Indian Institute of Technology Ropar
Department of Mathematics

MA303: Computing Lab II
2nd semester of academic year 2024-25

Lab Sheet-5
Two phase Method

- Write a MATLAB code to solve the following problems using the Two-Phase Method.

- The input should be taken from the user in the following sequence:

  1. Enter the number of variables.

  2. Enter the number of 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 in order.

- The output should include:

  1. Display of the initial simplex table for Phase 1.

  2. Iterative tables leading to the optimal solution for Phase 1.

  3. Display of the transformed simplex table for Phase 2.

  4. Iterative tables leading to the optimal solution.

  5. The optimal solution if one exists.

1. A company manufactures two products X_1 and X_2. The profit per unit of X_1 is Rs.50 and for X_2 is Rs.40. The production constraints are:

$$3X_1 + 2X_2 \leq 60$$
$$4X_1 + 3X_2 = 72$$
$$2X_1 + 5X_2 \geq 50$$
$$X_1, X_2 \geq 0$$

   Solve using the Two-Phase Method. [**Answer**: $X_1 = 12, X_2 = 6, Z_{max} = 840$]

2. Solve the following problem using the Two-Phase Method and analyze the nature of the solution:

   (a)

$$\text{Maximize} \quad Z = 4x_1 + 6x_2$$
$$\text{subject to} \quad 3x_1 + x_2 = 12$$
$$x_1 + 2x_2 \geq 10$$
$$x_1, x_2 \geq 0$$

(b)

$$\text{Minimize} \quad Z = 3y_1 + 5y_2$$
$$\text{subject to} \quad y_1 + 2y_2 \geq 8$$
$$2y_1 - y_2 = 6$$
$$y_1 - 3y_2 \leq 5$$
$$y_1, y_2 \geq 0$$

$$* * * * * \text{ END } * * * * *$$