

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

MATH 108

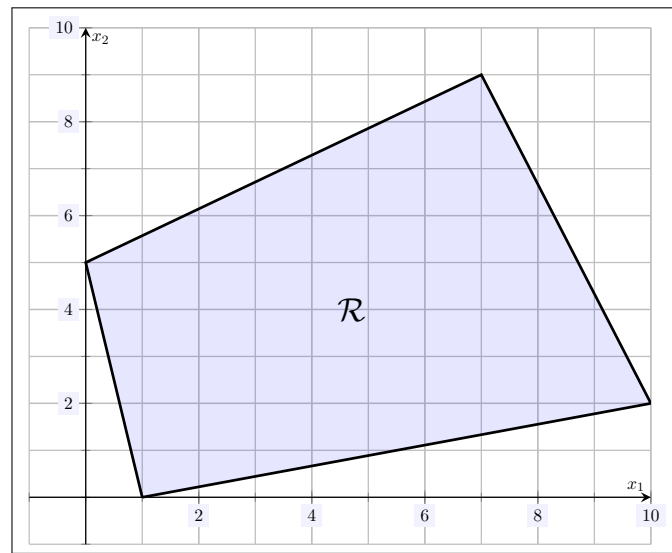
Spring 2024

HW 19: Due 04/22

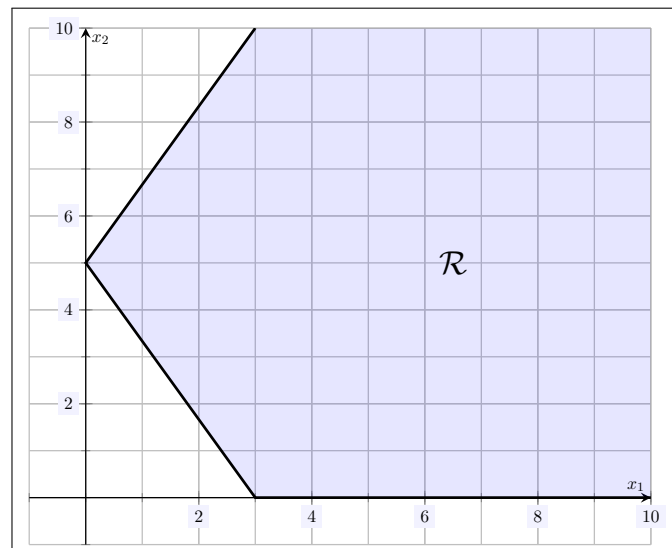
*"I was so unpopular in high school, the  
crossing guard used to lure me into traffic."*

— Annie Edison, Community

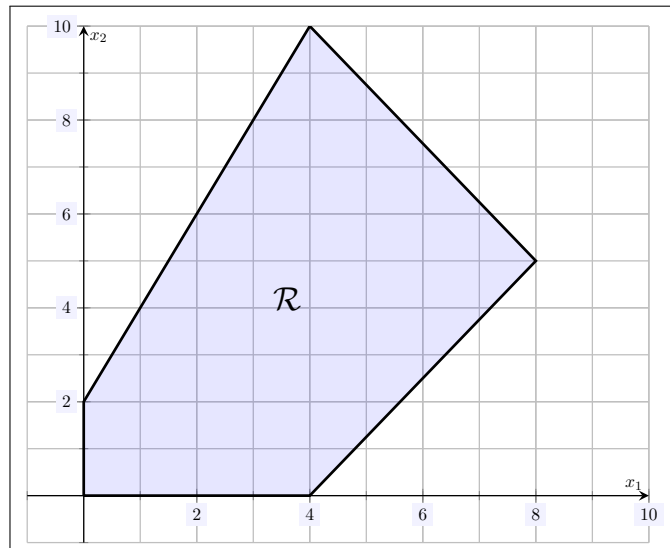
**Problem 1.** (10pts) Consider the function  $z = -65x_1 + 5x_2$  on the region  $\mathcal{R}$  shown below. Does  $z$  have a maximum or minimum value on  $\mathcal{R}$ ? Explain. If the function has a maximum or minimum value on  $\mathcal{R}$ , find the maximum and minimum value.



**Problem 2.** (10pts) Consider the function  $z = 6x_1 + 11x_2$  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.** (10pts) Consider the function  $z = x_1 + 7x_2$  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.** (10pts) Find the dual problem for the minimization problem shown below.

$$\begin{aligned} \min w &= y_1 - y_2 + y_3 \\ \begin{cases} 2y_1 - y_2 + y_3 \leq 9 \\ y_1 + 5y_2 - y_3 \geq 5 \\ 3y_1 + 4y_2 + 6y_3 \geq 10 \\ -y_1 + y_2 + 8y_3 \leq 5 \\ y_1, y_2, y_3 \geq 0 \end{cases} \end{aligned}$$