Game: matrix form

	SC	PA	ST
SC	D, D	W, L	L, W
PA	L, W	D, D	W, L
ST	W, L	L, W	D, D

Zero-sum game

	SC	PA	ST
SC	0, 0	1, -1	-1, 1
PA	-1, 1	0, 0	1, -1
ST	1, -1	-1, 1	0, 0

Assumptions: players wants to maximize her utility.

The players know the entire game table and their own and other players utility.

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object of game theory: determine the outcome of possible outcomes of each game. i.e, to solve a game.

Solutions of a game

	C1	C2	C3
R1	0, 0	1, 2	0, 2
R2	1, 3	1, 4	0, 0

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The solution is (R2, C2).

Two person strictly competitive game

	C1	C2	C3	C4
R1	0	1	7	7
R2	4	1	2	20
R3	3	1	0	25
R4	0	0	7	10

Solution? Equilibrium solution

	C1	C2	C3
R1	8	8	7
R2	0	10	4
R3	9	0	1

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Equilibrium solution: (R1, C3).

In a zero sum game a necessary and sufficient condition for a pair of strategies to be in equilibrium is that the payoff determined by them equal the minimal value of its row and the maximal value of its column.

Some games have no equilibrium solutions, some have more than one.

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Two-person non-zero non-cooperative game

examples: Battle of the sex

	C1	C2	
R1	2, 1	-1, -1	
R2	-1, -1	1, 2	

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Prisoner's dilemma

	C1	C2
R1	0.9,0.9	0,1
R2	1,0	0.1,0.1

	NotConfess	Confess
NotConfess	1 yr each	10, 0.3
Confess	0.3, 10	8 yrs each

The best thing to do is to avoid such games.

Is it rational to be moral?

In certain games, self-interested individual rationality provides no reasonable solution.

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A non-cooperative game is said to be solvable in the sense of Nash if every pair of equilibrium pairs are interchangeable. The solution of a game that is solvable in the sense of Nash is its set of equilibrium pairs.

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Desirability of preplay communication

	C1	C2
R1	(1, 2)	(3, 1)
R2	(0, -200)	(2, -300)

Unique equilibrium pair: (R1, C1).

With preplay communication, Row player can force (R1, C2) by threatening to take R2.

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