Simplex Method (Minimizing)

1. Minimize $C = x_1 + x_2 + 2x_3$ subject to the constraints

$$\begin{cases} x_1 + 2x_2 + x_3 \geq 16 \\ 2x_1 + x_2 + x_3 \geq 10 \\ x_1 + x_3 \geq 2 \end{cases} \qquad x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0$$

Answer: $Min\ C = 9\ at\ (2,\ 7,\ 0)$

2. Minimize $C = 3x_1 + 5x_2 + 2x_3$ subject to the constraints

$$\begin{cases} x_1 + x_2 + 3x_3 \geq 4 \\ x_1 + x_2 \geq 2 \\ x_1 + x_2 + x_3 \geq 6 \end{cases} \qquad x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0$$

Answer: $Min\ C = 14\ at\ (2,\ 0,\ 4)$

3. Minimize $C = 2x_1 + x_2 + 3x_3$ subject to the constraints

$$\begin{cases} x_1 + x_2 + x_3 \geq 100 \\ 2x_1 + x_2 \geq 50 \end{cases} \qquad x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0$$

Answer: $Min\ C = 100\ at\ (0,\ 100,\ 0)$

4. Minimize $C = x_1 + x_2 + 4x_3$ subject to the constraints

$$\begin{cases} -x_1 - x_2 + x_3 \geq 2 \\ -x_1 + x_2 + 2x_3 \geq 1 \end{cases} \qquad x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0$$

Answer: $Min\ C = 8\ at\ (0,\ 0,\ 2)$

5. Minimize $C = 2x_1 + 3x_2 + x_3 + x_4$ subject to the constraints

$$\begin{cases} x_1 + 4x_2 - x_3 + 2x_4 \geq 10 \\ 2x_1 + 2x_2 + 2x_3 - x_4 \geq 30 \\ x_1 + x_2 + x_3 - 3x_4 \geq 8 \end{cases} \qquad x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0,\ x_4 \geq 0$$

Answer: $Min\ C = 25\ at\ (0,\ 5,\ 10,\ 0)$

6. Minimize $C = 4x_1 + 6x_2 + 5x_3 + 3x_4$ subject to the constraints

$$\begin{cases} x_1 + x_2 + x_4 \geq 3 \\ x_1 + 2x_2 + 2x_3 \geq 4 \end{cases} \qquad x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0,\ x_4 \geq 0$$

Answer: $Min\ C = 14\ at\ (2,\ 1,\ 0,\ 0)$