Assignment 12 | Advance Algorithms CE-092

Assignment submission for Advance Algorithms subject week 12.

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Task 1:

Implement Simplex Tabular Method. Original LP should be Max type and assume all constraints <= type. Just implement for 2 variables and 2 constraints original LP.

Code:

```
# -*- coding: utf-8 -*-
# @Author: nevil11
# @Date:   2020-10-25 18:37:34
# @Last Modified by:   nevil11
# @Last Modified time: 2020-10-25 18:37:41

import itertools
import collections
import numpy as np

class simplex_tabular_solver:

    def __init__(self, eq1, eq2, max_eq):
        self.eq1 = eq1
        self.eq1.insert(len(self.eq1) - 1, 0)
        self.eq1.insert(len(self.eq1) - 1, 1)
        self.eq2 = eq2
        self.eq2.insert(len(self.eq2) - 1, 1)
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        self.eq2.insert(len(self.eq2) - 1, 0)
        self.max_eq = max_eq + [0, 0]
        self.Cb = [0, 0]
        self.Xb = [len(self.eq1) - 3, len(self.eq1) -
2]
        self.ratio = [1, 1]
        self.Z = [0] * 5
        self.ci_sub_zi = [0] * (len(self.eq1) - 1)
        self.ci_zi()

    def ci_zi(self):
        self.Z = [(self.eq1[i] * self.Cb[0] +
self.eq2[i] * self.Cb[1]) for i in
range(len(self.eq1))]
        self.ci_sub_zi = [(self.max_eq[i] - self.Z[i])
for i in range(len(self.Z) - 1)]

    def next_turn(self):
        if max(self.ci_sub_zi) > 0:
            index_enter =
self.ci_sub_zi.index(max(self.ci_sub_zi))
        else:
            return (True)

        self.ratio[0] =
(self.eq1[len(self.eq1)-1]/self.eq1[index_enter]) if
self.eq1[index_enter] > 0 else -1
        self.ratio[1] =
(self.eq2[len(self.eq2)-1]/self.eq2[index_enter]) if
self.eq2[index_enter] > 0 else -1
        min_ratio = min(self.ratio)
        if(min_ratio > 0):
            index_exit = self.ratio.index(min_ratio)
        elif(max(self.ratio) > 0):
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            index_exit =
self.ratio.index(max(self.ratio))
        else:
            return True

        print("\nEntering var : x%d:= %d, Exiting var :
