

ABS 212: Convex Optimization

Assignment 2

GGSIPIU (East Delhi Campus)

1. Solve the following LPPs through Big-M method and two-phase method.

$$\begin{aligned} \min \quad & z = 2x_1 - x_2 + 2x_3 \\ \text{subject to:} \quad & -x_1 + x_2 + x_3 = 4, \\ & -x_1 + x_2 - x_3 \leq 6, \\ & x_1 \leq 0, \quad x_2 \geq 0. \end{aligned}$$

2. Find the dual of the following LPPs:

(i)

$$\begin{aligned} \max \quad & x + 3y \\ \text{subject to:} \quad & x + y \leq 3, \\ & 2x - y \geq -1, \\ & x + 2y = 5, \\ & x \geq 0, y \in \mathbb{R}. \end{aligned}$$

(ii)

$$\begin{aligned} \min \quad & 5x - 2y + 3z \\ \text{subject to:} \quad & 2x + 2y - z \geq 2, \\ & 6x + 5y + 10z \leq 76, \\ & 8x - 3y + 6z \leq 50, \\ & x \geq 0, y \in \mathbb{R}, z \geq 0. \end{aligned}$$

3. Solve the following LPP (by any technique). By solving this problem, what can you conclude about the solution of its dual. Verify by solving the dual:

$$\begin{aligned} \max \quad & 5x + 4y \\ \text{subject to:} \quad & x - y \leq 8, \\ & x \leq 7, \\ & x, y \geq 0. \end{aligned}$$