



Lab Sheet-2
Algebraic Method

1. Given the following LPP

$$\begin{aligned} \text{Max } Z &= 2x_1 + 3x_2 + 4x_3 + 7x_4 \\ \text{subject to } 2x_1 + 3x_2 - x_3 + 4x_4 &= 8 \\ x_1 - 2x_2 + 6x_3 - 7x_4 &= -3 \\ x_1, x_2, x_3, x_4 &\geq 0 \end{aligned}$$

Write a MATLAB code for the following

- Standardize the LPP and take parameters A, C, b as input.
 - Define the number of constraints (m) and the number of decision variables (n).
 - List out all possible basic variables.
 - Construct all basis matrices B_i from A .
 - Find all the basic solutions and check their feasibility.
 - Find the optimal solution and present it with the corresponding basic solution
2. Solve the following LPPs using the algebraic method by following the instructions in **Question 1**.

- (a)

$$\begin{aligned} \text{Max } Z &= 0.5x_2 - 0.01x_1 \\ \text{subject to } 2x_1 + 5x_2 &\leq 80 \\ x_1 + x_2 &\leq 20 \\ x_1, x_2 &\geq 0 \end{aligned}$$

- (b)

$$\begin{aligned} \text{Min } Z &= x_1 - 3x_2 + 2x_3 \\ \text{subject to } 3x_1 - x_2 + 2x_3 &\leq 7 \\ 2x_1 - 4x_2 &\geq -12 \\ -4x_1 + 3x_2 + 8x_3 &\leq 10 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

3. A furniture firm manufactures chairs and tables, each requiring the use of three machines A, B, and C. Production of one chair requires 2 hours on machine A, 1 hour on machine B, and 1 hour on machine C. Each table requires 1 hour each on machine A and B and 3 hours on machine C. The profit realized by selling one chair is Rs. 300 while for a table the figure is Rs. 600. The total time available

per week on machine A is 70 hours, on machine B is 40 hours and on machine C is 90 hours. How many chairs and tables should be made per week to maximize the profit? Formulate the LPP and solve it using the algebraic method by following the instructions in **Question 1**.

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