

University of Toronto at Scarborough
Department of Computer and Mathematical Sciences

Linear Programming and Optimazation

MATB61 Winter 2020

Assignment #5

You are expected to work on this assignment prior to your tutorial in the week of Feb. 10th, 2019. You may ask questions about this assignment in that tutorial.

Midterm Test
Wednesday, February 26th, 5 – 7pm
IC130 (Last name A – Y)
IC120 (Last name Z)

The midterm test will cover materials in weeks 1 – 6 lecture notes and assignments 1 – 6.
Textbook: Chapter 1, 2

Note: There is a quiz in the week of **Feb 10th**, based on the assignment 4 (Simplex Method) and/or related material from the lecture in week 4.

The following problems are not to be handed-in.

Textbook: Elementary Linear Programming With Applications
B. Kolman & R. Beck, 2nd edition

Reading: Chapter 2 sections 2 & 3

Problems:

Section 2.2 #1 - #9

Section 2.3 #1 - #24 without Big M method

In addition:

Consider the following simplex tableau:

	x ₁	x ₂	x ₃	x ₄	x ₅	x ₆	
x ₂	-1	1	0	0	b	0	1
x ₄	-1	0	0	1	-2	1	2
x ₃	a	0	1	0	1	1	c
	d	0	0	0	e	2	0

Specify the ranges of values for the parameters a, b, c, d, e that make each of the following statements true. Assume that the original problem was a minimization problem ($\min c^T x$ subject to $Ax = b; x \geq 0$) and the initial simplex tableau contained the values c in the top row.

- a) The tableau describes an infeasible basic solution.
- b) The tableau describes an optimal basic feasible solution.
- c) The tableau describes a basic feasible solution, but the problem is unbounded and the simplex algorithm cannot proceed any further.
- d) The tableau describes an optimal basic feasible solution with multiple optimal solutions.
- e) The current basic solution is feasible. At the next iteration, x_5 is the only candidate for entering the basis. And if x_5 enters the basis, x_2 leaves the basis.
- f) The current basic solution is feasible. At the next iteration, a degenerate BFS will occur in the next tableau.