

MTH5114 Linear Programming and Games, Spring 2024 Week 5 Seminar Questions Viresh Patel

Practice Questions: Solve the following linear programs using the simplex algorithm. You should give the initial tableau and each further tableau produced during the execution of the algorithm. If the program has an optimal solution, give this solution and state its objective value. If it does not have an optimal solution, say 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.

1. $5x_1 + 6x_2 + 9x_3 + 8x_4$ maximize subject to $x_1 + 2x_2 + 3x_3 + x_4 < 5$, $x_1 + x_2 + 2x_3 + 3x_4 \le 3,$ $x_1, x_2, x_3, x_4 > 0$ 2. maximize $3x_1 + 2x_2 + 4x_3$ $x_1 + x_2 + 2x_3 \le 4,$ subject to $2x_1 + 3x_3 < 5$, $2x_1 + x_2 + 3x_3 < 7$ $x_1, x_2, x_3 > 0$ 3. $2x_1 + x_2 + 3x_3$ maximize $2x_1 + -2x_2 + x_3 < 1$ subject to $-x_1 + x_2 - 2x_3 < 4$ $-3x_1 + -3x_2 + 2x_3 < 4,$ $x_1, x_2, x_3 > 0$