MATH 354: Homework 8

Due: March 24, 2022 at 11:00 am

1. Office hours the week after break are Monday March 21 3-4 pm and Thursday March 24 9-10 am.

2. Reading is Sections 7.2-4 in Miller, or equivalently 2.3 in Kolman and Beck.

3. Use the two-phase method to maximize $z = x_1 + 3x_3$ subject to the constraints

$$\begin{cases} x_1 + 2x_2 + 4x_3 = 4 \\ x_1 + 3x_2 + 2x_3 = 5 \\ x_1, x_2, x_3 \geq 0 \end{cases}$$

4. Use the Big M method to maximize $z = x_1 + 2x_2 + 7x_3 - x_4$ subject to the constraints

$$\begin{cases} 3x_1 + x_2 - x_4 = 2 \\ 2x_1 + 4x_2 + 7x_3 \geq 3 \\ x_1, x_2, x_3, x_4 \geq 0 \end{cases}$$

5. Solve Problem 7 from Homework 1, using either strategy introduced in class. [Hint: You do not need four artificial variables.]

6. Consider the following linear programming problem: maximize $z = \frac{2}{5}x_1 + \frac{2}{5}x_2 - \frac{9}{5}x_3$ subject to the constraints

$$\begin{cases} \frac{3}{5}x_1 - \frac{32}{5}x_2 + \frac{24}{5}x_3 + x_4 = 0 \\ \frac{1}{5}x_1 - \frac{9}{5}x_2 + \frac{3}{5}x_3 + x_5 = 0 \\ \frac{2}{5}x_1 - \frac{8}{5}x_2 + \frac{1}{5}x_3 + x_6 = 0 \\ x_2 + x_7 = 1 \\ x_1, x_2, x_3, x_4, x_5, x_6, x_7 \geq 0 \end{cases}$$

   Use the simplex method calculator at `https://www.emathhelp.net/en/calculators/linear-programming/simplex-method-calculator/` to confirm that the simplex method using the standard rule cycles on this problem. Then, back up to the last place in the computation where you see the standard rule choose a different entering variable from Bland's rule and solve from there using Bland's rule.