Isfahan University of Technology
Game Theory
Dr. Manshaei
Homework #3
Due date: Saturday, Azar 4^{th} 1402, at 23:59

We only accept the homework **delivered via *Yekta*, before the deadline**. If you have any questions or concerns about this homework, feel free to contact Mr. Ravaee via *Telegram* (Preferred) or *Email*.

Problem 1. Find all of NEs in the 3-Player game given below.

Player 1/Player 2	L	R
T	0, 0, 0	-4, 1, 2
B	1,-4, 2	2, 2,-2

Player 3 Chooses X

Player 1/Player 2	L	R
T	3, 3, -2	1, -4, 2
B	-4, 1, 2	0, 0, 0

Player 3 Chooses Y

Problem 2. Prove that the Rock-Scissor-Paper game has a unique Nash equilibrium.

Problem 3. A crime is observed by a group of n people. Each person would like the police to be informed, but prefers that someone else makes the phone call. Specifically, suppose that each person attaches the value v to the police being informed and bears the cost c if she makes the phone call, where $v > c > 0$. Hence, each player's set of actions isCall, Don't Call, and she may get the payoff 0 if no one calls, $v - c$ if she calls, and v if at least one person calls but she does not.

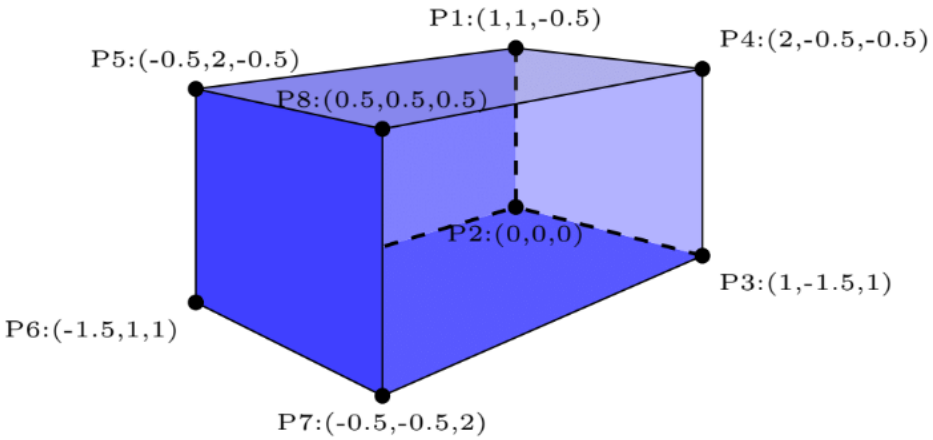
(a) Find all the pure Nash Equilibria of this game. Are they symmetric?

(b) Provided that the probability of a single person calling is p, what is the probability of no one calling the police? What's the probability of at least one person calling?

(c) Find the mixed strategy Nash Equilibrium of this game (i.e., find the probability p).

(d) As the number of people observing the crime increases, what happens to probability p?What about the probability of no one calling?

Problem 4. Consider this three player game:



(a) Choose arbitrary names for strategies and re-write these profiles in a matrix form. Notethat each player has two strategies.

(b) Find the Nash Equilibrium.

Problem 5. Look into *Bertrand duopoly* and explain it in details. How is it different with *Cournot duopoly*? Describe the situation where each of these models fit better.

Good Luck.