Name: _____

MATH 108

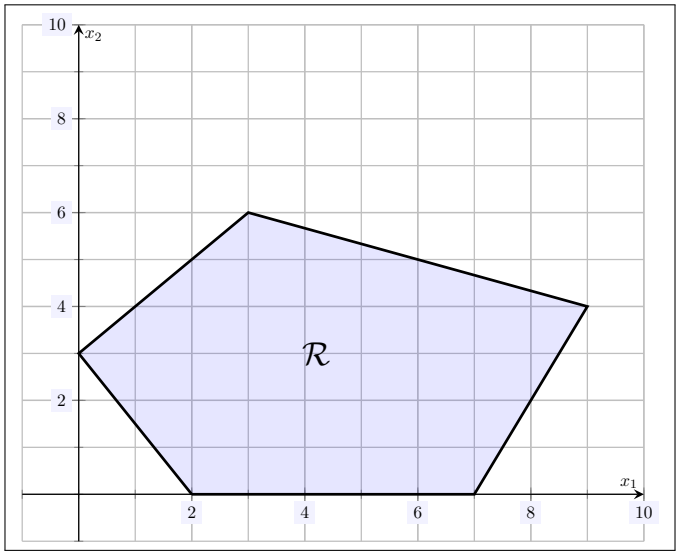
Fall 2023

HW 15: Due 12/12

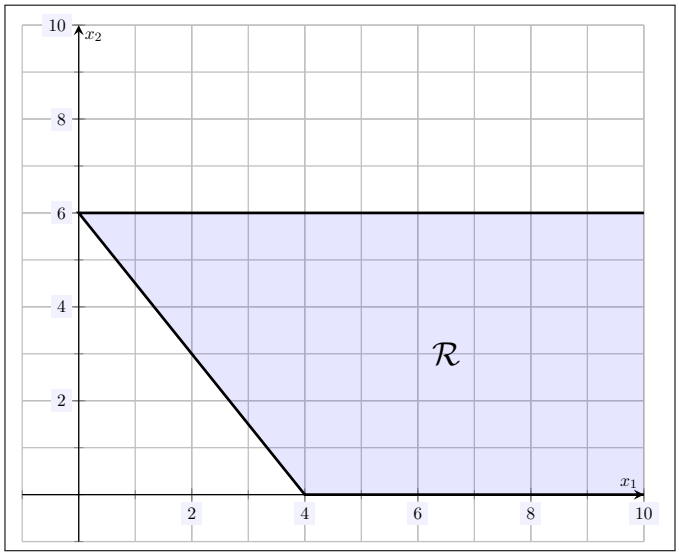
"The linear programming was—and is—perhaps the single most important real-life problem."

–Keith Devin

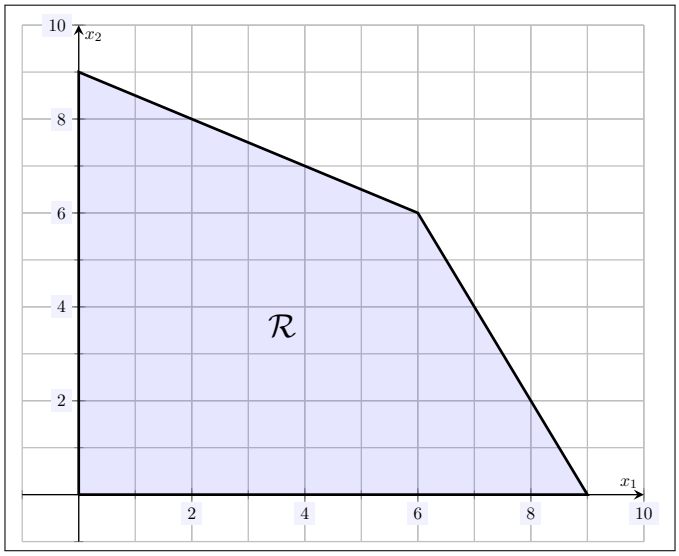
Problem 1. (10pt) Consider the function $z = 5x_1 - 6x_2$ on the region $\mathcal{R}$ shown below. Does z have a maximum or minimum value on $\mathcal{R}$? Explain. If the function has a maximum or minimum value on $\mathcal{R}$, find the maximum and minimum value.



Problem 2. (10pt) Consider the function $z = -3x_1 + 8x_2$ on the region $\mathcal{R}$ shown below. Does z have a maximum or minimum value on $\mathcal{R}$? Explain. If the function has a maximum or minimum value on $\mathcal{R}$, find the maximum and minimum value.



Problem 3. (10pt) Consider the function $z = x_1 - 9x_2$ on the region $\mathcal{R}$ shown below. Does z have a maximum or minimum value on $\mathcal{R}$? Explain. If the function has a maximum or minimum value on $\mathcal{R}$, find the maximum and minimum value.



Problem 4. (10pt) Find the dual problem for the minimization problem shown below.

$$\min w = 4y_1 + 6y_2 - 9y_3$$

$$\begin{cases} 7y_1 + 3y_2 + 8y_3 \geq 37 \\ 4y_1 - y_2 + 5y_3 \geq 55 \\ y_1 - y_2 + 3y_3 \leq 18 \\ y_1, y_2, y_3 \geq 0 \end{cases}$$