x%d:= %d " % (index_enter, self.max_eq[index_enter],
self.Xb[index_exit], self.Cb[index_exit]))
        self.Xb[index_exit] = index_enter
        self.Cb[index_exit] = self.max_eq[index_enter]

        if(index_exit == 0):
            self.eq1 =
[(self.eq1[i]/self.eq1[index_enter]) for i in
range(len(self.eq1))]
            row_key = self.eq2[index_enter]
            self.eq2 = [(self.eq2[i] -
row_key*self.eq1[i]) for i in range(len(self.eq2))]
            self.ci_zi()
        else:
            self.eq2 =
[(self.eq2[i]/self.eq2[index_enter])
                        for i in range(len(self.eq2))]
            row_key = self.eq1[index_enter]
            self.eq1 = [(self.eq1[i] -
row_key*self.eq2[i])
                        for i in range(len(self.eq1))]
            self.ci_zi()
        return False

    def table_printing(self):
        print("Cb\t", "Xb\t", "previous ratios:\t\t",
self.max_eq, ", rhs]")
        print(self.Cb[0], "\t", self.Xb[0], "\t",
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self.ratio[0], "\t\t\t\t", self.eq1)
        print(self.Cb[1], "\t", self.Xb[1], "\t",
self.ratio[1], "\t\t\t\t", self.eq2)
        print("-\t", "-\tcj - zj\t\t\t\t",
self.ci_sub_zi)
        print("\n")
        return ""

    def fully_solved(self):
        finish = False
        while not finish:
            finish = self.next_turn()
            self.table_printing()
        print("After Solving the Value of function is
:- ", self.Z[len(self.Z) - 1])
        print("using x%d : = %.1f, x%d : = %.1f "
%(self.Xb[0], self.eq1[-1], self.Xb[1], self.eq2[-1]))

print("\nEquation in format of x1 x2 c1\n")
expression1 = list(map(int, input("Enter the equation -
1 :- ").split()))
expression2 = list(map(int, input("Enter the equation -
2 :- ").split()))
maxEquation = list(map(int, input("Maximization the
following function :- ").split()))
ans_partially = simplex_tabular_solver(expression1,
expression2, maxEquation)
ans_partially.fully_solved()
```
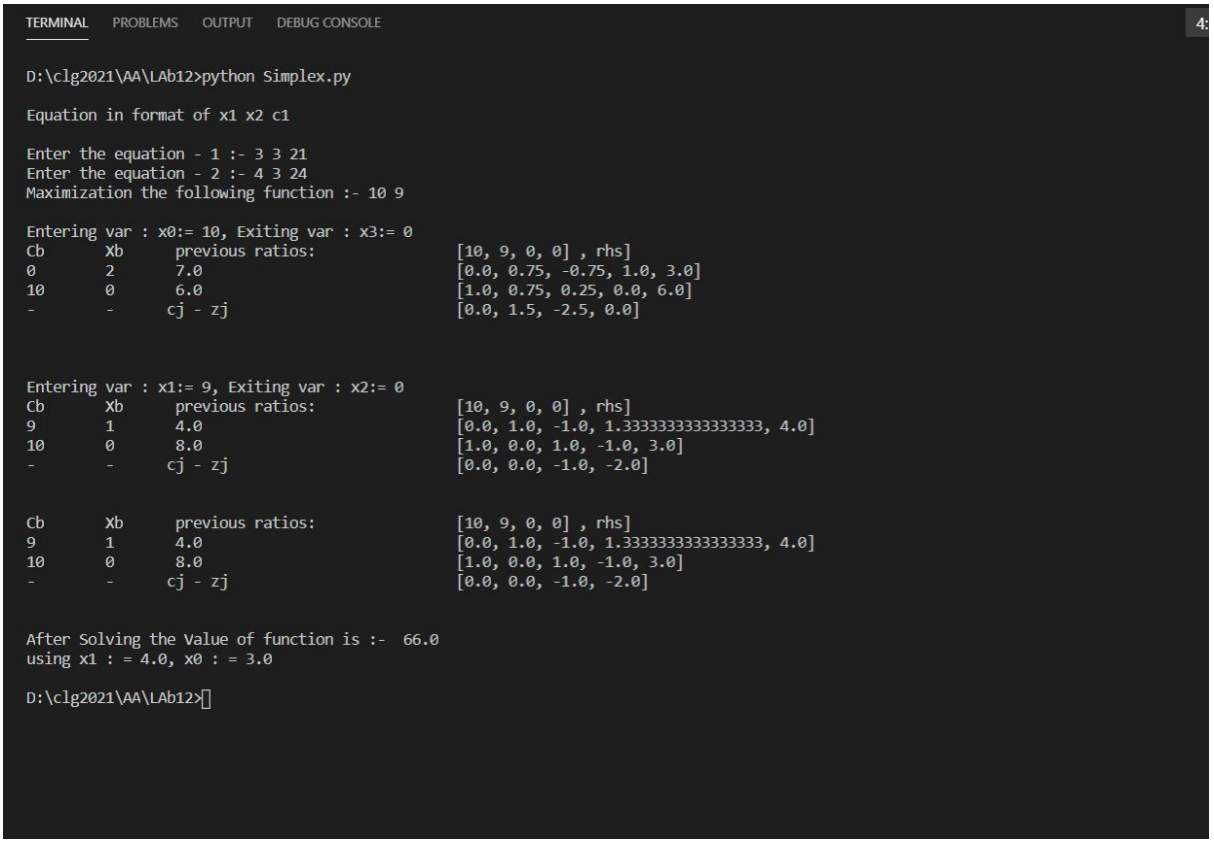

Output:



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