Econ 1200

Spring 2012

Homework #1 Answers

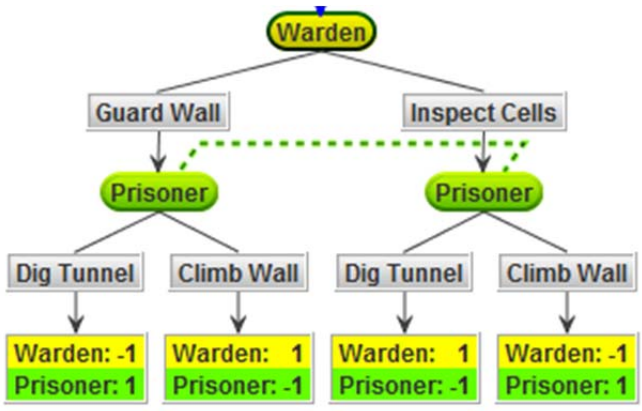
1.

a. (.5 point) The normal form of the game is:

		Warden	
		Guards at Wall	Regular Inspections
Prisoner	Climb Wall	-1, 1	1, -1
	Dig Tunnel	1, -1	-1, 1

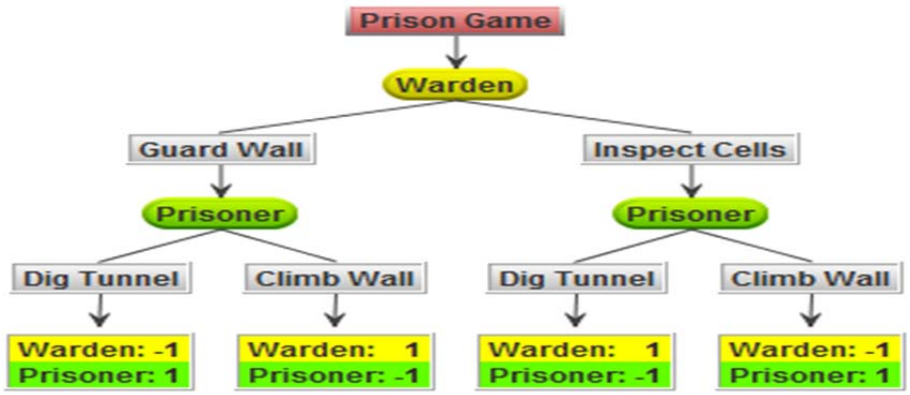
The game is zero, or constant sum

b. (.5 point) The extensive form version of the simultaneous move game is:



c. (.5 point) The mutual best response is to randomize the strategy choices. Prisoner plays Climb Wall with probability .5 and Dig Tunnel with probability .5 and Warden plays Guards at Wall with probability .5 and Regular inspections with probability .5.

d. (.5 point) The extensive form version of the sequential move game where the warden is the first mover is



The rollback/backward induction solution is that if Warden chooses to guard the wall, Prisoner chooses Dig Tunnel and if Warden chooses regular inspections, Prisoner chooses Climb Wall. The solution will be different, as the Prisoner can perfectly condition on the Warden's behavior and so the Prisoner can always win the game.

2. This game is a Prisoner's Dilemma.

a. (.5 point) Here is one possible parameterization of the game:

		Rita's	
		No Rewards Card	Rewards Card
Bruster's	No Rewards Card	2, 2	0, 3
	Rewards Card	3, 0	1, 1

b. (.5 point) Both players have a dominant strategy: offer rewards card.

c. (.5 point) In equilibrium, Rita's cool card will also offer 1 free ice cream for every 10 purchased. If it offered a better deal, Bruster's would have to match it and if it offered a worse deal, it would lose business to Bruster's.

