

Due Friday, January 31, 2014

1. A company produces three types of chemicals: chemical A, chemical B and chemical C. They sell chemical A for \$30 per barrel, chemical B for \$20 per barrel, and chemical C for \$10 per barrel. Chemical A requires .2 units of energy and 5 units of raw material to produce, Chemical B requires .3 units of energy and 6 units of raw material to produce and Chemical C requires .2 units of energy and 3 units of raw material to produce. Assume that all of the chemicals the company produces are sold. The company must produce at least 55 barrels of chemicals per day. It can use at most 7 units of energy per day and at most 120 units of raw material each day. The company wishes to maximize its profits. Formulate the appropriate linear program in standard form.
2. State the following LP in canonical form:

$$z = x_1 + 2x_2 - 3x_3 \longrightarrow \min$$

with respect to

$$\begin{cases} 4x_1 + x_2 - 2x_3 & \leq -3, \\ -x_1 - x_2 + 4x_3 & \geq -7, \\ 2x_1 + 3x_2 & -1x_4 = 5, \\ & x_1, x_3 \geq 0. \end{cases}$$

3. Solve by finding all basic feasible solutions.

$$z = 4x_1 + 2x_2 \longrightarrow \min$$

subject to

$$\begin{cases} 2x_1 + 6x_2 = 10 \\ x_1, x_2 \geq 0. \end{cases}$$

4. Solve the following problem:

$$z = 3x_1 + 2x_2 \longrightarrow \max$$

with respect to

$$\begin{cases} x_1 + 4x_2 \leq 12, \\ x_1 + x_2 \leq 4, \\ 5x_1 + 2x_2 \leq 15, \\ x_1, x_2 \geq 0. \end{cases}$$