MTH5114 **Linear Programming and Games, Spring 2024**

Week 6 Seminar Questions **Viresh Patel**

Practice Questions: Solve the following linear programs using the 2-phase Simplex algorithm. For each question, state the initial basic feasible solution found by the first phase, and the final optimal basic feasible solution to the linear program, together with its objective value. If one of these solutions does not exist, explain why.

You should indicate the highlighted row and columns in each pivot step as well as the row operations you carry out. This is in order to gain credit (e.g. in an exam) even if the final answer is incorrect.

(a)

$$\begin{aligned} \text{maximize} \quad & 3x_1 + x_2 + 2x_3 \\ \text{subject to} \quad & -x_1 + x_2 - x_3 = 1, \\ & x_1 + x_2 + 2x_3 \geq 3, \\ & 2x_1 + x_2 + 2x_3 \leq 4, \\ & x_1, x_2, x_3 \geq 0 \end{aligned}$$

(b)

$$\begin{aligned} \text{maximize} \quad & -3x_1 + x_2 \\ \text{subject to} \quad & x_1 + x_2 \geq 5, \\ & -x_1 + x_2 \geq 2, \\ & x_1 - 2x_2 = 1, \\ & x_1, x_2 \geq 0 \end{aligned}$$