Name: _____

MATH 108
Fall 2022
HW 20: Due 12/13

"We should forget about small efficiencies, say about 97% of the time: premature optimization is the root of all evil."

–Donald Knuth

Problem 1. (10pt) Write down the initial simplex tableau for the following optimization problem:

$$\begin{aligned} \min z = 5.3x_1 - 3.4x_2 + 6.8x_3 + 8.1x_4 \\ 1.1x_1 - 2.2x_2 + 3.3x_3 - 4.4x_4 \geq 15.6 \\ 8.4x_1 + 5.9x_2 + 17.8x_4 \geq 78.4 \\ 9.9x_1 - x_2 + 6.7x_3 \geq 100.5 \\ x_1, x_2, x_3, x_4 \geq 0 \end{aligned}$$

Problem 2. (10pt) Find the dual problem for the following minimization problem:

$$\begin{aligned} \min z &= 5x_1 + 4x_2 \\ x_1 + x_2 &\geq 4 \\ x_1 + 7x_2 &\geq 8 \\ x_1 + 5x_2 &\geq 9 \\ x_1, x_2 &\geq 0 \end{aligned}$$

Problem 3. (10pt) Write down the initial simplex tableau for the following optimization problem:

$$\begin{aligned} \max z = 2x_1 + x_2 - 3x_3 \\ x_1 + 2x_2 + 3x_3 \leq 90 \\ x_1 + x_2 \geq 10 \\ x_1 - x_2 - x_3 \leq -20 \\ x_1, x_2, x_3 \geq 0 \end{aligned}$$