Frequently Asked Questions

1. What does the term simplex mean?
   Answer:
   The simplex is an important term in mathematics, one that represents an object in an n-dimensional space, connecting n+ 1 point.
   - In one dimension, a simplex is a line segment connecting two points
   - in two dimensions, it is a triangle formed by joining three points
   - In three dimensions, it is a four sided pyramid, having four corners

2. What does simplex method examine?
   Answer:
   The simplex method examines the extreme points in a systematic manner repeating the same set of steps of the algorithm until an optimal solution is found.

3. What is simplex method also called as?
   Answer:
   The simplex method is also called as iterative method.

4. What is the advantage of the simplex method?
   Answer:
   Since the number of extreme points (corners or vertices) of the feasible solution space are finite, the method assures an improvement in the value of the objective function as we move from one iteration (extreme point) to another and achieve the optimal solution in a finite number of steps.

5. What is the use of simplex method?
   Answer:
   The use of simplex method to solve a linear programming problem requires that the problem can be converted into its standard form.

6. What are the characteristics of a standard LP problem?
   Answer:
   1. All the constraints should be expressed as equations by adding the slack or surplus and /or artificial variables
   2. The right hand side of each constraint should be made non-negative if it is not already; this should be done by multiplying both sides of the resulting constraint by minus
   3. The objective function should be of the maximization type

7. What does degenerate mean?
   Answer:
   Degenerate is a basic feasible solution and it is called degenerate if at least one basic variable possess zero value.

8. What is the standard form of LP problem expressed?
   Answer:
   Optimize (Max or Min) $Z = c_1x_1 + c_2x_2 + \ldots + c_nx_n + 0s_1 + 0s_2 + \ldots + 0s_m$

9. What does the word unbound solution mean?

Answer:

Unbounded solution: A solution which can be increased or decreased the value of objective function of linear programming problem indefinitely is called unbound solution.

10. What is a slack variable?

Answer:

A slack variable represents an unused resource, either in the form of time on a machine, labour hours, money, warehouse space or any number of such resources in various business problems, since these variables don't yield any profit, therefore such variables are added to the original objective function with zero coefficients.

11. What is a surplus variable?

Answer:

A surplus variable represents the amount by which solution values exceed a resource. These variables are also called negative slack variables. Surplus variables, like slack variables carry a zero coefficient in the objective function.

12. What is a basic solution?

Answer:

A solution obtained by setting n-m variables not associated with the columns of B, equal to zero, and solving the resulting system is called a basic solution to the given system of equations.

13. What is a basic feasible solution?

Answer:

Basic feasible solution: A basic solution to the system Ax is equal to b is called basic feasible if x_B greater than or equal to 0.

14. What are the steps of a simplex algorithm method?

Answer:

Step 1: Formulation of the mathematical model:
Step 2: Set-up the initial solution:
Step3: Test for optimality
Step 4: Select the variable to enter the basis
Step 5: Test for feasibility (variable to leave the basis)
Step 6: Finding the new solution
Step 7: Repeat the procedure

15. What is associated cost vector?

Answer:

Let X_B be a basic feasible solution to the linear programming problem maximize Z is equal to cx subject to constraints Ax is equal to b and x is greater than equal to 0. Then the vector c_B is equal to (c_{B1}, c_{B2}, and so on to c_{Bm}), is called the cost vector associated with the basic feasible solution x_B and c_B, is coefficient of basic variable xi.