```
##########################################################################
# File Name: model27_mySimplex_Q2.py                                     #
# Author: Geonsik Yu, Purdue University, IE Dept                         #
# LP problem (Model 27: Hydrological Model) from:                        #
# https://sites.math.washington.edu/~burke/crs/407/models/m27.html       #
##########################################################################
import MySimplex

## STEP 1. Set up what we need. ------------------------------------------------------
## Declare small constant epsilon for strict inequality removal:
EPSILON = 0.000000000001
## Declare variable names:
variables = ["b0", "b1", "b2", "x3"]
## Delare a list of coefficients  of each variable in the objective function (same order):
obj_coeffs = 3*[0.0] + [1.0]
## Delare a list of lowerbounds of each variable:
#lowerbounds = 3*[EPSILON] + 10*[-float("inf")]
lowerbounds = 3*[EPSILON] + [0.0]
## Declare contraint names:
constraint_names = ["Period 3-(1)", "Period 3-(2)",
                                    "Period 4-(1)", "Period 4-(2)",
                                    "Period 5-(1)", "Period 5-(2)",
                                    "Period 6-(1)", "Period 6-(2)",
                                    "Period 7-(1)", "Period 7-(2)",
                                    "Period 8-(1)", "Period 8-(2)",
                                    "Period 9-(1)", "Period 9-(2)",
                                    "Period 10-(1)", "Period 10-(2)",
                                    "Period 11-(1)", "Period 11-(2)",
                                    "Period 12-(1)", "Period 12-(2)",
                                    "b2", "b1 - b2", "b0 - b1",
                                    "b0+b1+b2"]
## Declare a list of RHS constants of each constraints:
righthand = [1.0, -1.0, 2.1, -2.1, 3.7, -3.7, 4.2, -4.2, 4.3, -4.3,
                    4.4, -4.4, 4.3, -4.3, 4.2, -4.2, 3.6, -3.6, 2.7, -2.7,
                    EPSILON, EPSILON, EPSILON, 1.0]

## Declare a list of inequality directions of each constraints:
senses = 23*['G'] + ['E']

## Declare and complete a coefficient matrix for the constraints:
Mat = []
Precip = [3.8, 4.4, 5.7, 5.2, 7.7, 6.0, 5.4, 5.7, 5.5, 2.5, 0.8, 0.4]
for i in range(2, 12):
    tmp1 = [Precip[i], Precip[i-1], Precip[i-2], 1]
    tmp2 = [-Precip[i], -Precip[i-1], -Precip[i-2], 1]
    Mat.append(tmp1)
    Mat.append(tmp2)
Mat.append([0.0, 0.0, 1.0, 0.0])
Mat.append([0.0, 1.0,-1.0, 0.0])
Mat.append([1.0,-1.0, 0.0, 0.0])
Mat.append([1.0, 1.0, 1.0, 0.0])

## Set coefficients of each variables in each constraints:
lin_expr = []
for row in Mat:
    print(row)
    lin_expr.append( row )

## STEP 2. Generate LP problem object ------------------------------------------------
## Generate an LP problem framework
problem = MySimplex.SimplexProblem()
## Set objective as minimization
problem.setObjectiveDirection( Max=False )
## Set variables and objective function
problem.setVariables( Names=variables, ObjCoeffs=obj_coeffs, Lowerbounds=lowerbounds )
## Set constraints
for idx in range(len(lin_expr)):
```

```
68      problem.addConstraint( Name = constraint_names[idx]
69                                              , rowVec = lin_expr[idx]
70                                              , ineq_dir = senses[idx]
71                                              , RHS = righthand[idx] )
72
73  ## STEP 3. Solve the problem ------------------------------------------------------------
74  problem.setup()
75  Tableau = problem.buildTableau()
76  Tableau = problem.solve(Tableau)
```