

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.
- Best answers for each question will be selected for the course memory (CM) and will receive extra points. This is optional. In order to be considered, send your (typed) answer as a pdf and also the source file (.tex, .doc, etc...) - use the ‘dummy questions’ for this.
- If you don’t want to engage with the ‘extra point’ activities, just ignore the dummy questions.
- 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 (see pinned question on notation in the course memory).

• Specific comments for this assignment:

Goal: The goal of this assignment is to test and evaluate your understanding of the simplex algorithm and to increase your ‘learning awareness’.

Question 1 (3 marks) In no more than 500 words (strict), explain the main points of what you have learnt so far in MAST 20018, including comments on what topics are still not clear to you (if any). End your answer with a reflection on how you can improve your learning experience and outcome for the end of the semester. Focus on the actions that you can implement yourself—for suggestions on the subject, use the SSLC evaluation.

Question 2 (7 marks)

Consider the linear program below:

$$\begin{aligned} & \max 5x_1 + 2x_2 \\ \text{s.t.} \quad & 2x_1 + x_2 \leq 15 \\ & 3x_1 - 2x_2 \leq 12 \\ & x_1 + 2x_2 \leq 15 \\ & -x_1 + 3x_2 \leq 15 \\ & x_1, x_2 \geq 0 \end{aligned}$$

Draw the feasible space and label all basic feasible solutions. Then, starting at the origin and using Bland's rule (see video 14), solve the problem using the simplex algorithm. For each iteration indicate the initial tableau, the basic and non-basic indices, the basic matrix A_B and its inverse A_B^{-1} , the matrix of vectors $y = (A_B)^{-1}A_{NB}$, the value of the current basic solution and to which extreme point this solution is associated.

End of Exam—Total Available Marks = 10