Linear Programming

- **Linear Programming Problem(LPP)**

  A linear programming problem deals with the optimisation (maximisation and minimisation) of a linear function of two variables, known as objective function subject to the conditions that the variables are non negative and satisfy a set of linear inequalities(called linear constraints)

Terms

- **Objective function**

  Linear function Z = ax + by (where a and b are constrants) which has to be maximised or minimised is called a linear objective function

- **Decision variable**

  In the objective function z = ax + by, x and y are called decision variable

- **Constraints**

  The linear inequalities or restrictions on the variables of an LPP are called constraints. The conditions $x \geq 0$ and $y \geq 0$ are called non negative constraints.

- **Feesible Region**

  The common region determined by all the constraints including non negative constraints of an LPP is called feesible region for the problem

- **Feesible solutons:**

  Points within and on the boundary of the feesible region for an LPP represent feesible solutions.

- **Infeesible solution:**

  Any point outside feesible region is called on infeesible solution

- **Optimal solution**

  Any point in the feesible region that gives the optimal value(maximum or minimum) of the objective function is called an optimal solution

- **Theorem 1:**

  Let R be the feesible region (convex polygon) for an LPP and let z = ax + by be the objective function. When z has an optimum value(maximum or minimum), where x and y subject to the constraints described by linear inequalities, this optimal value must occur at a corner point(vertex) of the feesible region

- **Theorem 2**

  Let R be the feesible region for an LPP and let z = ax + by be the objective function. If R is bounded, then the objective function z has both a maximum and a minimum value on R and each of these occur at a corner point of R.

- **Note:**

  If the feesible region is unbounded, the maximum or minimum value of the objective function may or maynot exist.

  If it exist, it must occur at a corner point of R.