

Name: \_\_\_\_\_

MATH 108

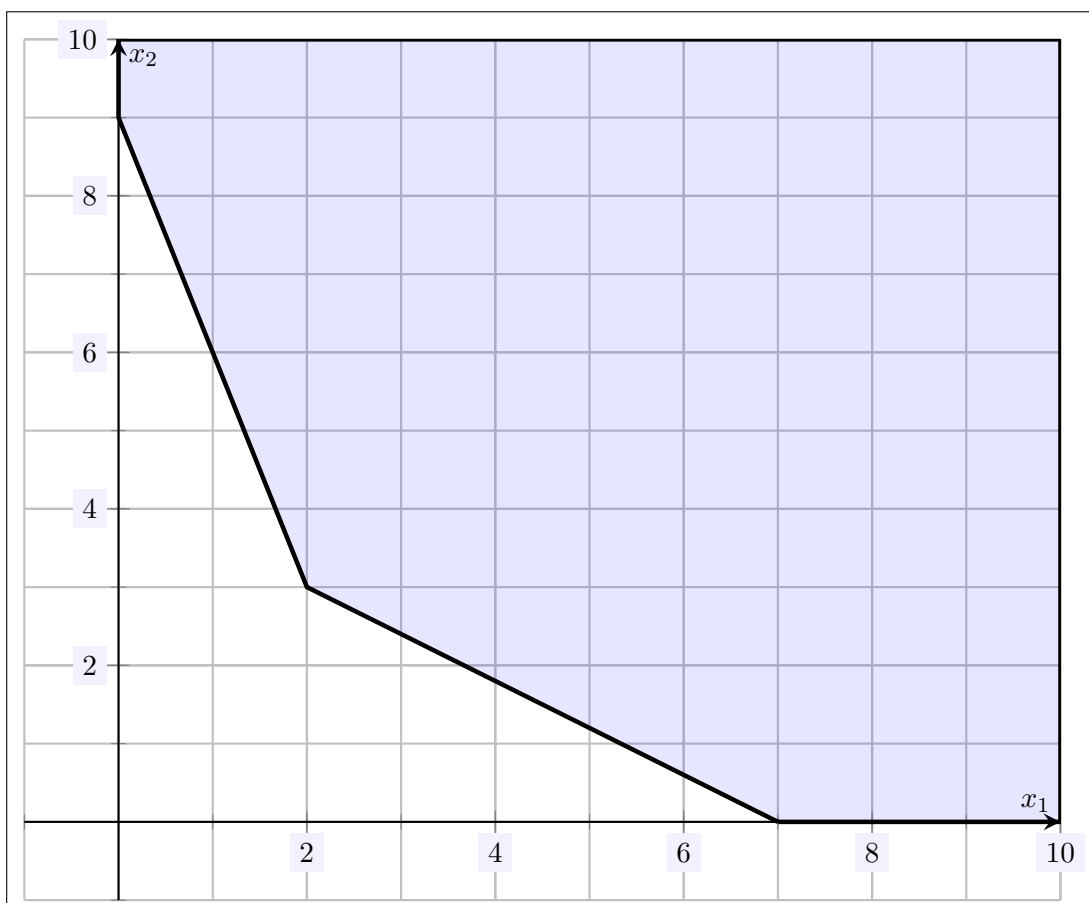
Spring 2022

Written HW 6: Due 03/07

*"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.



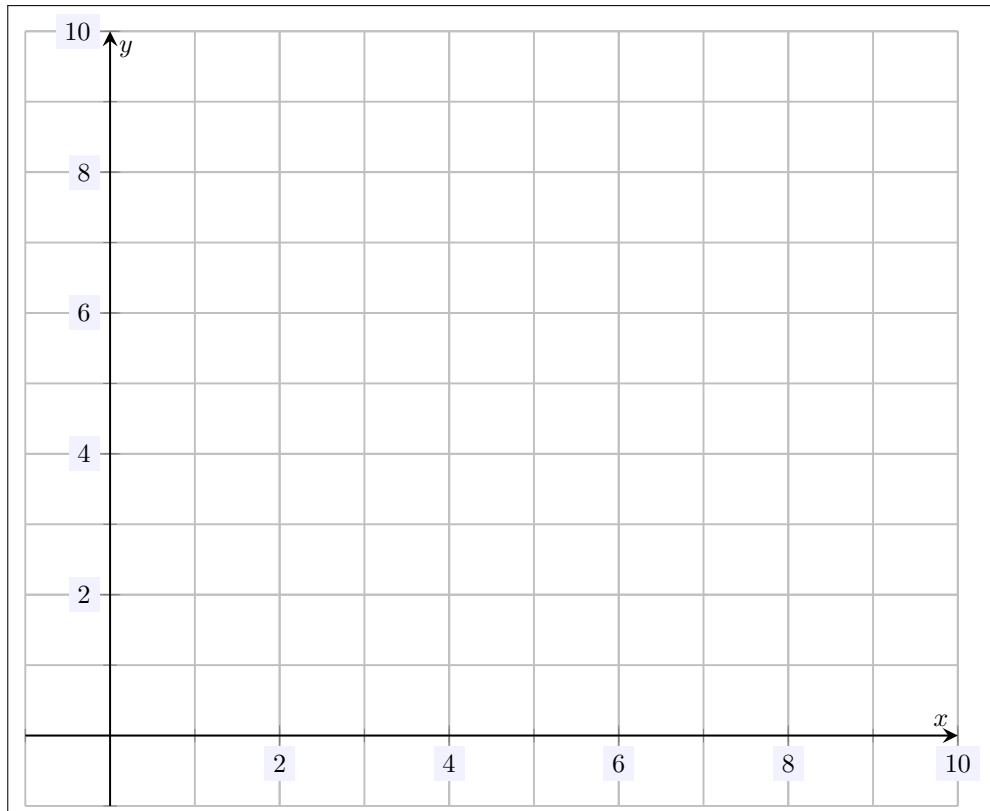
**Problem 2.** (10pt) Consider the minimization problem given below. As accurately as possible, sketch the feasible region given by the minimization problem. Is this minimization problem in standard form? Explain. Is there a guaranteed solution to this minimization problem? Explain.

$$\min z = -3x_1 + 8x_2$$

$$x_1 - x_2 \geq -5$$

$$7x_1 + x_2 \leq 35$$

$$x_1, x_2 \geq 0$$



**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.

4	-2	6	5	1	0	125
3	0	-3	5	0	1	340
-1	3	-2	-6	0	0	0

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

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