

Assignment 2

Use the Big M method to solve the following LPs:

$$\begin{aligned} 1 \quad & \min z = 4x_1 + 4x_2 + x_3 \\ & \text{s.t.} \quad x_1 + x_2 + x_3 \leq 2 \\ & \quad \quad 2x_1 + x_2 \leq 3 \\ & \quad \quad 2x_1 + x_2 + 3x_3 \geq 3 \\ & \quad \quad x_1, x_2, x_3 \geq 0 \end{aligned}$$

$$\begin{aligned} 2 \quad & \min z = 2x_1 + 3x_2 \\ & \text{s.t.} \quad 2x_1 + x_2 \geq 4 \\ & \quad \quad x_1 - x_2 \geq -1 \\ & \quad \quad x_1, x_2 \geq 0 \end{aligned}$$

$$\begin{aligned} 3 \quad & \max z = 3x_1 + x_2 \\ & \text{s.t.} \quad x_1 + x_2 \geq 3 \\ & \quad \quad 2x_1 + x_2 \leq 4 \\ & \quad \quad x_1 + x_2 = 3 \\ & \quad \quad x_1, x_2 \geq 0 \end{aligned}$$

$$\begin{aligned} 4 \quad & \min z = 3x_1 \\ & \text{s.t.} \quad 2x_1 + x_2 \geq 6 \\ & \quad \quad 3x_1 + 2x_2 = 4 \\ & \quad \quad x_1, x_2 \geq 0 \end{aligned}$$

$$\begin{aligned} 5 \quad & \min z = x_1 + x_2 \\ & \text{s.t.} \quad 2x_1 + x_2 + x_3 = 4 \\ & \quad \quad x_1 + x_2 + 2x_3 = 2 \\ & \quad \quad x_1, x_2, x_3 \geq 0 \end{aligned}$$

$$\begin{aligned} 6 \quad & \min z = x_1 + x_2 \\ & \text{s.t.} \quad x_1 + x_2 = 2 \\ & \quad \quad 2x_1 + 2x_2 = 4 \\ & \quad \quad x_1, x_2 \geq 0 \end{aligned}$$

7.

Use the Big M method and the two-phase method to find the optimal solution to the following LP:

$$\begin{aligned} & \max z = 5x_1 - x_2 \\ & \text{s.t.} \quad 2x_1 + x_2 = 6 \\ & \quad \quad x_1 + x_2 \leq 4 \\ & \quad \quad x_1 + 2x_2 \leq 5 \\ & \quad \quad x_1, x_2 \geq 0 \end{aligned}$$