1. Solve the linear relaxation of the following integer program using the geometric view where the optimal value is found in a “corner point” of the polytope defined by the inequations.

min \(-x_1 - x_2\)  
\(s.t.
\begin{align*}
   x_1 + 2x_2 & \leq 8 \\
   2x_1 + x_2 & \leq 8 \\
   x_1 & \geq 0 \\
   x_2 & \geq 0 \\
   x_1, x_2 \text{ integers}
\end{align*}
\)

2. Solve the problem above by the branch and bound algorithm using linear relaxation. Select always \(x_1\) as the branching variable when both \(x_1\) and \(x_2\) are fractional.

3. Give the following linear program in the standard form in a Simplex tableau in the diagonalized form corresponding to a basic feasible solution.

min \(-5x_1 - 4x_2\)  
\(s.t.
\begin{align*}
   6x_1 + 12x_2 & \leq 24 \\
   x_1 + 2x_2 & \leq 6 \\
   x_1 - x_2 & \geq -1 \\
   x_2 & \leq 2 \\
   x_1 & \geq 0 \\
   x_2 & \geq 0
\end{align*}
\)

4. Solve the problem above using the Simplex algorithm.