ASSIGNMENT-1

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Question:

Assumption

1. Polytope is non-degenerate.
2. Polytope is bounded
3. Rak of A is n

Implement the simplex algorithm to maximize the objective function, You need to implement the method discussed in class.

Input: CSV file with m+2 rows and n+1 column.

- **The first row excluding the last element is the initial feasible point z of length n**
- **The second row excluding the last element is the cost vector c of length n**
- **The last column excluding the top two elements is the constraint vector b of length m**
- **Rows third to m+2 and column one to n is the matrix A of size m*n**

Output: You need to print the sequence of vertices visited and the value of the objective function at that vertex.

REPORT

Code implements a simplex algorithm for linear programming. It processes input data from a file, validates the feasibility of an initial point, adjusts it to a basic feasible point, and then optimizes the objective function to find the optimal solution.

➔ Parsing the input file to extract:

- Initial point **(z)**
- Cost vector **(c)**
- Constraints matrix **(A)** and vector **(v)**

- ➔ The **is_feasible_point** function checks if the given (z) satisfies the constraint $A \cdot z \leq v$
- ➔ The **adjust_to_basic_feasible** function modifies z to ensure it is a basic feasible solution by iterating over active constraints.
- ➔ The **simplex** function iteratively moves between feasible vertices, reducing and optimizing the cost function (**c.z)** , using active constraints and reduced costs.
- ➔ We took **input as t.csv at line 111**, we can change according to our test cases.

OUTPUT: