

Optimization

Fall 2018, YSU

PSS

Problem 1. Solve the following LP problems:

a.

$$\text{minimize } -x_1 + x_2$$

$$\text{subject to } x_1 - x_2 \leq 2;$$

$$x_1 + x_2 \leq 6;$$

$$x_1, x_2 \geq 0.$$

b.

$$\text{minimize } 5x_1 - 2x_2$$

$$\text{subject to } 4x_1 - 3x_2 \leq 12;$$

$$-x_1 + 2x_2 \geq -2;$$

$$x_1, x_2 \geq 0.$$

Problem 2. Consider the following LPP:

$$\text{minimize } -\alpha x_1 + x_2$$

$$\text{subject to } 2x_1 - x_2 \leq 2;$$

$$x_1 + x_2 \leq 3;$$

$$x_1, x_2 \geq 0,$$

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. $\text{minimize } x - 2y$

b. $\text{maximize } 2x + 3y + z$

$$\text{subject to } x + 5y - 3z \geq -4;$$

$$\text{subject to } 2x + 3y + 3z \leq 2;$$

$$2x - 13y - z \geq 3;$$

$$x - y - 4z \leq 5;$$

$$x \geq 0, y \geq 0, z \geq 0$$

$$5x + 2y \leq 3;$$

$$x \geq 0, y \geq 0, z \geq 0$$

c. $\text{minimize } x - 2y + 5z$

d. $\text{maximize } -2x - 5y$

$$\text{subject to } x + 2y - 3z = -1;$$

$$\text{subject to } 3x + y \leq 2;$$

$$2x - 3y - z = 4;$$

$$x - y \leq 5;$$

$$x \geq 0, y \geq 0, z \geq 0$$

$$x \geq 0$$