1. In game theory, a zero-sum game implies that:

a) The total payoffs of all players sum up to zero.
b) One player's gain is exactly balanced by another player's loss.
c) Both players always achieve equal outcomes.
d) The game involves two players only.

Answer: b) One player's gain is exactly balanced by another player's loss.

Explanation: In a zero-sum game, the total utility or payoff is constant; any gain by one player is exactly offset by a loss to another player.

2. What does the graphical solution of a two-person zero-sum game involve?

a) Plotting the utility functions of both players on a graph.
b) Drawing indifference curves for each player.
c) Identifying the Nash equilibrium point.
d) Finding the intersection of the players' best response lines.

Answer: d) Finding the intersection of the players' best response lines.

Explanation: The graphical solution involves plotting the best response functions of each player and finding their intersection, which represents the Nash equilibrium point.

3. Which technique is commonly used to solve two-person zero-sum games algebraically?

a) Matrix inversion method
b) Determinant calculation

c) Gauss-Jordan elimination
d) Mixed strategy analysis

Answer: a) Matrix inversion method

Explanation: The matrix inversion method involves finding the optimal strategies for each player by computing the inverse of a matrix derived from the payoff matrix of the game.

4. Linear programming is utilized in solving two-person zero-sum games primarily to:

a) Find the equilibrium strategies.
b) Determine the Pareto optimal outcomes.
c) Maximize the total utility.
d) Minimize the regret of each player.

Answer: a) Find the equilibrium strategies.

Explanation: Linear programming helps in determining the optimal strategies for players in a two-person zero-sum game, leading to the equilibrium outcome.

5. Replacement models in decision-making primarily deal with:

a) Finding optimal times to replace equipment or assets.
b) Identifying the best substitutes for existing products.
c) Calculating the depreciation of assets over time.
d) Evaluating the risk associated with investment decisions.

Answer: a) Finding optimal times to replace equipment or assets.

Explanation: Replacement models involve determining when to replace equipment or assets to minimize costs while ensuring operational efficiency.

6. Economic life in replacement models refers to:

a) The period over which an asset generates revenue.
b) The time until an asset becomes technologically obsolete.
c) The duration in which an asset's maintenance costs exceed its benefits.
d) The optimal time to replace an asset based on financial considerations.

Answer: d) The optimal time to replace an asset based on financial considerations.

Explanation: Economic life represents the period during which it is financially optimal to continue using an asset before replacing it.

7. What characterizes a single-variable search technique in decision models?

a) It involves optimizing a function with respect to multiple parameters simultaneously.
b) It relies on evaluating one variable at a time to find the optimal solution.
c) It requires exhaustive iteration through all possible combinations of variables.
d) It is only applicable to linear programming problems.

Answer: b) It relies on evaluating one variable at a time to find the optimal solution.

Explanation: Single-variable search techniques focus on optimizing one variable at a time while holding others constant to find the optimal solution.

8. Dynamic programming in decision models is particularly effective for:

a) Solving complex, multi-stage optimization problems.
b) Identifying the equilibrium strategies in game theory.
c) Finding the optimal solution through exhaustive enumeration.
d) Analyzing linear programming models with multiple constraints.

Answer: a) Solving complex, multi-stage optimization problems.

Explanation: Dynamic programming is well-suited for solving problems with multiple stages or decisions, where each decision influences future outcomes.

9. Which of the following is a key feature of a multi-variable search technique?

a) It simplifies complex problems into one-dimensional searches.
b) It guarantees finding the global optimum in every iteration.
c) It evaluates multiple variables simultaneously to find the optimal solution.
d) It is computationally less intensive compared to single-variable search.

Answer: c) It evaluates multiple variables simultaneously to find the optimal solution.

Explanation: Multi-variable search techniques consider and evaluate multiple variables simultaneously to find the optimal solution, accounting for interactions between variables.

10. In decision models, the objective of dynamic programming is to:

a) Minimize the number of decision variables.
b) Maximize the immediate payoff in each decision step.
c) Find the optimal sequence of decisions over multiple stages.
d) Solve problems with only one stage of decision-making.

Answer: c) Find the optimal sequence of decisions over multiple stages.

Explanation: Dynamic programming aims to find the optimal sequence of decisions over multiple stages to achieve the best overall outcome.