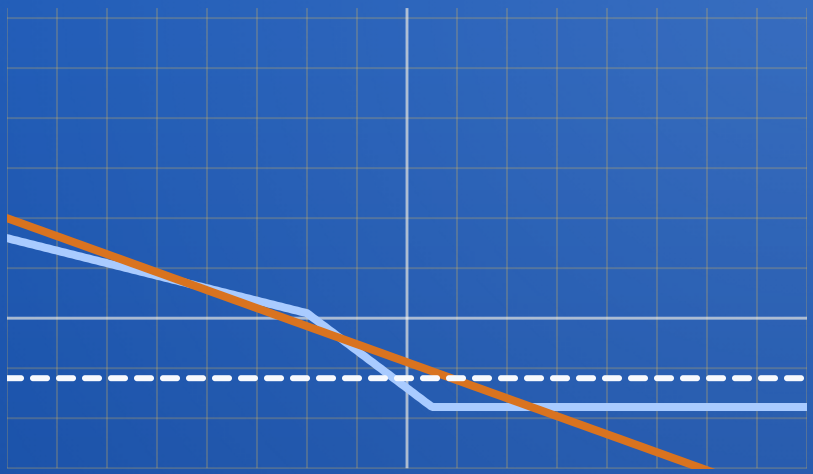
KECUDO

2026 EDITION · COLLEGE MATH SERIES



APPLIED & BUSINESS MATH

Class L2

Linear Programming & Optimization

The best decision under constraints

PREMIUM EDITION · KECUDO · L2

13 CHAPTERS · 120 SELF-ASSESSMENT QUESTIONS

INTERACTIVE EDITION + PRINT PDF

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FOUNDATION

Chapter 1

Building Models

- **Decision variables**: what you control (x city bikes, y e-bikes per week).
- **Objective**: what to maximize or minimize (profit 60x + 100y).
- **Constraints**: limits written as linear inequalities.
- **Non-negativity**: x, y ≥ 0.

WORKED EXAMPLE **Kecudo's weekly assembly plan**

1. Each city bike needs 1 h assembly and 3 h testing; each e-bike needs 2 h and 2 h.
2. Available: 40 assembly hours, 60 testing hours. Profit: $60 per city bike, $100 per e-bike.
3. Maximize P = 60x + 100y subject to x + 2y ≤ 40, 3x + 2y ≤ 60, x, y ≥ 0.

✓ **A linear program (LP)**

WHY "LINEAR"?

Every expression is a sum of constants times variables: no products of variables, powers or roots. That's what makes LPs solvable for millions of variables.

FOUNDATION

Chapter 2

Systems of Inequalities

Each linear inequality is a half-plane. Graph the boundary line, then shade the side that satisfies it (test the point (0, 0) if it isn't on the line).

WORKED EXAMPLE **Graph x + 2y ≤ 40**

1. Boundary: x-intercept 40, y-intercept 20.
2. Test (0, 0): 0 ≤ 40 true, so shade the side containing the origin.

✓ **The feasible region is the overlap of all half-planes**

FEASIBLE REGION

The set of points satisfying every constraint. For LPs it is always convex: the segment between any two feasible points stays feasible.

CHECK YOUR UNDERSTANDING

Chapter 1: Building Models

5 questions · your answer locks when you choose it

1. In Kecudo's model, x and y are the:

- **A** profits
- **B** constraints
- **C** objective
- **D** decision variables

2. Profit per e-bike in the model:

- **A** $2
- **B** $40
- **C** $60
- **D** $100

3. The assembly constraint is:

- **A** $x + 2y \leq 40$
- **B** $3x + 2y \leq 60$
- **C** $60x + 100y$
- **D** $x + y \leq 40$

4. Which is NOT linear?

- **A** $x - y = 4$
- **B** $xy \leq 10$
- **C** $2x + 3y \leq 10$
- **D** $x \geq 0$

5. Non-negativity means:

- **A** profit ≥ 0
- **B** $x, y \geq 0$
- **C** $x = y$
- **D** $x \leq 0$

FINAL EXAM

25 Questions on the Whole Book

Parts A–E · 5 questions each

Part A · Basics

1. An LP has a linear objective and:

A linear constraints
B no constraints
C quadratic constraints
D integer variables only

2. Optimal LP solutions occur at:

A random points
B the centroid
C intercepts only
D corner points

3. A slack variable is:

A a dual price
B an integer
C profit
D unused resource

4. Shadow price means:

A cost of a product
B value of one more unit of a resource
C price of a bike
D slack

5. Integer programming requires variables to be:

A continuous
B negative
C whole numbers
D equal



KECUDO

Thank you for learning with Kecudo.

NEXT IN THE SERIES

Class L3 · Math for Data Science