Instructions. Use GAMS as an assistant to solve subproblems.

1. Solve the following binary integer program using Branch-and-Bound.

\[
\text{max}\{2x_1 - x_2 + 5x_3 - 3x_4 + 4x_5\}
\]

subject to

\[
\begin{align*}
3x_1 - 2x_2 + 7x_3 - 5x_4 + 4x_5 & \leq 6 \\
x_1 - x_2 + 2x_3 - 4x_4 + 2x_5 & \leq 0 \\
\end{align*}
\]

\(x_1, x_2, x_3, x_4, x_5\) binary

2. Consider the following pure integer program.

\[
\text{max}\{8x_1 + 5x_2\}
\]

subject to

\[
\begin{align*}
x_1 + x_2 & \leq 6 \\
9x_1 + 5x_2 & \leq 45 \\
\end{align*}
\]

\(x_1, x_2 \geq 0, \text{ integer}\)

(a) Solve this problem graphically. Is it possible to round the LP relaxation solution to obtain the optimal integer solution?

(b) Solve the integer program using Branch-and-Bound.