Assignment 5 - Simplex Algorithm

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May 7, 2018

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1 Objectives

A company wants to invest in 3 stocks (x, y, and z).

- x is the number of units of stock 1
- y is the number of units of stock 2
- z is the number of units of stock 3

The constraints include:

- $x + y + z = 6$
- $3x + 2y + z = 10$
- $z = 3$

1. Write the constraints in a matrix form. Explain the result. You can use Microsoft Word or Notepad.
2. Determine x, y, and z values using the **Numpy linalg.solve** function.
3. Inidcate a possible objective function in this case.

2 Linear Programming Problem

$$C^T x \to min$$
$$\begin{cases} Ax \leq b, \\ x \geq 0 \end{cases}$$

In out case:

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 3 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

$$x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

$$b = \begin{bmatrix} 6 \\ 10 \\ 3 \end{bmatrix}$$

3 Implementation

We require to import **numpy**

Constraints

$$A = numpy.matrix([[1, 1, 1], [3, 2, 1], [0, 0, 1]])$$

$$b = [6, 10, 3]$$

Determine the solution

$$x = numpy.linalg.solve(A, b)$$

The solution, determined the function is

$$x = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

And it is obviously correct.

4 Possible Objective Function

Possible objective function is out case could be minimization of transaction costs:

$$\sum_{i=1}^{3} |(x_i)| \rightarrow min$$