Game Theory : Indian Economy

Assignment 1

Shorthand Notations: NE is Nash Equilibrium, WDSE is Weakly Dominant Strategy Equilibrium, SDSE is Strongly Dominant Strategy Equilibrium , S is the Strategy set, C is the Cost Function

1. Give examples of two player games:
   a) Having no NE
   a) unique NE which is not a WDSE
   b) a unique WDSE which is not an SDSE
   c) a unique DSE and another profile which is only an NE.

2. Consider the following variant of prisoners' dilemma problem
   (3+3+3+3)

P1/P2	NC	C
NC	-4,-4	-2,-X
C	-X,-2	-X,-X

Find the values of x for which:
 a) (C, C) is an SDSE
 b) (C, C) is a WDSE but not an SDSE

 c) (C, C) is an NE but not a WDSE
 d) (C, C) is not even an NE

3. Compute NE for two player game with $S1 = \{1, 2\}$, $S2 = \{3, 4\}$, such that $u_1(x, y) + u_2(x, y) = 0$

   $u_1(x, y) = |x - y|$

for all x, y lying in the set S1 and S2 respectively.

4. Find All the NE for the game

P1/P2	A	B	C	D
A	5,2	2,6	1,4	0,4
B	0,0	3,2	2,1	1,1
C	7,0	2,2	1,5	5,1
D	9,5	1,3	0,2	4,8

5. Consider 10 players simultaneously announce an integer between 0 and 100. A prize of $100 is split equally between all players whose number is closest to ⅔ of the average. Other players get nothing. Find the NE of this game.

6. Each of n people choose whether or not to contribute a fixed amount toward the provision of a public good. The good is provided if and only if at least k people contribute, where $2 \leq k \leq n$; if it is not provided, contributions are not refunded. Each person ranks outcomes from best to worst as follows: (i) any outcome in which the good is provided and he does not contribute, (ii) any outcome in which the good is provided and he contributes, (iii) any outcome in which the good is not provided and he does not contribute, (iv) any outcome in which the good is not provided and he contributes. Formulate this situation as a strategic game and find all the Nash equilibria.