

CS498: Introduction to Game Theory

Assignment 1

August 19, 2016

Q1. Quiz 1 (25 marks)

Q2. (25 Marks)

Consider a game with 3 players and each player having actions 00, 01, 10, 11. That is, there are four tables of four rows, four columns each. Player 1 selects a row. Player 2 selects a column and Player 3 selects a table (Top Left, Top Right, Bottom Left, Bottom Right).

Convince yourself that there are total 64 strategy profiles. We number these strategy profiles from 0 to 63 as follows:

- Say row player selects 01, column player selects 10 and table player selects 00 then we say strategy profile is 011000 in binary. That is we number it 24 in decimal. (Everybody selecting 11, we say 63 and so on.)

Take your roll number and do mod 64 operation. (Mod operation gives remainder. So $67 \bmod 64 = 3$.) You will get a number between 0-63. Let us say this number is y . Design utility matrices for the above game and present it in Matrix form such that y is strictly dominant strategy equilibrium of the game. (If $y = 27$, then 011011, i.e., row player playing 01, column player playing 10 and table player playing 11 is a strongly dominant strategy equilibrium of the game.) (You may normalize utilities between $[0,1]$).

Q3. (50 Marks) (You may do this in groups of two people. Write a java program to find a strongly as well as weakly dominant strategy equilibrium of any n person matrix form game. (For input, generate games .nfg file format of gambit. That is, your program should take .nfg file as input <http://www.gambit-project.org/gambit14/formats.html>)

Depending on your interests, you may develop GUI to upload .nfg file, display out put etc at no extra credits. Or you may just take file name as command line argument and display output on command line.

Check your game of Q2 for dominant strategy equilibrium. Test many more :) on your own. It should work on the games TAs ask you to execute.