1 Instructions

1. You can use any programming language of your choice with the suitable input format for each of the question. Each question should have a readme file, atleast 2 input files, and a file containing implementation details.

2. A readme file should precisely tell how to compile and run your program. Give the exact commands with respect to the input files provided.

3. File containing implementation details should clearly mention the data structure used to store the game and algorithmic details. Also provide the time complexity for your implemented algorithm. Try to give as efficient program as possible.

4. The marks will be given on the basis of quality of code, use of innovative data structures, scalability, correctness, and completeness of the programs.

5. You are supposed to submit the assignment on google classroom no later than 19th **April 2020**. This is a strict deadline and any assignment submitted later will not be consider for evaluation.

Question 1

Write a program that takes a finite n-player strategic form game and outputs the following: [40 Marks]

1. All strongly dominant strategies [5]

2. All weakly dominant strategies [5]

3. Strongly dominant strategy equilibrium [5]

4. Weakly dominant strategy equilibrium [5]

5. All pure strategy Nash equilibrium [10]

6. maxmin values of all players and all their maxmin strategies [5]

7. minmax values of all players and all minmax strategy profiles against each player [5]

Question 2

Write a program that takes a finite n-player strategic form game and outputs the mixed strategy Nash equilibrium. You can expect an input with smaller number of players with smaller number of strategies as oppose to Question 1. [15 Marks]

Question 3

Write a program that takes two player zero sum game and outputs the following:[15 Marks]

1. A saddle point if it exists [5]

2. Mixed strategy Nash equilibria [10]

Question 4

Given a set of players, their finite type sets, a finite set of outcomes, and utility values, write a program that outputs all possible social choice functions that are ex-post efficient, Dominant strategy incentive compatible, and non-dictatorial at the same time (if it exists). [20 Marks]