

Name \_\_\_\_\_

SHOW AS MUCH WORK AS POSSIBLE BECAUSE YOU MAY RECEIVE PARTIAL CREDIT FOR THE WORK YOU DO IF YOUR ANSWER IS INCORRECT.

1. Formulate the following scenario as a system of inequalities using the given definitions of  $x_1$ ,  $x_2$ , and  $x_3$ :

Darrin is trying to lose weight and wants to limit his intake to 2,000 calories per day. Each gram of fat contributes 9 calories and each gram of protein or carbohydrates contributes 4 calories. The recommended amount of fat is no more than 65 grams per day. In addition, he is trying a "low-carb" diet and so he wants to eat at least as many grams of protein as grams of carbohydrates.

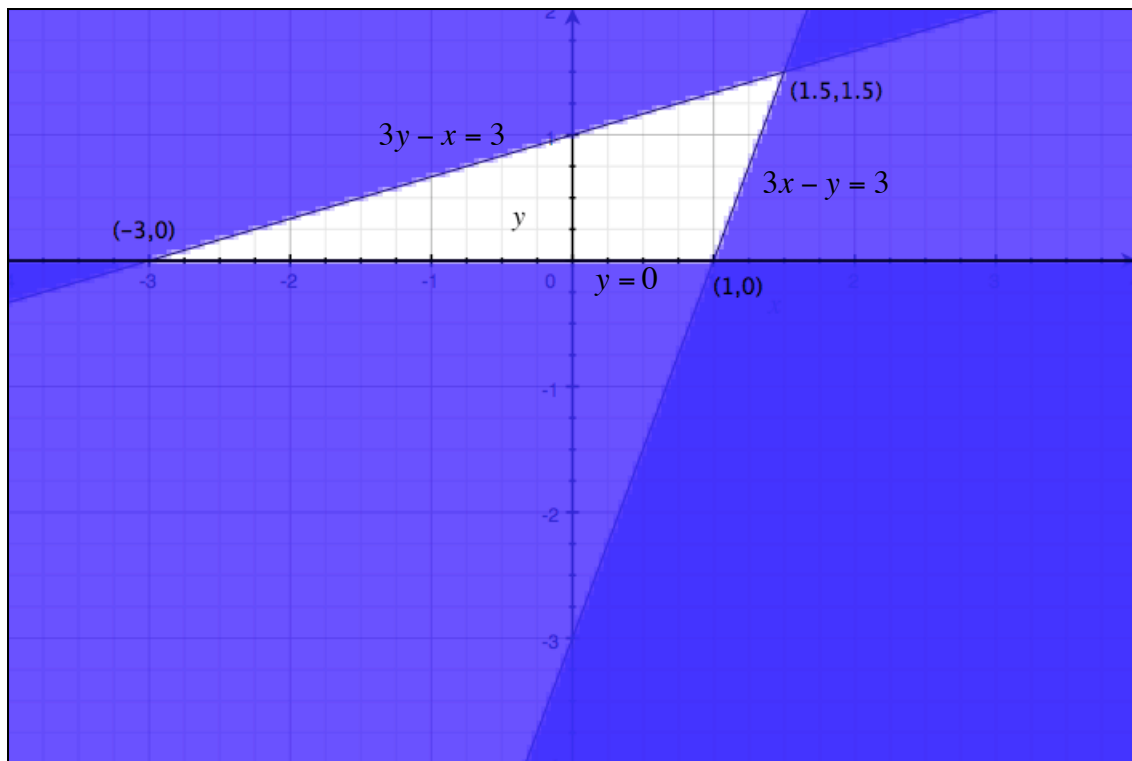
Let  $x_1$  be the number of grams of fat,  $x_2$  be the number of grams of protein, and  $x_3$  be the number of grams of carbohydrates in his diet.

$$\begin{cases} 9x_1 + 4x_2 + 4x_3 \leq 2000 \\ x_1 \leq 65 \\ x_2 \geq x_3 \\ x_1 \geq 0, x_2 \geq 0, x_3 \geq 0 \end{cases}$$

2. For the following system of inequalities:

$$\begin{cases} 3x - y \leq 3 \\ 3y - x \leq 3 \\ y \geq 0 \end{cases}$$

- Draw a graph of the system and shade in the feasible region.
- On the graph, label each of the boundary lines with its equation.
- On the graph, label each of the vertices with its coordinates.
- State whether the feasible region is "bounded" or "unbounded."



(The feasible region is **bounded** and it is the part in white.)