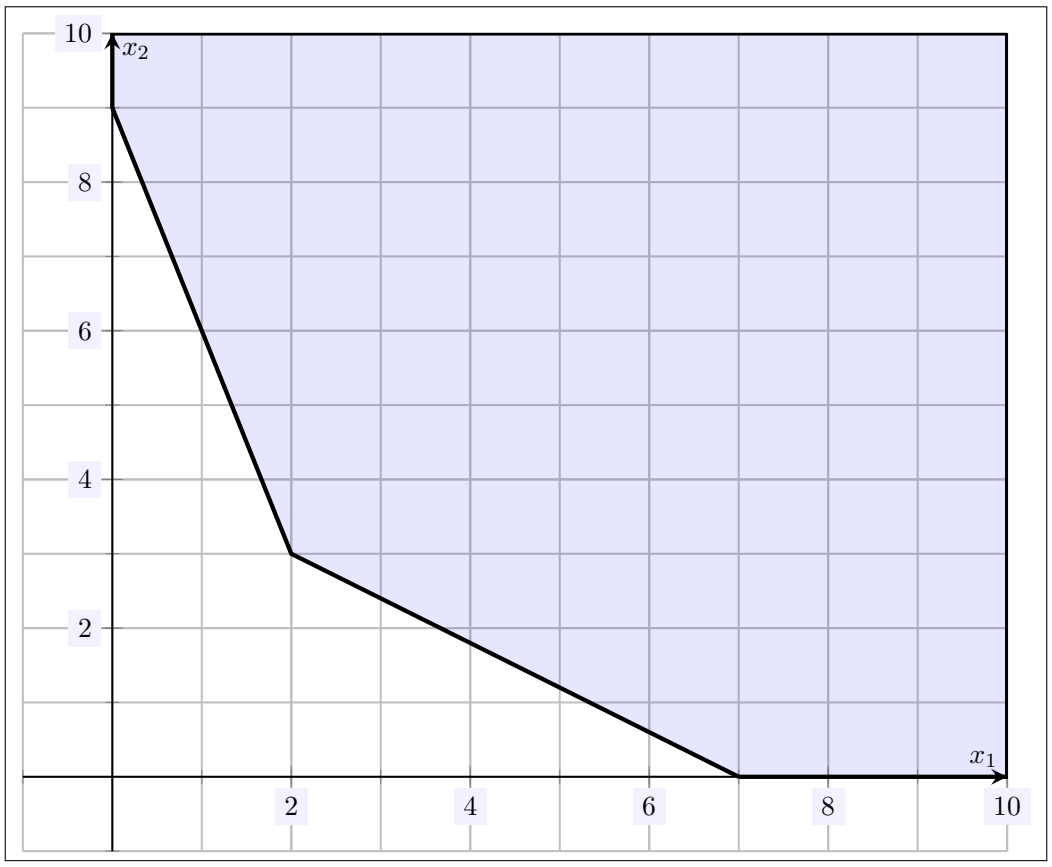
Name: _____

MATH 108
Spring 2022
Written HW 6: Due 03/09

"Always remember that you are absolutely unique—just like everyone else."

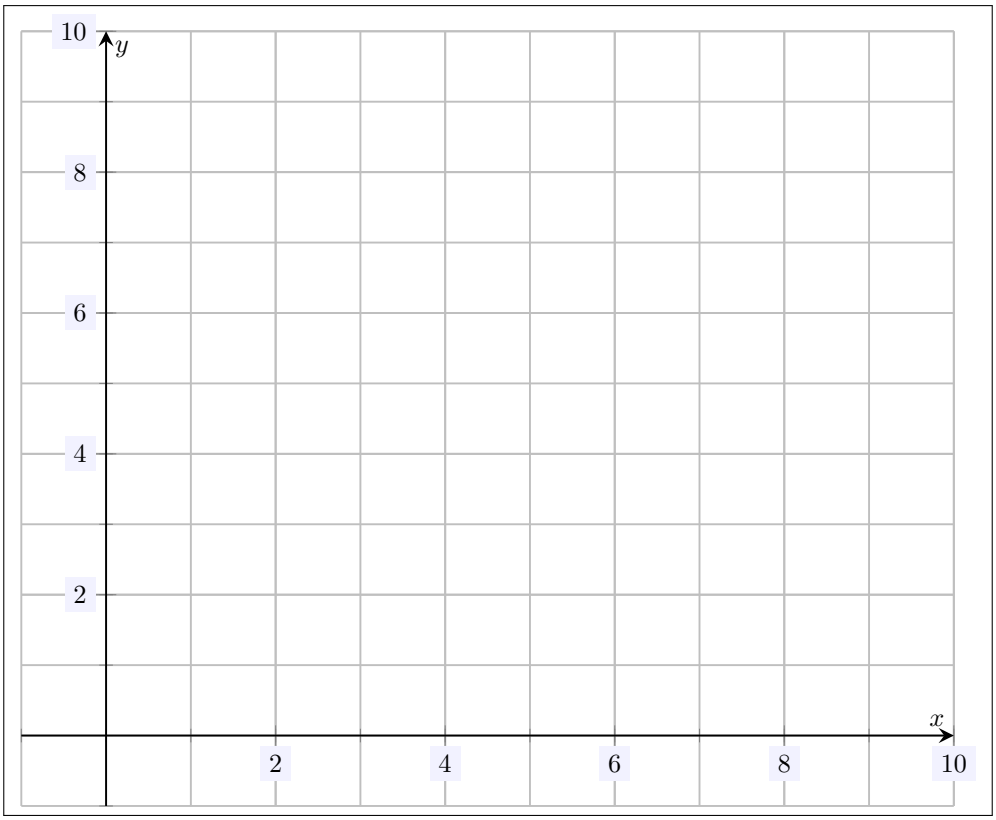
–Margaret Mead

Problem 1. (10pt) Given the feasible region shown below, find the minimum value of $f(x_1, x_2) = 8x_1 + 6x_2$. Does the function $f(x_1, x_2)$ have a maximum value on the same feasible set? Explain.



Problem 2. (10pt) Consider the minimization problem given below. As accurately as possible, sketch the feasible region given by the minimization problem. Is this minimization problem in standard form? Explain. Is there a guaranteed solution to this minimization problem? Explain.

$$\begin{aligned} \min z = -3x_1 + 8x_2 \\ x_1 - x_2 \geq -5 \\ 7x_1 + x_2 \leq 35 \\ x_1, x_2 \geq 0 \end{aligned}$$



Problem 3. (10pt) Assume the following is an 'initial simplex tableau associated to a standard minimization problem.' Write down the function being maximized and the corresponding system of constraints. Explain how the function and corresponding system of constraints changes if the problem were a standard maximization problem.

$$\begin{array}{cccccc|c} 4 & -2 & 6 & 5 & 1 & 0 & 125 \\ 3 & 0 & -3 & 5 & 0 & 1 & 340 \\ \hline -1 & 3 & -2 & -6 & 0 & 0 & 0 \end{array}$$

Problem 4. (10pt) Find the dual problem to...

$$\begin{aligned} \min w = 6x_1 - 7x_2 + 9x_3 \\ x_1 + 7x_2 - x_3 \geq 10 \\ 2x_1 - 4x_3 \geq 5 \\ x_1 + 5x_2 + 4x_3 \geq 10 \\ x_1, x_2, x_3 \geq 0 \end{aligned}$$