OR LAB

Assignment 5

Nikita – 18AE30029

Date: 11-02-2022

Q1)

Input:

```
3
3
3 2 1 10
2 3 3 15
1 1 -1 4
1
1
2
2 3 4
1
```

Output:

```
phase1_objective_fn: 0 0 0 0 0 0 -1
The initial tableau:
0 4 3 2 1 1 0 0 0 10
0 5 2 3 3 0 1 0 0 15
-1 7 1 1 -1 0 0 -1 1 4

Reached the termination state of phase 1
Phase2 matrix:
2 1 1 0 3 1 0 2 2
0 5 0 -2.22045e-16 9 1 1 5 5
3 2 0 1 -4 -1 0 -3 2

Beginning Simplex method!!
leaving_var_row_index: 1, entering_var_col_index: 4
Reached the termination state

The Optimisation function is optimised at the point : x1 = 0.333333, x3 = 0.555556, x2 = 4.22222, Rest all xis=0
The value of the objective function at this point is : 15.5556
```

Q2)

Input:

```
3
3
1 1 1 40
2 1 -1 10
0 -1 1 10
1
2
2
2 3 1
1
```

Output:

```
phase1_objective_fn: 0 0 0 0 0 -1 0 -1
The initial tableau:
0 4 1 1 1 1 0 0 0 0 40
-1 6 2 1 -1 0 -1 1 0 0 10
-1 8 0 -1 1 0 0 0 -1 1 10

Reached the termination state of phase 1
Phase2 matrix:
0 4 0 2 0 1 0.5 1.5 20
2 1 1 0 0 0 -0.5 -0.5 10
1 3 0 -1 1 0 0 -1 10

Beginning Simplex method!!
leaving_var_row_index: 0, entering_var_col_index: 3
Reached the termination state

The Optimisation function is optimised at the point : x2 = 10, x1 = 10, x3 = 20, Rest all xis=0
The value of the objective function at this point is : 70
We are at an optimal point and there are non-basic variables with reduced cost equal to 0, so there are multiple values
for the decision variables that allow obtaining the optimal value
Along with the mentioned point, infinite other points exist s.t. the optimisation function is optimised
```

Q3)

Input:

```
3
3
5 7 4 7
-4 7 5 -2
3 4 -6 4.14285714
1
2
2
3 2 2
1
```

Output:

```
phase1_objective_fn: 0 0 0 0 0 0 -1
The initial tableau:
0 4 5 7 4 1 0 0 0 7
0 5 4 -7 -5 0 1 0 0 2
-1 7 3 4 -6 0 0 -1 1 4.14286

Reached the termination state of phase 1
Phase2 matrix:
2 2 0 1 42 3 0 5 0.285714
0 5 0 0 521 37 1 63 1.8e-07
3 1 1 0 -58 -4 0 -7 1

Beginning Simplex method!!
leaving_var_row_index: 1, entering_var_col_index: 4
Reached the termination state

The Optimisation function is optimised at the point : x2 = 0.285714, x3 = 3.45489e-10, x1 = 1, Rest all xis=0
The value of the objective function at this point is : 3.57143
```