DEFINITION:

Two-person zero-sum game has such properties:

1. There are are two players(called row and column)
2. The row player must choose 1 of m strate strategies, and column player must choose 1 of n strategies
3. Reward of row player and loss of column player is the meaning of a(ij), where i is a choice of row player and j is a choice of column player.

Why it is zero sum - because reward and loss of two players is 0, so cooperation between players is impossible.

John von Neumann and Oskar Morgenstern developed a theory of how two-person zero-sum games should be played, based on the following assumption

The game has saddle point if max(row min) = min(col max)

So for such game, the most ration strategy to choose is row or column where is saddle point.

Game can not to have saddle point

DEFINITION:

A two-person constant-sum game is a two-player game in which, for any choice of both player’s strategies, the row player’s reward and the column player’s reward add up to a constant value c.

If there is no saddle point in the game, we may use other ways to determine optimal strategy. One of the way, randomized it and declare each strategy some probability. It calls mixed strategy. Where some strategy has probability 1 it is pure strategy. To find optimal distribution of probabilities we may use graph method, to determine. We construct n number of lines and find their intersection if it is possible. We add all possible outcomes if another player will choose some strategy i.

As in a two-person zero-sum game, a choice of strategy by each player (prisoner) is an equilibrium point if neither player can benefit from a unilateral change in strategy

For each subset S of N, the characteristic function v of a game gives the amount v(S) that the members of S can be sure of receiving if they act together and form a coalition

Consider any two subsets of sets A and B such that A and B have no players in common (A intersection B = Ø). Then for each of our examples (and any n-person game), the characteristic function must satisfy the following inequality: v(A union B) > v(A)+ v(B) (12) This property of the characteristic function is called superadditivity.

Let`s denote x as a vector of rewards for every player. If x satisfy two equalities(group ratio and individual ration) than such x called imputation.

Important concept is domination, when we have vectors and one of them better for every i.

The core of an n-person game is the set of all undominated imputations

An imputation x {x1, x2,..., xn} is in the core of an n-person game if and only if for each subset S of N,

sum(x(i)) >= V(S)