

Linear Programming — Assignment 1

Class 12 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Elements of an LPP

MCQ Questions (choose the correct option)

- The function to be maximised or minimised in an LPP is called the
 - objective function
 - constraint
 - feasible region
 - vertex
- The conditions $x \geq 0, y \geq 0$ in an LPP are called
 - non-negativity constraints
 - objective functions
 - vertices
 - slack variables
- A linear programming problem has an objective function that is
 - linear
 - quadratic
 - cubic
 - constant
- The set of all feasible points is called the
 - feasible region
 - objective region
 - constraint set
 - vertex set

1 Mark Questions

- Define the objective function of an LPP.
- What are non-negativity constraints?
- Define the feasible region of an LPP.

2 Mark Questions

- Write the objective function for maximising profit if x units of A and y units of B are produced, with profits ₹5 and ₹8.
- State whether the objective function of an LPP is always linear.

3 Mark Questions

- Graph the feasible region for $x + y \leq 4, x \geq 0, y \geq 0$.
- Identify the constraints and objective function in a standard LPP.

The Corner Point Method

MCQ Questions (choose the correct option)

1. The optimum value of the objective function occurs at
 - (A) a corner point of the feasible region
 - (B) the origin
 - (C) any interior point
 - (D) the midpoint
2. The corner point method evaluates the objective function at
 - (A) each vertex
 - (B) the centroid
 - (C) the origin only
 - (D) the axes
3. For a bounded feasible region, the maximum of a linear objective function occurs at
 - (A) a vertex
 - (B) a side
 - (C) the interior
 - (D) the origin
4. If the feasible region is unbounded, a maximum may
 - (A) not exist
 - (B) always exist
 - (C) equal zero
 - (D) be negative

1 Mark Questions

1. Where does the optimum value of the objective function occur?
2. What is the corner point method?
3. When may the maximum of an LPP not exist?

2 Mark Questions

1. Evaluate $Z = 3x + 5y$ at the vertices $(0, 0)$, $(4, 0)$, $(0, 4)$.
2. List the steps of the corner point method.

3 Mark Questions

1. Maximise $Z = 4x + 3y$ subject to $x + y \leq 8$, $x, y \geq 0$ using the corner point method.
2. Minimise $Z = 2x + 3y$ subject to $x + 2y \geq 4$, $x, y \geq 0$.

Formulating a Word Problem**MCQ Questions (choose the correct option)**

1. While formulating an LPP, variables are usually
 - (A) non-negative
 - (B) negative
 - (C) zero
 - (D) complex
2. Constraints in a word problem represent

- (A) limited resources
 - (B) profits
 - (C) vertices
 - (D) objectives
3. The first step in formulating an LPP is to
- (A) identify decision variables
 - (B) find the objective
 - (C) graph the region
 - (D) find vertices
4. A word problem is translated into
- (A) inequalities and an objective
 - (B) equalities only
 - (C) a matrix
 - (D) a single equation

1 Mark Questions

1. What do the constraints represent in a word problem?
2. Why are the variables of an LPP non-negative?
3. What is the first step in formulating an LPP?

2 Mark Questions

1. Formulate an LPP for maximising profit where each unit of product A needs 2 hours and B needs 3 hours, with 100 hours available.
2. Write the constraints for a diet problem mixing two foods.

3 Mark Questions

1. Formulate and solve: A factory makes two products with machine-hour limits.
2. Formulate an LPP for a transport problem minimising cost.

Special Cases

MCQ Questions (choose the correct option)

1. If the feasible region is unbounded, the objective may have
 - (A) no maximum
 - (B) only a vertex
 - (C) a unique maximum always
 - (D) no minimum
2. If two corner points give the same optimal value, the problem has
 - (A) infinitely many solutions
 - (B) no solution
 - (C) a unique solution
 - (D) no feasible region
3. If the objective function is parallel to a constraint boundary, the problem may have
 - (A) multiple optimal solutions
 - (B) no solution

- (C) a unique solution
 - (D) unbounded region
4. An infeasible LPP has
- (A) no feasible region
 - (B) one vertex
 - (C) many vertices
 - (D) an unbounded region

1 Mark Questions

1. What happens if the feasible region is unbounded and the objective is to maximise?
2. When does an LPP have infinitely many solutions?
3. What is an infeasible LPP?

2 Mark Questions

1. Explain when an LPP has multiple optimal solutions.
2. Give an example of an unbounded feasible region.

3 Mark Questions

1. Discuss the special case where the objective function is parallel to a constraint.
2. Explain why an unbounded feasible region may still have a finite minimum.