Indian Institute of Technology Ropar
Department of Mathematics
MA303: Computing Lab
2nd semester of academic year 2024-25

Lab Sheet-6
Dual Simplex Method

- Write a code to solve the following problems through the Dual Simplex method.
- Where the input method should be like the following: (Ask from user)

  1. Enter the number of the variables.
  2. Enter the number of the constraints.
  3. Enter the number of "$\leq$" constraints.
  4. Enter the number of "$=$" constraints.
  5. Enter the number of "$\geq$" constraints.
  6. Enter the constraints chronologically.

  The output should be like following:

  1. Print the initial simplex table.
  2. Print all the tables.
  3. Print the optimal solution.
  4. Test your code on the following example.

$$\begin{aligned} \text{Maximize } Z &= -2x_1 - x_3 \\ \text{subject to } x_1 + x_2 - x_3 &\geq 5 \\ x_1 - 2x_2 + 4x_3 &\geq 8 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

Ans: $x_1 = 0, x_2 = 14, x_3 = 9$ **and** $Z_{max} = -9$

$*****$ END $*****$

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Lab Sheet-7
Transportation Problems

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1. A product is produced by four factories A, B, C, and D. Their production capacities are factory A - 50 units, B - 70 units, C - 30 units, and D - 50 units. These factories supply the product to four stores, demands of which are 25, 35, 105 and 20 units respectively. Unit transport cost in rupees from each factory to each store is given in the table below.

	Stores			
Factories	I	II	III	IV
A	2	4	6	11
B	10	8	7	5
C	13	3	9	12
D	4	6	8	3

   Write a code to determine the extent of deliveries from each of the factories to each of the stores using North-West Corner Rule and Least Cost Method, so that the total production and transportation cost is minimum.

2. Find the basic feasible solution using the Least cost method.

	I	II	III	IV	V	Available
A	4	3	1	2	6	80
B	5	2	3	4	5	60
C	3	5	6	3	2	40
D	2	4	4	5	3	20
Required	60	60	30	40	10	200 (Total)

* * * * * End * * * * *