School of Information Technology, Deakin University

SIT320 — Advanced Algorithms

Pass Task 9 — **Linear Programming**

About this Task

At the completion of the module (**Module 9: Linear Programming**), you are required to fill a lesson review by doing following activities.

Your tutor will then review your submission and will give you feedback. If your submission is incomplete they will ask you to include missing parts. They can also ask follow-up questions, either to clarify something, or to double check your understanding of certain concepts

Task List

- **(0)** Provide a short overview of what you learned in the module. This should be based on your learning summary from lecture (seminar), module content on cloud Deakin, your interaction with Unit Chair/Tutors/Peers, your research in the library or the internet and/or your interaction with chatGPT (make sure to provide the prompts you use).
- **(1)** Solve the following LP problem graphically using the level curves in this week's lab notebook:

$$\begin{aligned} \max \quad & 4X_1 + 5X_2 \\ \text{subject to} \quad & 2X_1 + 3X_2 \leq 120 \\ & 4X_1 + 3X_2 \leq 140 \\ & X_1 + X_2 \geq 80 \\ & X_1 \geq 0 \\ & X_2 \geq 0 \end{aligned}$$

- **(2)** Write code in this week's lab for solving a system of linear equations in form of y = Ax. Note, you should use LU decomposition algorithm that we discussed in the lecture, and then use forward and backward substitution to find a value of x.
- **(3)** Solve the following linear program using Simplex on a piece of paper:

$$\begin{aligned} \text{maximize} \quad & 18X_1 + 12.5X_2 \\ \text{subject to} \quad & X_1 + X_2 \leq 20 \\ & X_1 \leq 12 \\ & X_2 \leq 16 \\ & X_1, X_2 \geq 0 \end{aligned}$$