Feasible and infeasible regions, feasible and infeasible solutions, Optimal feasible solutions

SUBJECT : (Mathematics)
CHAPTER NUMBER: 12
CHAPTER NAME : L. P. P.

Important Definitions and Results

The solution of an LPP: A set of values of the variables x_l, x_2,….,x_n satisfying the constraints of an LPP is called a solution of the LPP.

Feasible Solution of an LPP: A set of values of the variables x_l, x_2,….,x_n satisfying the constraints and non-negative restrictions of an LPP is called a feasible solution of the LPP.

Feasible Region: The common region determined by all the constraints of an LPP is called the feasible region and every point in this region is a feasible solution of the given LPP.

Important Definitions and Results

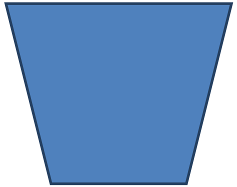
Infeasible Solution: A solution of an LPP is an infeasible solution if it does not satisfy the non-negativity restrictions.

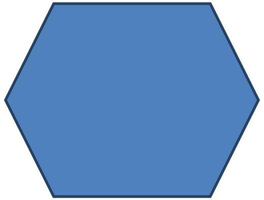
Infeasible Region: The region other than the feasible region is called the infeasible region.

Optimal Solution of an LPP: A feasible solution of an LPP is said to, be optimal (or optimum) if it also optimizes the objective function of the problem.

Convex set

A set S is convex if any point on the line segment connecting any two points in the set is also in S.





Remember: The set of all feasible solutions of an LPP is a convex set.

Important Definitions and Results

Bounded Feasible Region: A feasible region is said to be bounded if it can be enclosed within a circle.

Unbounded Feasible Region: A feasible region is said to be unbounded if it cannot be enclosed within any circle $i.e.$, if it extends indefinitely in any direction.

Fundamental Extreme Point Theorem: An optimal solution of an LPP, if it exists, occurs at one of the extreme (corner) points of the convex polygon of the set of all feasible solutions.

Assignments

Fill in the blanks:

1. Any solution to an LPP which satisfies the non-negative restrictions are called _____.

2. If the half-planes include the straight-line $ax + by + c = 0$, then these are represented by _____.

3. What happens when the objective function attains optimum value at more than one point.

4. Check whether the region given by $2x + 5y \geq 1$ is a bounded region.

5. The value of the objective function is maximum under linear constraints:

(a) At the centre of the feasible region

(b) At $(0, 0)$

(c) At any vertex of the feasible region

(d) The vertex which is the maximum distance from $(0, 0)$

THANKING YOU

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