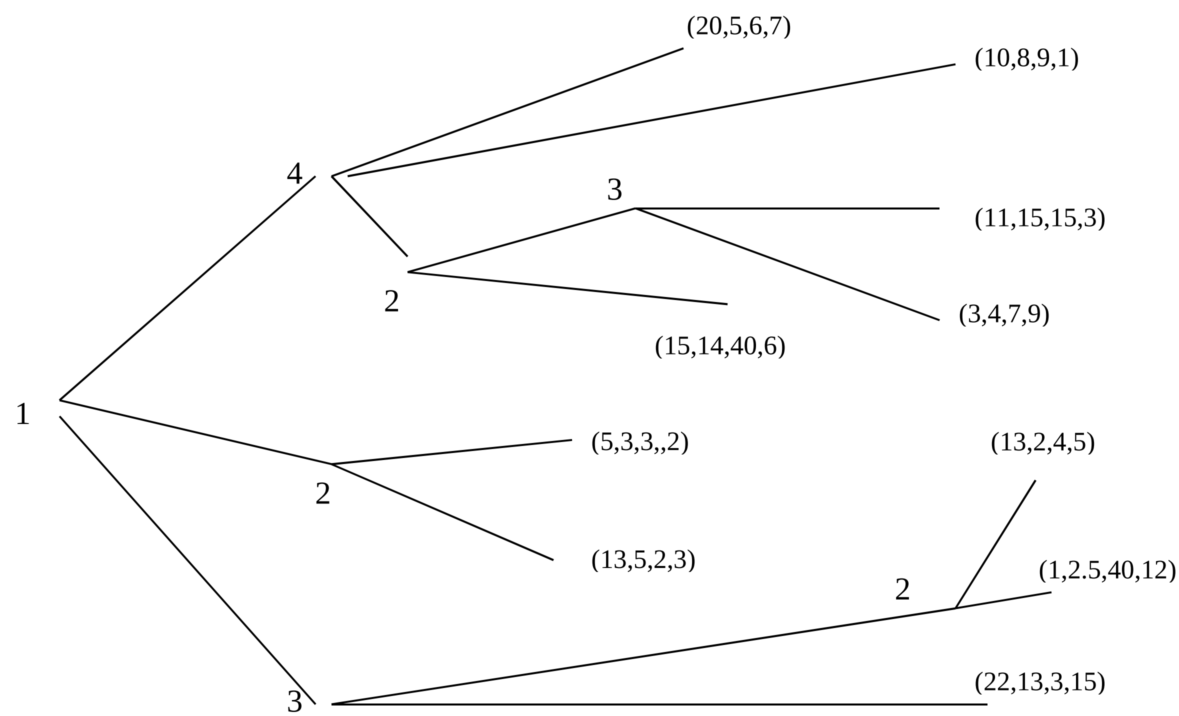
Midterm Exam October, 2013
HONORS 259L
Explain your reasoning clearly.

1. (5 points) Solve the four player game below back to front. The number at each node indicates which player gets to move. The numbers at the end show payoffs (Player1,Player 2, Player 3, Player 4). Pay careful attention to who moves when:



2 . (10 points) Find all the (pure strategy) Nash Equlibria of the following game:

	C1	C2	C3	C4
R1	(2,3)	(11,5)	(1,10)	(10 ,1)
R2	(10,11)	(7,6)	(0,-1)	(4,0)
R3	(1,6.5)	(5,20)	(2,-4)	(2,7.5)
R4	(4,4)	(1,8)	(3,11)	(4.5,7)

3. (15 points) Emily and James have agreed to divide their collection of 100 chocolate bars they gleaned from Halloween. They will divide their loot according to an offer game with a pre-determined number of offers. At each stage, one of them will propose a division (x,y), where x is the number of chocolate bars for Emily and y is the number of bars for James. The other of the two children either agrees (and the division is as proposed) or rejects. If the stage is not the final stage and there is a rejection, their father will eat one of the chocolate bars. If it is the final stage, their father will force them to split the remaining bars equally (if there is an odd number, the father will eat one and then split them equally.) At any stage of the proceedings, the sum x+y must equal the number of bars that remains in their collection. You can assume that if a player is indifferent between accepting and rejecting the player will accept.

i. Provide a back to front solution of the game where Emily offers at most once and then James offers at most once with Emily making the first offer.

ii. Provide a back to front solution of the same game where Emily makes two offers, the first and last (if the game goes that far) and James makes an offer in between (if it goes that far).

4. (10 points) In the simultaneous move, three player game below, Player 1 decides IN or OUT. Player 2 selects Rows and Player 3 selects Columns. The payoffs are listed in each cell with first entry for player 1, then Player 2 and finally, Player 3. Find the Nash equilibrium of the game by successively eliminating dominated strategies.

IN

	C1	C2	C3	C4
R1	(23,2,2)	(-3,9,0)	(33,1,7)	(1,5,8)
R2	(20,3,6)	(-2,7,4)	(34,2,7)	(2,8,10)
R3	(21,4,1)	(0,3,0)	(32,3,2)	(4,4,3)

OUT

	C1	C2	C3	C4
R1	(21,1,3)	(-2,6,-1)	(33,3,3)	(4,2,2)
R2	(20,2,9)	(-3,6,7)	(32,5,9)	(1,6,10)
R3	(23,1,3)	(0,2,-1)	(32,6,3)	(2,7,4)

5. (10 points) A child I know enjoys behaving badly and dislikes spending time-out in her room. Each hour of time-out is so bad it destroys the pleasure of one hour of bad behavior. Behaving pleasantly is only OK for her. She has about 20 hours available to spend in time-out, behaving well or behaving badly. Her parents have a short fuse. The first hour of bad behavior costs 5 minutes of time out, the next hour costs an additional 10 minutes, the next hour another 15 minutes, the next hour, 20 minutes and so on. She has just spent 2 hours being pleasant to her relatives.

   i) Use this information to provide examples of marginal costs, sunk costs and opportunity costs.

   ii) How should she allocate the rest of her time to maximize her enjoyment? If you need to make some additional assumptions to answer this, make clear what you are assuming.