

Problem set (2): Graphical Solution of LP Problems & Their Standard Form

Using the graphical method, solve each of the following:

Problem (1)

Maximize:

$$z = 3x_1 + 4x_2$$

Subject to:

$$x_1 - x_2 \leq -1$$

$$-x_1 + x_2 \leq 0$$

$$x_1, x_2 \geq 0$$

Problem (2)

Maximize:

$$z = 8x_1 + x_2$$

Subject to:

$$8x_1 + x_2 \leq 8$$

$$2x_1 + x_2 \leq 6$$

$$3x_1 + x_2 \leq 6$$

$$x_1 + 6x_2 \leq 8$$

$$x_1, x_2 \geq 0$$

Problem (3)

Maximize:

$$z = 4x_1 + 5x_2$$

Subject to:

$$x_1 + x_2 \geq 1$$

$$-2x_1 + x_2 \leq 1$$

$$4x_1 - x_2 \geq 1$$

$$x_1, x_2 \geq 0$$

Problem (4)

A company is manufacturing products Y and Z. one unit of product Y requires 4.8 minutes of machining and 10 minutes of assembly time. The profit for product Y is L.E. 0.70 per unit. Product Z requires 6 minutes of machining time and 5 minutes of welding time for manufacturing one unit. The profit for product Z is L.E. 0.90 per unit. The capacity of the machining department available for these products is 1400 minutes per week. The welding department has an idle capacity of 800 minutes per week and the assembly department has

1800 minutes per week. Determine the quantities of Y and Z so that the total profit is maximized.

Problem (5)

Put the following problem in the standard form:

Maximize:

$$z = 4x_1 + x_2 - 3x_3$$

Subject to:

$$x_1 + 5x_2 - 3x_3 \leq 20$$

$$2x_1 + 7x_2 + 2x_3 \leq 10$$

$$x_1 - 5x_2 - 3x_3 \geq 3$$

$$x_1 \geq 0$$