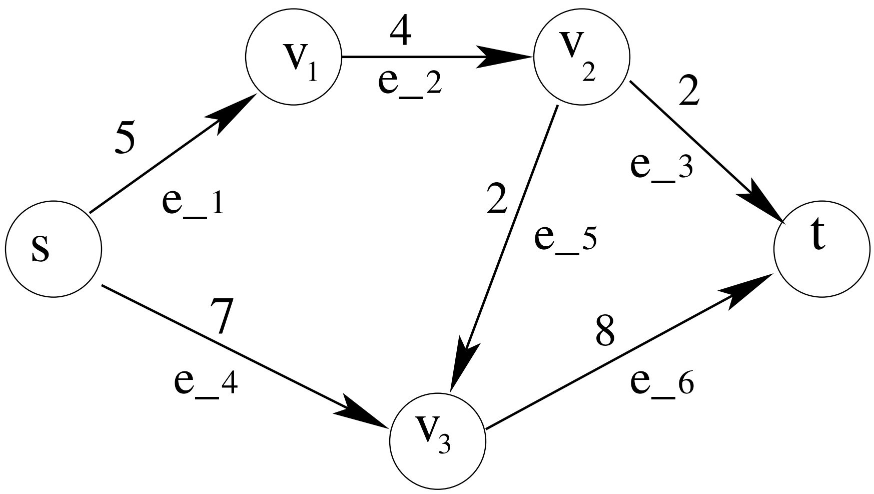
Math 482 **HW7** Section: ______________ Name: ______________

Due Friday, October 30, 2015

Students in section D13 (three credit hours) need to solve any four of the following five problems. Students in section D14 (four credit hours) must solve all five problems.

1. THIS PROBLEM IS COUNTED AS TWO PROBLEMS. TO EARN ONE PROBLEM CREDIT, IT IS ENOUGH TO PERFORM TWO ITERATIONS CORRECTLY, I.E. CORRECTLY FIND CARRY-0, CARRY-1, AND CARRY-2.

   Use the revised simplex method to find a maximal flow in the network below. **Do not** write explicitly the whole matrix. Use an auxiliary shortest path problems to find a pivot column.



2. THIS PROBLEM IS COUNTED AS TWO PROBLEMS. TO EARN ONE PROBLEM CREDIT, IT IS ENOUGH TO PERFORM ONE ITERATIONS CORRECTLY, I.E. YOU MUST USE THE PRIMAL-DUAL METHOD TO FIND AN UPDATED π^T AND COMPUTE J RELATIVE TO THIS UPDATED π^T.

   Starting from the dually feasible vector $\pi^T = (0, 1/3, 0)$, use the primal-dual simplex method to find an optimal solution to the problem

$$\text{Minimize } z = 4x_1 + x_2 + 3x_3 + x_4$$

subject to

$$\begin{array}{ccccccc} x_1 & +x_2 & +x_3 & & = & 3, \\ x_1 & & +x_3 & +3x_4 & = & 2, \\ & x_2 & +x_3 & +x_4 & = & 2, \\ x_1, & x_2, & x_3, & x_4 & \geq & 0. \end{array}$$

3. Suppose there are n men and n women and m marriage brokers (labeled $c_1, \ldots, c_m$). Each broker has a list of men and women as clients and can arrange marriages between any pairs of men and women on the list. In addition, we restrict the number of marriages that broker i can arrange to a maximum of b_i. Each man can be married to at most one women and each women can be married to at most one man. Translate the problem of finding a solution with the most marriages into one of finding the maximum flow in a flow network. (You can assume that if the capacities on the edges are all integers, than there exists a maximum flow in which the flow on every edge is an integer.)