9!pip install -q amplpy

from amplpy import AMPL, tools

ampl = tools.ampl\_notebook(

modules=["cplex"],

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

%%writefile Goldilocks.mod

var m1 >= 0;

var m2 >= 0;

minimize TotalTime: m1 + m2;

subject to GoldConstraint: 2 \* m1 + m2 >= 12;

subject to SilverConstraint: 2 \* m1 + 3 \* m2 >= 18;

%%ampl\_eval

reset;

model Goldilocks.mod

option solver cplex;

solve;

display TotalTime;

%%writefile Owl.mod

var m1 >= 0;

var m2 >= 0;

var m3 >= 0;

var m4 >= 0;

minimize TotalCost: 0.25 \* m1 + 0.38 \* m2 + 0.18 \* m3 + 0.33 \* m4;

subject to ProteinRequirement: 3 \* m1 + 5 \* m2 + 2 \* m3 + 3 \* m4 >= 48;

subject to CarbohydrateRequirement: 7 \* m1 + 4 \* m2 + 2 \* m3 + 8 \* m4 >= 84;

subject to FatRequirement: 5 \* m1 + 6 \* m2 + 6 \* m3 + 2 \* m4 >= 64;

%%ampl\_eval

reset;

model Owl.mod

option solver cplex;

solve;

display TotalCost;

%%writefile Covid.mod

var la >= 0;

var ga >= 0;

var ma >= 0;

var lb >= 0;

var gb >= 0;

var mb >= 0;

minimize TotalCost:

0.30\*la + 2.00\*ga + 2.50\*ma + 0.35\*lb + 1.75\*gb + 2.55\*mb;

subject to GlovesRequirement: la + lb >= 30000;

subject to GownsRequirement: ga + gb >= 5500;

subject to MasksRequirement: ma + mb >= 12500;

subject to SupplierAMinOrder: la + ga + ma >= 25000;

subject to SupplierBOrderSizeMin: lb >= 10000;

subject to SupplierBOrderSizeMax: lb + gb + mb <= 20000;

subject to SupplierAGlovesAvailable: la <= 20000;

subject to SupplierAGownsAvailable: ga <= 5000;

subject to SupplierAMasksAvailable: ma <= 10000;

subject to SupplierBGlovesAvailable: lb <= 11000;

subject to SupplierBGownsAvailable: gb <= 7000;

subject to SupplierBMasksAvailable: mb <= 9500;

%%ampl\_eval

reset;

model Covid.mod

option solver cplex;

solve;

display la, ga, ma, lb, gb, mb, TotalCost;

%%writefile presidential.mod

var pres >= 0;

var sen >= 0;

maximize Profit: 149 \* pres + 135 \* sen - (1.35 \* 30 \* pres + 1.35 \* 24 \* sen + 4.75 \* (pres + sen));

subject to ParticleBoardConstraint: 30 \* pres + 24 \* sen <= 15000;

subject to SlidingMechanismsConstraint: pres + sen <= 600;

subject to LaborHoursConstraint: 5 \* pres + 3 \* sen <= 3000;

%%ampl\_eval

reset;

model presidential.mod;

option solver cplex;

solve;

display Profit;