!pip install -q amplpy

from amplpy import AMPL, tools

ampl = tools.ampl\_notebook(

modules=["cplex"],

license\_uuid="906b5cb9-52ea-4345-9735-e9d2687b1b40")

%%writefile Shoe.mod

set I:= {"Pontiac", "Cincinnati", "Dayton", "Atlanta"};

set J:= {"Milwaukee", "Dayton", "Cincinnati", "Buffalo", "Atlanta"};

var x{I, J} >= 0 integer;

var y{I} binary;

param C{I, J};

param F{I};

param Cap{I};

param Prod{I};

param Demand{J};

minimize Z: sum{i in I} y[i]\*F[i] + sum{i in I, j in J} C[i, j]\*x[i, j] + sum{i in I} Cap[i]\*Prod[i]\*y[i];

s.t. capacity{i in I}: sum{j in J} x[i, j] <= Cap[i]\*y[i];

s.t. demand{j in J}: sum{i in I} x[i, j] >= Demand[j];

s.t. CinDay: y["Dayton"] <= y["Cincinnati"];

s.t. Pontiac: sum{i in I} y["Cincinnati"]+y["Dayton"]+y["Atlanta"] <= 1+y["Pontiac"];

s.t. tot: sum{i in I} y[i] = 2;

%%writefile Shoe.dat

param C: Milwaukee Dayton Cincinnati Buffalo Atlanta :=

Pontiac 0.42 0.36 0.41 0.39 0.50

Cincinnati 0.46 0.37 0.30 0.42 0.43

Dayton 0.44 0.30 0.37 0.38 0.45

Atlanta 0.48 0.45 0.43 0.46 0.27;

param: F Cap Prod:=

Pontiac 7000 32000 2.70

Cincinnati 4000 40000 2.64

Dayton 6000 40000 2.69

Atlanta 7000 40000 2.62;

param Demand:=

Milwaukee 10000

Dayton 15000

Cincinnati 16000

Buffalo 19000

Atlanta 12000;

%%ampl\_eval

reset;

# Model File

model Shoe.mod;

data Shoe.dat;

# Calling Optimization Engine and Optimizing

option solver cplex;

solve;

# Display Results

display Z,x;

%%writefile Telecom.mod

set I:= {"T0", "T1", "T2", "T3", "T4", "T5"};

set J:= {"R0", "R1", "R2", "R3", "R4", "R5", "R6", "R7", "R8"};

var y{I} binary;

var x{J} binary;

param V{I,J};

param P{J};

param C{I};

maximize Z: sum{j in J} P[j]\*x[j];

s.t. constraint: sum{i in I, j in J} V[i,j]\*y[i] >=1;

s.t. budget: sum{i in I} C[i]\*y[i] <=20;

%%writefile Telecom.dat

param V: R0 R1 R2 R3 R4 R5 R6 R7 R8 :=

T0 1 1 0 0 0 1 0 0 0

T1 1 0 0 0 0 0 0 1 1

T2 0 0 1 1 1 0 1 0 0

T3 0 0 1 0 0 1 1 0 0

T4 1 0 1 0 0 0 1 1 1

T5 0 0 0 1 1 0 0 0 1;

param: P :=

R0 523

R1 690

R2 420

R3 1010

R4 1200

R5 850

R6 400

R7 1008

R8 950;

param: C :=

T0 4.2

T1 6.1

T2 5.2

T3 5.5

T4 4.8

T5 9.2;

%%ampl\_eval

reset;

# Model File

model Telecom.mod;

data Telecom.dat;

# Calling Optimization Engine and Optimizing

option solver cplex;

solve;

# Display Results

display Z,x;