



Indian Institute of Technology Ropar
Department of Mathematics

MA303: Computing Lab II
2nd semester of academic year 2023-24

Assignment 1

Duration - Till 23:59 (19/02/2024)

Total Marks - 15

1. Write a MATLAB code to solve any linear programming problem (LPP) by **Two Phase Method**.

An example of the LPP is given below, which you can use as a test case

$$\begin{aligned} \text{Minimize } Z &= -3x_1 + x_2 - 2x_3 \\ \text{subject to } x_1 + 3x_2 + x_3 &\leq 5 \\ 2x_1 - x_2 + x_3 &\geq 2 \\ 4x_1 + 3x_2 - 2x_3 &= 5 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

Input Format:

(This input format (when the complete code is written) has 10 marks assigned to it. If someone is not taking the input in the following manner, straight 10 marks will be deducted.)

- Enter the number of variables.
- Enter the no of constraints.
- Enter the number of " \leq , \geq , $=$ " constraints respectively.
- At first, enter the coefficients and RHS of each " \leq " type constraint.
- Then enter the coefficients and RHS of each " \geq " type constraint.
- Then enter the coefficients and RHS of each " $=$ " type constraint.
- Then your program should ask whether the problem is maximization or minimization type.
- Enter the coefficients of the objective function.

Required Output:

- Print all the slack, surplus, and artificial variables used.
- Print the objective function for Phase 1.
- Print all the tables of Phase 1 and clearly print where Phase 1 starts and ends.
- Print all the tables of Phase 2 and clearly print where Phase 2 starts and ends.
- At the end, if an optimal solution exists, print the optimal solution and optimal value.
- If the LPP is infeasible, or the solution is unbounded, or the solution can not be reached, the same must be printed at the end.

***** End *****