

MATH 3310 Mathematical Modeling

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Project 1

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### Project Code

When ran, the source code will run through 4 Simplex problems (2 2D problems that were gone over in class, and 2 3D problems I found on the internet) All of the results will be printed out in the following format:

```
Start:
-----
x1      x2      y1      y2      z      RHS
20.0    30.0    1.0     0.0    0.0    690.0
5.0     4.0     0.0     1.0    0.0    120.0
-25.0   -30.0    0.0     0.0    1.0     0.0
-----

Row Operations:
20      30      1      0      0      690
7/3     0      -2/15   1      0      28
-5      0      1      0      1      690
0       1      1/14   -2/7   0      15
7/3     0      -2/15   1      0      28
0       0      5/7    15/7   1      750

Result:
{'x1': 12.0, 'x2': 15.0, 'max': 750.0}
```

Where 'Start:' will show the starting table. Afterwards, all of the necessary row operations that were computed are printed. Finally, a resulting list shows the optimal variable values as well as the value of the result itself.

The constraints and function are added directly into the code for each problem. A matrix is generated with the needed dimensions. Each position in the constrain() arguments relates to the position of variables and the last 2 positions relate to the equality sign and the result. So the first constraint equation shown would be  $20x_1 + 30x_2 \leq 690$  (L = less than or equal to, G = greater than or equal to). The objective function follows the same format but there is no equality sign.

```
def simplex_1():
    m = gen_matrix(2, 2)
    constrain(m, '20,30,L,690')
    constrain(m, '5,4,L,120')
    obj(m, '25,30,0')
```