1. Which phase of an operations research study primarily deals with optimizing linear relationships among decision variables?

a) Sensitivity analysis
b) Graphical method
c) Simplex algorithm
d) Duality formulation

Answer: c) Simplex algorithm

Explanation: The simplex algorithm is a fundamental part of linear programming, a technique used in operations research to optimize linear relationships among decision variables within a feasible region defined by linear constraints.

2. In linear programming, what graphical tool is commonly used to visualize feasible regions and identify optimal solutions for two decision variables?

a) Pie chart
b) Scatter plot
c) Pareto chart
d) Graph

Answer: d) Graph

Explanation: Graphs are often used in linear programming to represent feasible regions and identify optimal solutions visually, especially when dealing with problems involving only two decision variables.

3. What key concept in linear programming refers to the property that changing the coefficients of the objective function or constraints does not affect the optimal solution?

a) Sensitivity analysis
b) Duality formulation
c) Feasibility condition
d) Degeneracy

Answer: a) Sensitivity analysis

Explanation: Sensitivity analysis in linear programming deals with understanding how changes in the coefficients of the objective function or constraints impact the optimal solution without altering the problem structure.

4. Which method in linear programming involves transforming the problem into an equivalent form to maximize one function while minimizing another related function?

a) Graphical method
b) Simplex algorithm
c) Duality formulation
d) Sensitivity analysis

Answer: c) Duality formulation

Explanation: Duality formulation in linear programming transforms the primal problem into a related dual problem, where the objective is to minimize a cost function subject to certain constraints, providing valuable insights into the original problem.

5. What technique in linear programming is utilized to examine the impact of changes in resource availability or objective function coefficients on the optimal solution?

a) Graphical method
b) Sensitivity analysis
c) Simplex algorithm
d) Duality formulation

Answer: b) Sensitivity analysis

Explanation: Sensitivity analysis in linear programming assesses how changes in parameters such as resource availability or objective function coefficients affect the optimal solution and related factors like shadow prices or dual variables.

6. Which algorithm is specifically designed to iteratively navigate through the vertices of the feasible region to find the optimal solution in linear programming?

a) Genetic algorithm
b) Graphical method
c) Simplex algorithm
d) Monte Carlo algorithm

Answer: c) Simplex algorithm

Explanation: The simplex algorithm is an iterative procedure used to find the optimal solution of a linear programming problem by traversing through the vertices of the feasible region in a systematic manner.

7. What property in linear programming refers to a situation where the basic variables remain the same despite multiple optimal solutions existing?

a) Unboundedness
b) Degeneracy
c) Redundancy
d) Feasibility

Answer: b) Degeneracy

Explanation: Degeneracy in linear programming occurs when the number of basic variables in the optimal solution is less than the number of constraints, leading to multiple optimal solutions while the basic variables remain the same.

8. Which aspect of linear programming focuses on identifying the trade-offs between multiple conflicting objectives to achieve a balanced solution?

a) Sensitivity analysis
b) Pareto optimality
c) Duality formulation
d) Feasibility condition

Answer: b) Pareto optimality

Explanation: Pareto optimality in linear programming involves finding solutions where no objective can be improved without degrading at least one other objective, thereby highlighting trade-offs between conflicting objectives.

9. In linear programming, what term refers to the set of all feasible solutions that satisfy the problem's constraints?

a) Objective function
b) Decision variables
c) Feasible region
d) Optimal solution

Answer: c) Feasible region

Explanation: The feasible region in linear programming represents the set of all possible solutions that satisfy the problem's constraints, forming the boundary within which the optimal solution lies.

10. What phase of linear programming involves translating real-world problems into mathematical models, defining decision variables, and establishing constraints?

a) Sensitivity analysis
b) Duality formulation
c) Model formulation
d) Graphical method

Answer: c) Model formulation

Explanation: Model formulation is the initial phase of linear programming where real-world problems are translated into mathematical models by defining decision variables, establishing constraints, and formulating an objective function.