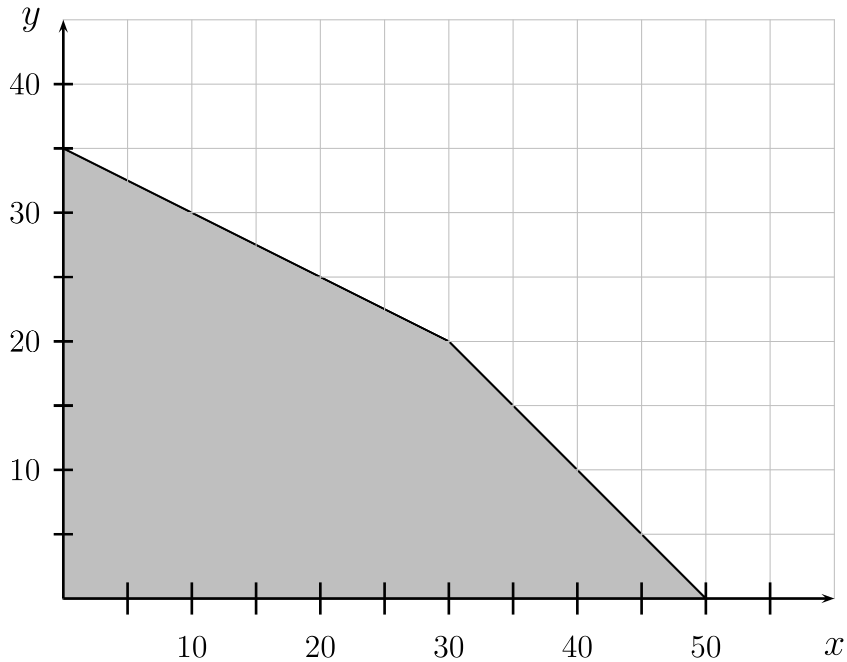
Math 371 ASSIGNMENT 5, WINTER 2016 **Name:** ______________________________

1. The shaded area below is the **feasible region** for Exercise 2 of Assignment 3. We will consider the region, along with the **objective function** $z = 140x + 150y$.

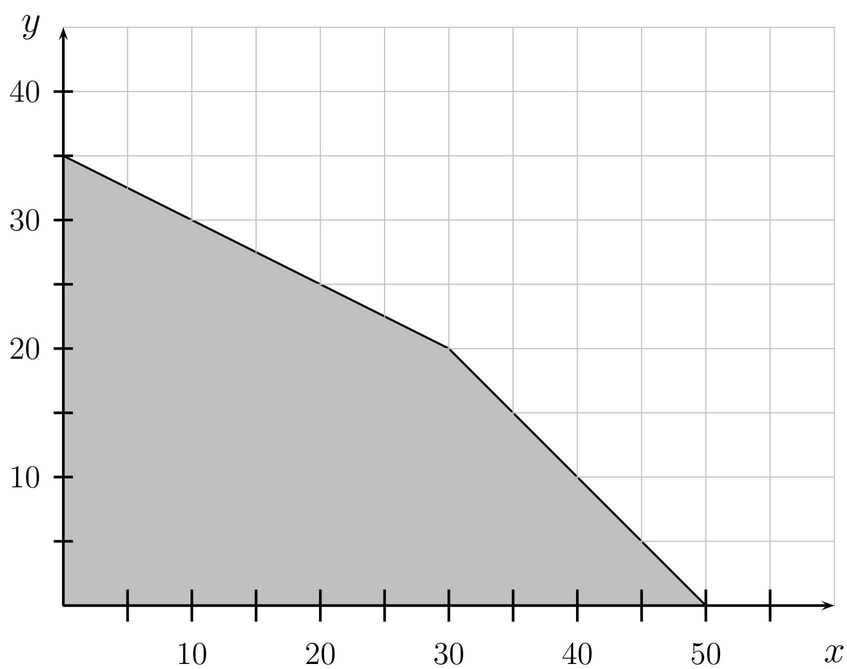
   (a) Substitute the value $z = 2100$ into the objective function and plot the resulting line by finding its intercepts *using a straightedge to draw the line.* Then write $z = 2100$ along the line, which is called a **level curve** of the objective function.

   (b) Draw and label the level curves for $z = 4200$ and $z = 6300$. (They are both lines as well.)

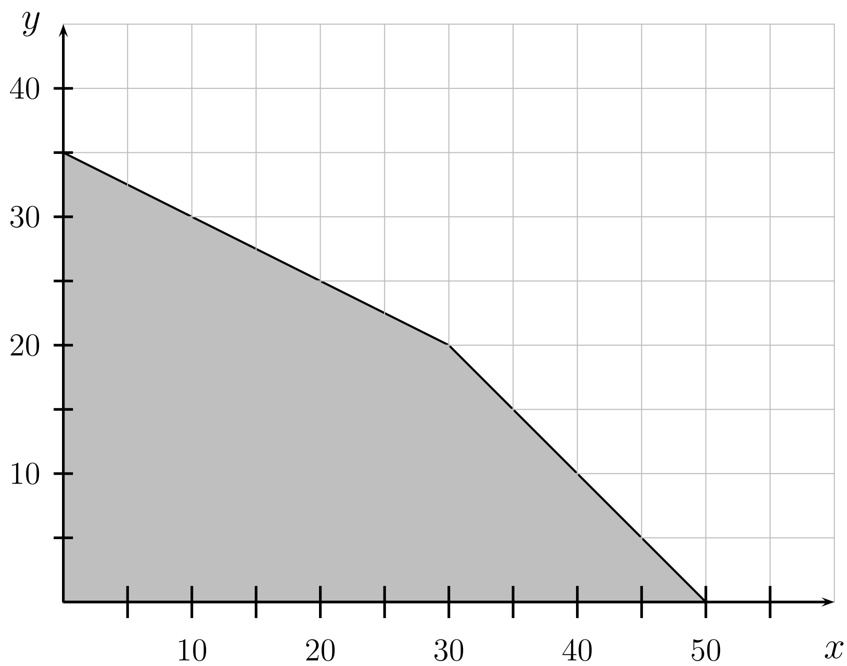
   (c) How do the three lines you've drawn relate to each other?



2. Now consider the objective function $z = 140x + 100y$. Draw in the level curve lines for $z = 1400$, $z = 2800$ and $z = 4200$ on the grid below.



3. Finally, for the objective function $z = 120x + 150y$. Draw in the level curve lines for $z = 1800$, $z = 3600$ and $z = 5400$ on the grid below.



4. On another sheet of paper, solve each of the following systems of equations by row reduction, as we did in class on Thursday. **Show all steps clearly. Any time that a row has a common factor, you will make things easier if you divide that row by the common factor.**

(a)
$$\begin{aligned} x - 3y + 2z &= 9 \\ -5x + y + 4z &= -17 \\ 2x + 2y - 3z &= 3 \end{aligned}$$

(b)
$$\begin{aligned} x - 5y + 5z &= 3 \\ 2x - 3y + z &= 2 \\ 3x + y - 3z &= 5 \end{aligned}$$

5. Determine where the lines $x + y = 100$ and $5x + 3y = 300$ cross by finding the x and y values that make both equations true. Do this by

(a) the substitution method

(b) the addition method