14.12 Game Theory
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Fall 2012

Homework 2
Due on 10/5/2012 (in recitation)
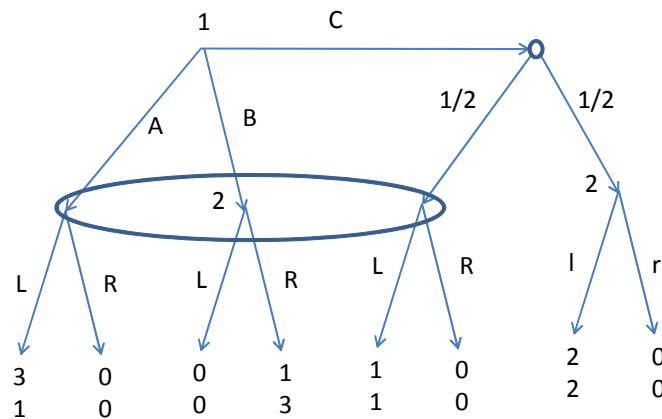
1. Consider the following game.

	a	b	c	d
w	2,0	0,5	1,0	0,4
x	4,1	2,1	0,2	1,0
y	2,1	5,0	0,0	0,3
z	0,0	1,0	4,1	0,0

   (a) Compute the set of rationalizable strategies.

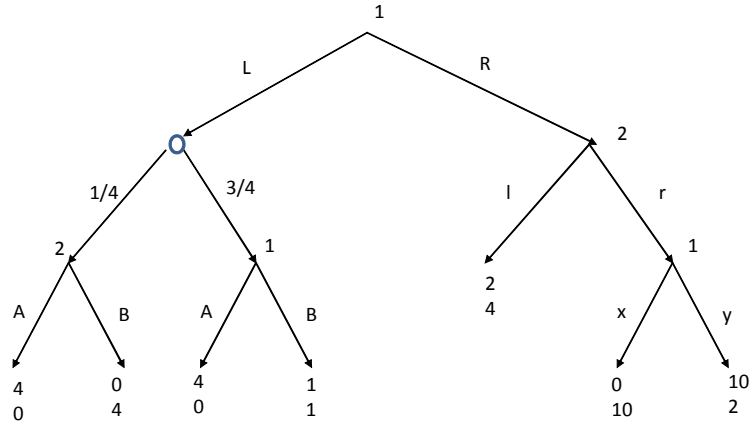   (b) Compute the set of all Nash equilibria.

2. Consider the following game.

   (a) Find all Nash equilibria in pure strategies.

   (b) Find a Nash equilibrium in which Player 1 plays a mixed strategy (without putting probability 1 on any of his strategies).

3. Use backwards induction to compute a Nash equilibrium of the following game.

1

L   R

1/4   3/4   2

2   1   l   r

A   B   A   B   2   x   y
4

4   0   4   1   0   10
0   4   0   1   10   2

4. A unit mass of kids are uniformly located on a street, denoted by the $[0, 1]$ interval. There are two ice cream parlors, one located in x and the other is located in $1 - x$, where $x \ll 1/2$. A kid located in w is to pay cost $c\,|w - y|$ to go to a store located at y, where $c > 0$. Given the prices p and q for the ice cream in stores located at x and $1 - x$, respectively, each kid buys one unit of ice cream from the store with the lowest total cost, which is the sum of the price and the cost to go to the store. (If the total cost is the same, she flips a coin to choose the store to buy.)

(a) Compute the revenue for each firm, as a function of price vector (p, q). The revenue is price times the total mass of the kids who buy from the given store.

(b) Assume that each store set their own price simultaneously and try to maximize the expected value of its own revenue, as computed in part (a). Write this game in normal form.

(c) Compute the set of Nash equilibria.

(d) Compute the set of rationalizable strategies.

14.12 Economic Applications of Game Theory
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