

Homework 2.1

10 points. End term: 8-th week (19-25 november 2020)

1. Devise an implementation (C, C++, C#, Java) for the Two Phase Algorithm (reusing the Simplex Algorithm code).

2. Run the Two Phase implemented algorithm on the following problems:

$$(a) \begin{cases} \min & z = -x_1 \\ \text{s. t.} & x_1 + x_2 \geq 6 \\ & 2x_1 + 3x_2 \leq 4 \\ & x_1, x_2 \geq 0 \end{cases} \quad (b) \begin{cases} \min & z = x_1 + x_2 \\ \text{s. t.} & 2x_1 + x_2 + x_3 = 4 \\ & x_1 + x_2 + 2x_3 = 2 \\ & x_1, x_2, x_3 \geq 0 \end{cases}$$

$$(c) \begin{cases} \min & z = -3x_1 + x_2 + 3x_3 - x_4 \\ \text{s. t.} & x_1 + 2x_2 - x_3 + x_4 = 0 \\ & 2x_1 - 2x_2 + 3x_3 + 3x_4 = 9 \\ & x_1 - x_2 + 2x_3 - x_4 = 6 \\ & x_1, x_2, x_3, x_4 \geq 0 \end{cases} \quad 4. \begin{cases} \min & z = x_1 + 2x_2 \\ \text{s. t.} & x_1 + x_2 = 2 \\ & 2x_1 + 2x_2 = 4 \\ & x_1, x_2 \geq 0 \end{cases}$$

2 points bonus. Modify your Simplex algorithm in order to detect (if exists) at least an alternative optimal solutions (if any).