3. Dixit, Skeath and Reiley Chapter 3, exercises U2 and U3, p. 85

U2: (1 point)

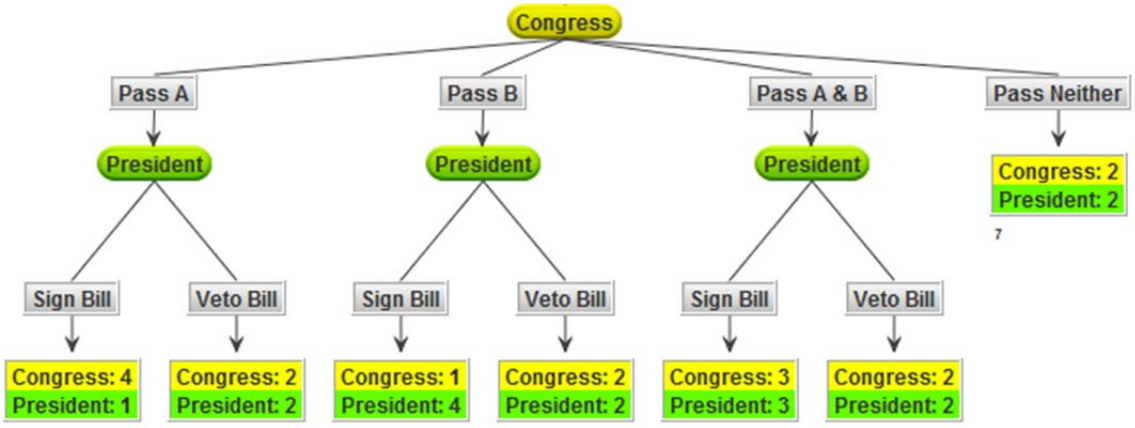
a. Albus: {N,E,S}; Minerva: {(aaa),(aab),(aba),(abb),(baa),(bab),(bba),(bbb)}
b. Albus: {(NN),(NS),S}; Minerva: {(aa),(ba),(ca),(ab),(bb),(cb)}
c. Albus:{(NN),(NS),S}; Minerva: {b,(aa),(ab)}; Severus: {X,Y}

U3: (1point)

a. Equilibrium: Albus: N, Minerva; b; Albus's equilibrium strategy is: N, Minerva's equilibrium strategy is (bab).
b. Equilibrium: Albus: S, Minerva: a; Albus's equilibrium strategy is: S, Minerva's equilibrium strategy is: (ca).
c. Equlibrium: Albus: S, Minerva: b; Severus: Y. Equilibrium strategy is Albus: S, Minerva, b and Severus Y.

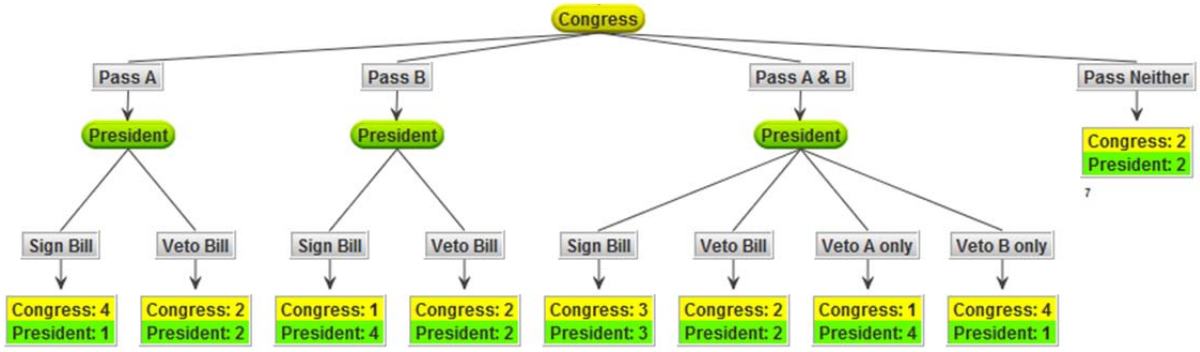
4.

a. (.5 point) The game tree looks like this:



The rollback equilibrium is for the Congress to pass both proposals A and B and for the President to sign the bill into law.

b. (.5 point) In this case the game tree looks like this:



The rollback equilibrium is now for the Congress to pass neither proposal (or to pass A and have the president veto the bill).

c. (.5 point) Intuitively, giving the line-item veto to the President means that compromise legislation such as passing both A and B will become less likely as the President now has more power to affect the outcome he desires.

