Math 482 **HW1** **1/23/2015** Name: _____

Due Friday, January 30, 2015

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 this problem as a linear program. You do not need to find an optimal solution for this LP.

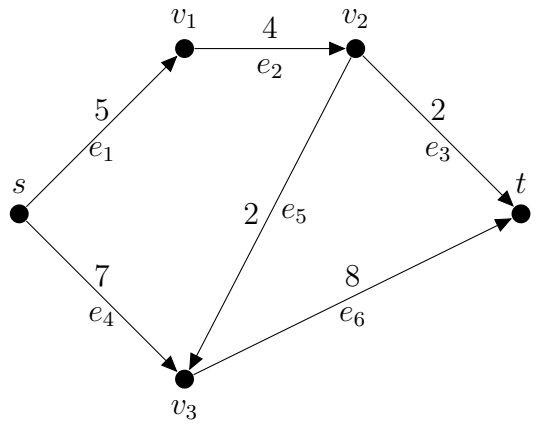
2. Solve the following problem:

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

with respect to

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

3. Formulate the problem of finding a maximum flow in the network below as a linear programming problem. The number above each edge as the capacity of that edge.



4. State the following LP in equational form.

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

with respect to

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