Econ 308 Homework # 2

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1. Find all the Nash equilibria of the following games. (Please indicate both equilibrium strategies and payoffs.)

   (a)

		Player 2		
		l	m	r
Player 1	U	1,2	3,1	2,2
	M	0,0	1,1	1,1
	D	1,1	4,0	2,1

   (b)

P3

A

P1		P2 L	P2 R
	U	1,1,1	1,2,4
	M	2,1,0	3,1,0
	D	3,1,1	3,2,0

B

P1		P2 L	P2 R
	U	2,2,2	1,2,1
	M	3,0,0	2,1,0
	D	1,1,1	4,1,1

   (c)

		Player 2				
		V	W	X	Y	Z
Player 1	A	2,2	1,6	1,3	2,1	5,5
	B	6,1	3,4	4,4	1,3	1,6
	C	4,1	3,2	3,0	1,2	4,1
	D	1,2	2,3	1,1	2,3	2,0
	E	5,5	2,4	1,3	0,2	2,2

2. A clothing store and a jewelry store are located side by side in a small shopping mall. The number of customers who come to the shopping mall intending to shop at either store depends on the amount of money that the store spends on advertising per day. Each store also attracts some customers who come to shop at the neighboring store. If the clothing store spends $\$x_C$ per day on advertising, and the jeweler spends $\$x_J$ on advertising per day, then the total profits per day of the clothing store are $\Pi_C = (60 + x_J)x_C - 2x_C^2$ and the total profits per day of the jewelry are $\Pi_J = (105 + x_C)x_J - 2x_J^2$.

   This scenario is a simultaneous game between the clothing store and the jeweler where the strategies for each of them are their advertisement spendings.

   (a) Find the best response functions for the two stores.

   (b) Find the Nash equilibrium strategies as well as the payoffs (i.e. profits) for this game.

3. Consider the following 3 step scenario: There are 3 players.

Step 1 Player 1 chooses between H and T.

Step 2 Player 2 observes the choice of Player 1 and chooses between H and T.

Step 3 Player 3 observes the choice of Player 2, but does not observe the choice of Player 1. She also chooses between H and T and the game terminates.

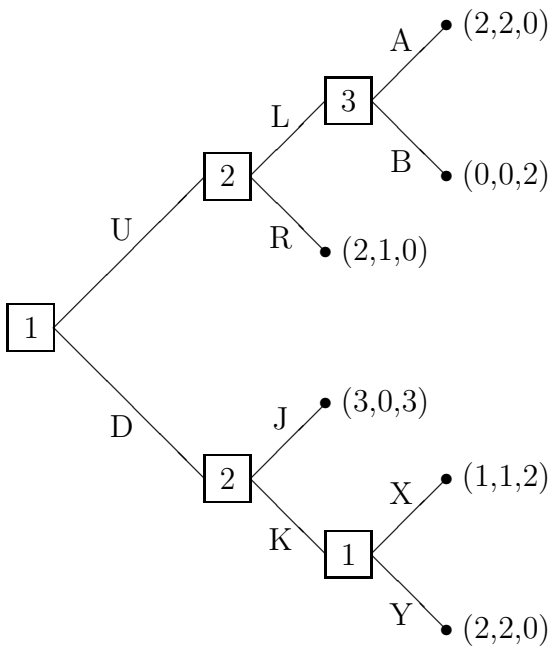
The payoffs are determined as follows:

- Player 1's payoff depends on the number of other players matching his choice. If both players match his choice then he gets a payoff of 1, if only one matches his choice then he gets a payoff of 2, and if none matches his choice then he gets a payoff of 3.
- Player 2's payoff determined as follows:
  - If he as well as Player 3 match Player 1's choice, then his payoff is 1,
  - If he matches Player 1's choice but Player 3 does not, then his payoff is 3,
  - If he does not match Player 1's choice but Player 3 does, then his payoff is 0, and
  - If neither matches Player 1's choice then his payoff is 2.
- Player 3's payoff depends only on his choice and that of Player 1. If there is a match then her payoff is 3, otherwise her payoff is 0.

(a) Represent this scenario as an extensive form game.

(b) Find the strategic game equivalent of this game.

