

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 linear programming problem using the given definitions of  $x$  and  $y$ :

A non-profit urban development corporation has agreed to rebuild at least 24 city blocks in the east end of the city. At least 15 blocks will be semidetached single-family homes and at least 3 but not more than 10 blocks will be commercial buildings. It will cost \$6 million to rebuild 1 block with homes and \$7 million to rebuild 1 block for commercial use, and the corporation wants to meet its rebuilding goals at the least cost.

Let  $x$  be the number of blocks rebuilt with homes and  $y$  be the number of blocks rebuilt with commercial buildings.

Minimize	$C = 6x + 7y$
	$\begin{cases} x + y \geq 24 \\ x \geq 15 \end{cases}$
subject to	$\begin{cases} y \geq 3 \\ y \leq 10 \\ x \geq 0, y \geq 0 \end{cases}$

2. Solve the following linear programming problem by sketching the feasible region and labeling the vertices, deciding whether a solution exists, and then finding it if it does exist:

Maximize	$P = 80x + 70y$
	$\begin{cases} x + 2y \leq 18 \\ x + y \leq 10 \end{cases}$
subject to	$\begin{cases} x \geq 0, y \geq 0 \end{cases}$



Since the feasible region is bounded, a solution exists at one of the vertices.  
The maximum value of  $P$  is 800 and it occurs at  $(10,0)$ .