

Optimization

Fall 2018, YSU

PSS

Problem 1. Solve the following LP problems:

a.

$$\begin{aligned} & \text{minimize} && -x_1 + x_2 \\ & \text{subject to} && x_1 - x_2 \leq 2; \\ & && x_1 + x_2 \leq 6; \\ & && x_1, x_2 \geq 0. \end{aligned}$$

b.

$$\begin{aligned} & \text{minimize} && 5x_1 - 2x_2 \\ & \text{subject to} && 4x_1 - 3x_2 \leq 12; \\ & && -x_1 + 2x_2 \geq -2; \\ & && x_1, x_2 \geq 0. \end{aligned}$$

Problem 2. Consider the following LPP:

$$\begin{aligned} & \text{minimize} && -\alpha x_1 + x_2 \\ & \text{subject to} && 2x_1 - x_2 \leq 2; \\ & && x_1 + x_2 \leq 3; \\ & && x_1, x_2 \geq 0, \end{aligned}$$

where $\alpha > 0$ is a constant. Choose the value of α such that our LPP will have more than one solution.

Problem 3. Form the dual LPPs of the following problems:

a.	$\begin{aligned} & \text{minimize} && x - 2y \\ & \text{subject to} && x + 5y - 3z \geq -4; \\ & && 2x - 13y - z \geq 3; \\ & && x \geq 0, y \geq 0, z \geq 0 \end{aligned}$	b.	$\begin{aligned} & \text{maximize} && 2x + 3y + z \\ & \text{subject to} && 2x + 3y + 3z \leq 2; \\ & && x - y - 4z \leq 5; \\ & && 5x + 2y \leq 3; \\ & && x \geq 0, y \geq 0, z \geq 0 \end{aligned}$
c.	$\begin{aligned} & \text{minimize} && x - 2y + 5z \\ & \text{subject to} && x + 2y - 3z = -1; \\ & && 2x - 3y - z = 4; \\ & && x \geq 0, y \geq 0, z \geq 0 \end{aligned}$	d.	$\begin{aligned} & \text{maximize} && -2x - 5y \\ & \text{subject to} && 3x + y \leq 2; \\ & && x - y \leq 5; \\ & && x \geq 0 \end{aligned}$