4. Consider the following extensive form game:



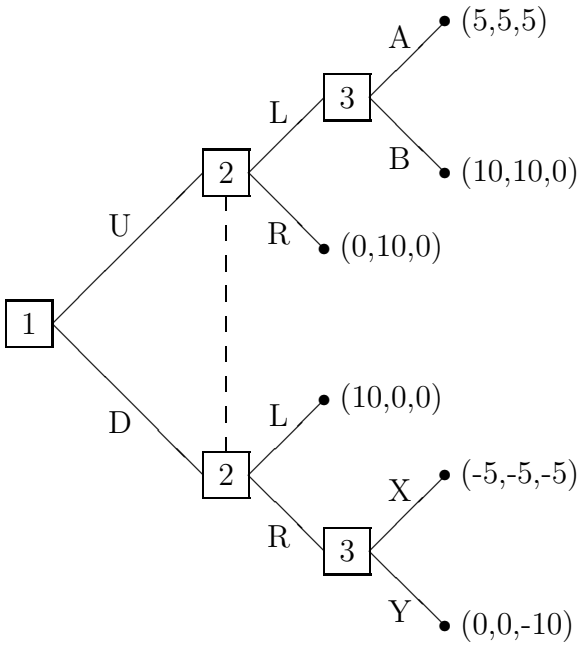
(a) Find its equivalent strategic form game.

(b) Find all its Nash equilibria using the equivalent strategic form game. (Please give equilibrium strategies as well as payoffs.)

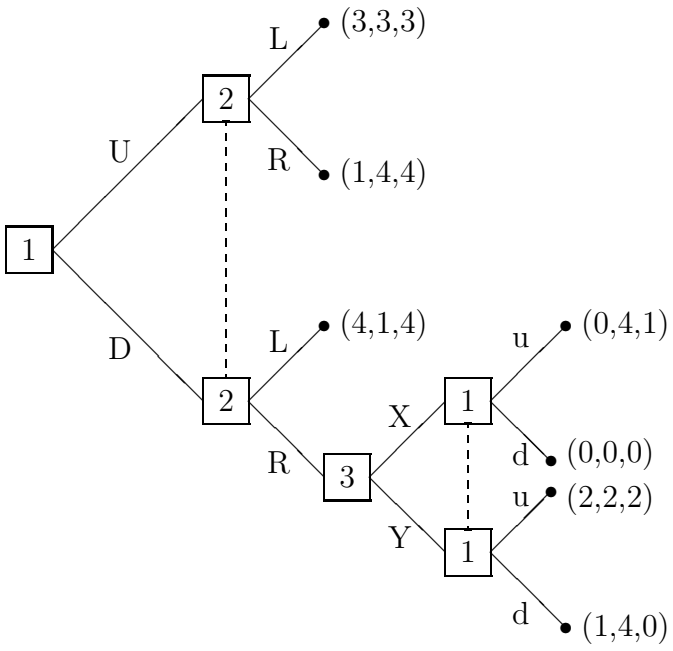
(c) Find all its subgame perfect Nash equilibria. (As always, provide strategies as well as payoffs.) Are there any Nash equilibria that are not subgame perfect? If so, which ones?

5. Find all the subgame perfect Nash equilibria of the following games. Please give equilibrium strategies as well as payoffs.

(a)


1
U
D
2
2
L
R
L
R
3
3
A
B
X
Y
(5,5,5)
(10,10,0)
(0,10,0)
(10,0,0)
(-5,-5,-5)
(0,0,-10)

(b)


1
U
D
2
2
L
R
L
R
3
1
1
X
Y
u
d
u
d
(3,3,3)
(1,4,4)
(4,1,4)
(0,4,1)
(0,0,0)
(2,2,2)
(1,4,0)

6. Firm 1, Firm 2 and Firm 3 are the only competitors in a market for a good. The price in the market is given by the inverse demand equation $P = A - (Q_1 + Q_2 + Q_3)$ where Q_i is the output of Firm i for $i = 1, 2, 3$. Unit cost for each firm is the same and it is $\$c$ per unit. Each firm wants to maximize it's profits. First Firm 1 (the leader) chooses Q_1 and next, observing Firm 1's choice, Firm 2 and Firm 3 (the two followers) simultaneously choose Q_2 and Q_3. Find the subgame perfect Nash equilibrium strategies as well as payoffs for this market? (Clearly equilibrium strategies and payoffs will be a function of the parameters of the problem A and c.)