Tutorial 4

Gomory's Cut-Plane Method

Date of the Session:
Learning outcomes:
 If the optimal solution is integers, then problem is solved. Otherwise, add Gomory's constraint (cut) is added to optimal solution Now new problem is solved using dual simplex method The method terminates as soon as optimal solution become integers.
4.1 PRE-TUTORIAL
 Enumerate the steps involved in Gomory's cutting plane method.
Step 1: Build the Simplex Table
Step 2: Check out the conditions & build it.
Step3: Initially follow the simplex.
5tep 4: Get the corresponding values
steps: If values are integer then stop next all steps.
Step 6: If not by considering the max fractional value from it.
Step 7: Generate the source row.
Step 8: Update the table.
Step 9: Solve it.
Step 10: We'll get corresponding values

4.2 IN-TUTORIAL

1. Find solution using integer simplex method (Gomory's cutting plane method)

$$\begin{aligned} \text{Maximize} Z &= x_1 + x_2 \\ \text{subject to} \\ &= 3x_1 + 2x_2 \le 5 \\ &= x_2 \le 2 \end{aligned}$$

and x_1, x_2 are non-negative integers

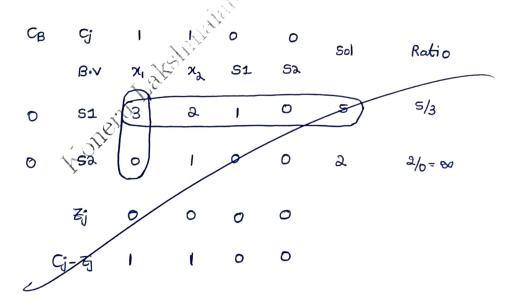
Solution:

Max
$$z = x_1 + x_2$$

 $3x_1 + 2x_2 \le 5$
 $x_2 \le 2$
Max(z) = $x_1 + x_2 + 051 + 052$
 $\Rightarrow 3x_1 + 2x_2 + 51 = 5$

 $0x_1 + x_2 + 5a = 2$

Initial Simplex Table



$$x_1 = 0 + \frac{1}{3} = \frac{1}{3} / x_2 = 2 + 0 = 2$$

To obtain an optimum integer we have to add gomory constant.

$$Max(\frac{1}{3},0) = \frac{1}{3}$$

ox is source yow.

$$\frac{1}{3} = x_1 + 0x_2 + \frac{1}{3} + 51 + \frac{0}{3} + 52$$

Fractional cut constraint

$$\frac{51}{3} + \frac{052}{3} \geqslant \frac{1}{3}$$

$$-\frac{51}{3} - \frac{052}{3} + 61 = \frac{11}{3}$$

$$C_{8}$$
 C_{j} | | | 0 0 0 0 | 8.0 | X_{1} X_{2} X_{3} X_{3}

4.3 POST-TUTORIAL

I. Consider the following or a societies forming profession

$$\label{eq:Maximum} Maximum 2 = 11r_1 + 16\sigma$$
 Subject to the constraint:

$$4r_1 + 4r_2 \le 12$$

 $6r_1 + 8r_2 \le 24$

and
$$x_1, x_2 \ge 0$$
 and are integers

Solve the problem by Gomory's cutting plane method

16

Ratio

$$\chi_{l}$$

$$x_1 = \frac{12}{7} / x_2 = \frac{12}{7}$$

Max(물,물) = I'm considering X2 is the source Yow.

fractional cut constraint

C_B C_j 14 16 0 0 0 Sol Ratio
B₁V
$$\chi_1$$
 χ_2 S1 Sa G₁

14 χ_1 1 0 $-4/_{7}$ $-3/_{7}$ 0 $1^{24/_{7}}$ 3

16 χ_2 0 1 $-3/_{7}$ $4/_{7}$ 0 $1^{24/_{7}}$ -4

0 G₁ 0 0 $-11/_{7}$ $-11/_{7}$ 1 $1^{24/_{7}}$

Z_j 14 16 2 3 0

C_j-Z_j 0 0 -2 -3 0

$$C_{B}$$
 C_{J} I_{1} I_{1} I_{2} I_{3} I_{4} I_{5} I_{5

Max. x, = 2, x2 = 1

14x,+16x2

28 + 16 = 44

F For Evaluator's Use only

Evaluator's Comments

Evaluator's Observation

Marks Secured

Full Name of the Evaluator:

Signature of the Evaluator:

Date of Evaluation: