

Solve the following LP (Simplex Method)

Use pivot elements of 1 or -1 as far as possible to avoid fractions.

$$\begin{aligned}
 1. \quad \text{Min } z &= -2x_1 + x_2 - 2x_3 + x_4 \\
 \text{s.t.} \quad x_1 - x_2 &+ x_4 \leq 2 \\
 &x_2 + x_3 + 2x_4 \leq 3 \\
 &x_1 + 2x_2 + 4x_3 - 2x_4 \leq 12 \\
 &x_j \geq 0 \text{ for all } j
 \end{aligned}$$

$$\begin{aligned}
 2. \quad \text{Min } z &= -2x_1 + 2x_2 + x_3 \\
 \text{s.t.} \quad x_1 - x_2 - 2x_3 &\leq 3 \\
 &x_1 - x_2 - x_3 \leq 4 \\
 &x_1 - 2x_2 \leq 0 \\
 &x_j \geq 0 \text{ for all } j
 \end{aligned}$$

$$\begin{aligned}
 3. \quad \text{Min } z &= -2x_3 - 10x_4 \\
 \text{s.t.} \quad x_1 &+ x_3 + 2x_4 \geq 2 \\
 &x_2 + x_3 + x_4 \geq 4 \\
 &x_1 + x_2 + 2x_3 + 3x_4 \leq 6 \\
 &2x_1 + x_2 + 3x_3 + 6x_4 \leq 8 \\
 &x_j \geq 0 \text{ for all } j
 \end{aligned}$$