THE UNIVERSITY OF MELBOURNE

Student Number

Written assignment,

School of Mathematics and Statistics

MAST20018 Discrete Maths and Operations Research

This weekly assignment consists of 2 pages (including this page)

On the weekly assignments:

- All course assignments are individual activities. You can ask 'high-level' questions (i.e., no specific mention to answers) in #perusall.
- Assignments 2 - 9 will be scored using a 0-10 scale.
- You all have 10 points for assignment 3.
- Extra points from Perusall (P) and Course Memory (CM) activities will be added to A and capped at 100: your final mark in the assignments component (worth 20% of the final mark) will be given by $\min(A + P + CM, 100)$
- **Full marks** will be given for answers that are correct and *concise but still comprehensive*. You will also be assessed based on the clarity and organisation of your submission, which includes correct use of notation.

- **Specific comments for this assignment:**

  Goal: The goal of this assignment is to increase and test your ability to understand the relations between the primal-dual optimal solutions and how to obtain both from an optimal primal tableau.

Question 1 (10 marks) Solve the following question from (Sierksma and Zwols).

Exercise 4.8.3. Consider the following LO-model:

$$\begin{array}{lll} \max & 2x_1 + 4x_2 + 10x_3 + 15x_4 & \\ \text{s.t.} & -x_1 + x_2 + x_3 + 3x_4 \geq 1 & \\ & x_1 - x_2 + 2x_3 + x_4 \geq 1 & \\ & x_1, x_2, x_3, x_4 \geq 0. & \end{array}$$

(a) Solve the model by solving its dual model (using the graphical solution method).

(b) Solve the model by using the complementary slackness relations.

(c) Determine optimal feasible basic solutions of the model and its dual model.

End of Exam—Total Available Marks = 10