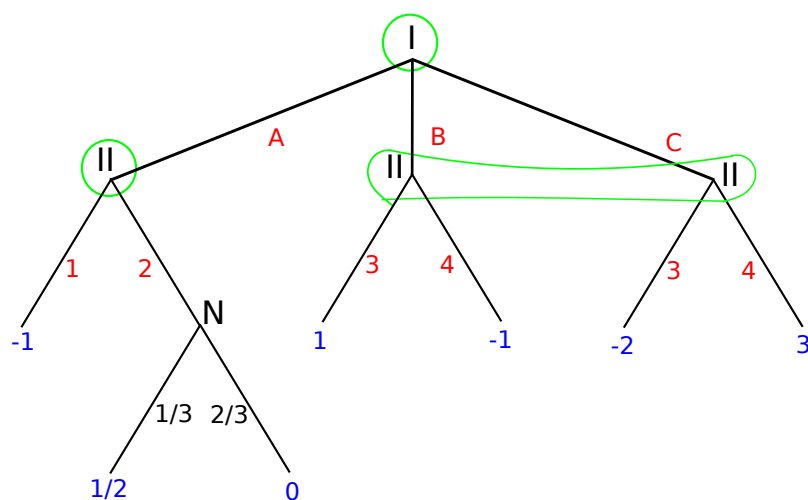


MA152 Spring 2017

Homework 5

Due: 17th May at 4PM in APM basement

- Convert the following game from Extensive Form to Strategic Form (you do *not* need to solve the game).



- For the game

$$A = \begin{pmatrix} 1 & -1 \\ 0 & 3 \end{pmatrix}$$

use Fictitious Play to find upper and lower bounds on the value of the game, where the upper and lower bounds differ by at most $1/2$.

- In *Silver Dollar 2*, Player II hides a dollar in either room A or room B. Player I chooses one of these rooms to search for the dollar, without knowing which room Player II chose. If the dollar is in room A and Player I searches this room, the probability of finding it is $1/2$. In room

With the probability is $1/3$. If Player I does not find the dollar (either from searching the wrong room or being unlucky), then they get to choose either of the two rooms again to search. If they do not find the dollar after the second search, they give up. Draw the Extensive Form for this game (*note*: it might be more convenient to denote the information sets using different colors, instead of loops).

4. Consider the *Poker Endgame* situation from class and the textbook (page II-51, Figure 1 in the textbook), where Player I can bet 2 additional dollars. We make a small modification: if Player I is dealt a *losing* card they may check or bet y additional dollars, for some constant $0 < y \leq 2$ (if they are dealt a winning card, they either check or bet 2 additional dollars, like before). Find the strategic form for this game, and find the value (in terms of y).

5.

$$A = \begin{pmatrix} \sqrt{2} & 0 \\ 0 & 1 \end{pmatrix}$$

- (a) Suppose two players are playing this game repeatedly. Player I guesses that Player II's next move will be chosen randomly from among Player II's previous moves. If Player II's previous moves were column 2, column 1, column 2, which row should Player I choose next?
- (b) Suppose Player II knows that Player I is choosing their strategies in this way. Explain how Player II can exploit this to guarantee they never lose money (except perhaps on the first turn).