Name: _____

MATH 108
Spring 2024
HW 20: Due 04/24

"Okay. No hard feelings, but I hate you. Not joking. Bye."
— Gina Linetti, Brooklyn 99

Problem 1. (10pts) Find the initial simplex tableau corresponding to the linear programming problem shown below:

$$\max z = 6x_1 + 9x_2$$

$$\begin{cases} x_1 + x_2 \leq 100 \\ -x_1 + 7x_2 \geq 10 \\ -6x_1 + x_2 \leq -70 \\ x_1 + 7x_2 \leq 80 \\ x_1, x_2 \geq 0 \end{cases}$$

Problem 2. (10pts) Below is the initial simplex tableau corresponding to a linear programming maximization problem. Find the initial maximization problem.

$$\begin{array}{rrrrrrr} 4 & -1 & 2 & 1 & 0 & 0 & 82 \\ -1 & 5 & 9 & 0 & 1 & 0 & 55 \\ 7 & -1 & 4 & 0 & 0 & 1 & 68 \\ -2 & -3 & -1 & 0 & 0 & 0 & 0 \end{array}$$

Problem 3. (10pts) Below is the final simplex tableau for a linear programming maximization problem.

$$\begin{array}{rrrrrrrrr} 0 & 1 & 0 & 0 & 0.03 & 0.12 & -0.1 & 0.04 & 8.89 \\ 0 & 0 & 1 & 0 & -0.05 & 0.03 & 0.01 & 0.05 & 2.19 \\ 0 & 0 & 0 & 1 & 0.05 & -0.01 & 0.05 & 0.02 & 7.31 \\ 1 & 0 & 0 & 0 & 0.01 & -0.06 & -0.03 & 0.1 & 1.27 \\ 0 & 0 & 0 & 0 & 0.25 & 0.86 & 0.18 & 0.6 & 123.14 \end{array}$$

(a) How many inequalities were considered?

(b) How many variables were there in the original inequalities?

(c) How many slack/surplus variables were introduced?

(d) What was the solution to this maximization problem?

Problem 4. (10pts) Below is the final simplex tableau for a linear programming minimization problem.

$$\begin{array}{rrrrrrr} 3 & 9 & 0 & 1 & 0 & 2 & 5 \\ 0 & -5 & 0 & 0 & 1 & -1 & 2 \\ 1 & 4 & 1 & 0 & 0 & 1 & 2 \\ 5 & 48 & 0 & 0 & 0 & 15 & 30 \end{array}$$

(a) How many inequalities were considered?

(b) How many variables were there in the original inequalities?

(c) How many slack/surplus variables were introduced?

(d) What was the solution to this minimization problem?