5. Marienbad

a. Obvious: player 1 takes a match from 1 of the two piles. Since the last player to pick up a match loses the game, and each player must pick up a number of matches from one of the two piles, player 2 will lose.

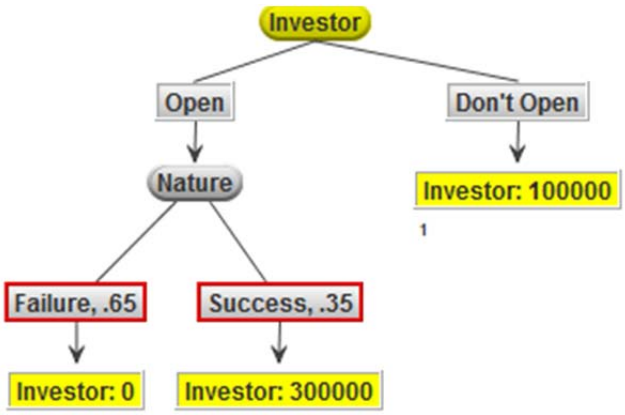
b. (1 point) If m=n>1, let us write the initial configuration of matches in the two piles as (m,m). Suppose after player 1's first move the configuration is (k,m), where k is a number between 0 and m-1 (players must remove a least one stick from one pile). If k=0, player 2 can then remove m-1 matches from the second pile, so that when it is player 1's move, the configuration of the two piles is (0,1); in this case player 2 wins the game. If k>0, then player 2 moves the game to (k, k) (mimics the choice of player 1 and equalizes the two piles).

Now it is player 1's turn again; suppose he moves the game to (j,k). If j=0, player 2 removes k-1 matches from the second pile and wins the game. If j>0 player 2 moves the game to (j,j). In this fashion, after no more than m-1 moves by player 1, the game must arrive at a configuration such as (1,p), where p>1 *and* it is player 2's move. Player 2 then removes the p sticks from the second pile and wins the game. (Note: for simplicity I assumed that player 1 always removes from the first pile, but this assumption is not crucial since every time player 1 makes a move --unless he has eliminated all the sticks from one of the piles--the two piles have equal numbers of sticks due to the strategy of player 2).

c. (.5 point) Player 1 can equalize the two piles in his first move. If he then follows the strategy pursued by player 2 in part b, he will win the game.

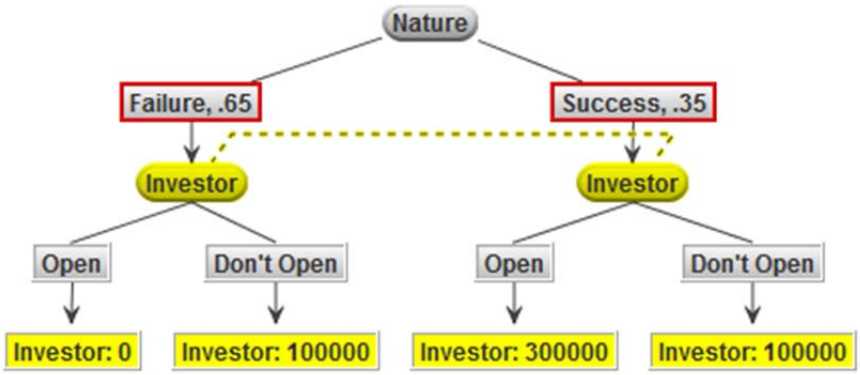
6.

a. (.5 point)



b. (.5 point) A risk neutral investor treats expected payoffs the same as certain payoffs. The expected payoff from opening the restaurant is .35 x 300,000 + .65 x 0 = $105,000. Since this is larger than the payoff from not opening the restaurant, $100,000, the risk neutral investor opens the restaurant. A risk averse investor might not necessarily follow the same decision. A risk averse investor prefers a certain payoff to an uncertain payoff, which has the same expected payoff as the certain payoff.

c. (.5 point)



The answer to part b is unchanged because the investor does not know nature's first move. The lack of information about the move made by nature is indicated by the dashed line (representing a single information set). The game is a simultaneous move game, since the investor does not know nature's choice and nature does not know the investor's choice.