Math 482 **HW8** Section: _____ Name: _____

Due Friday, November 6, 2015

All students should do each of the four problems.

1. Use the two-phase revised simplex method to solve the problem (use Bland's pivot rule).

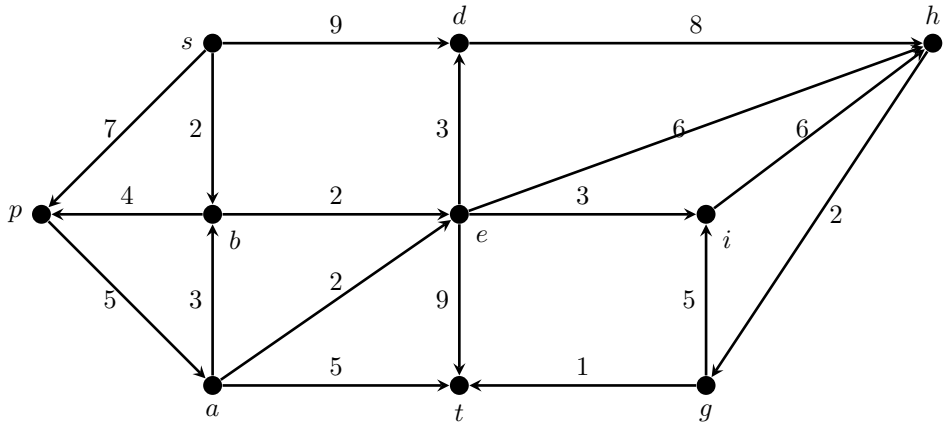
$$\text{Minimize } z = 3x_1 + x_2 + 2x_3$$

subject to

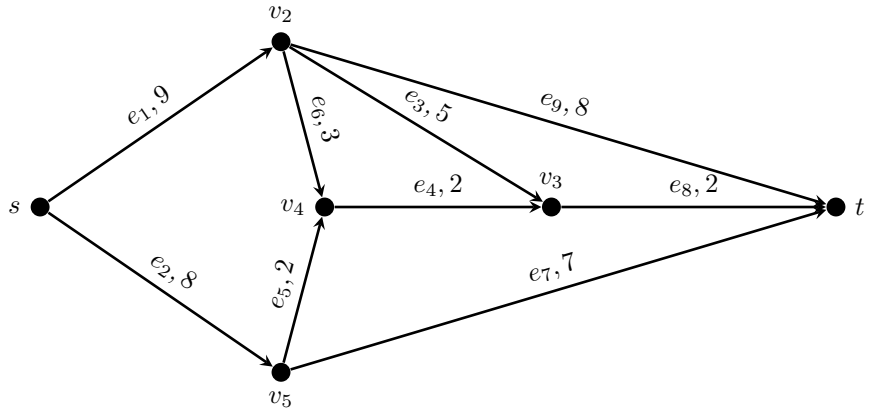
$$\begin{cases} x_1 + 3x_2 + 5x_3 - x_4 &= 10, \\ 2x_1 - x_2 - 9x_3 - x_5 &= 1, \\ 4x_1 + 5x_2 + x_3 + x_6 &= 7, \\ x_1, \ldots, x_6 &\geq 0. \end{cases}$$

   Now, what can you say about the dual problem?

2. Using Dijkstra's algorithm as described in the book (section 6.4) to find a shortest (s,t)-path in the directed graph below. On every step, starting with $W = \emptyset$ and $\rho(s) = 0$ and $\rho(x) = \infty$ for every vertex $x \neq s$, list the vertex you are adding to W and any changes that made to the function ρ.



3. Beginning with the vector $\pi = (0,0,0,0,0,0)^T$ which is feasible for the dual, use the primal dual method as described in class and section 5.4 of the book to find a shortest path from s to t in the weighted graph shown below. For each iteration, you must write π, π^r and θ.



4. Apply the Ford-Fulkerson algorithm to the following network. On each iteration, write the current flow f (starting with $f = 0$), the augmenting path f^r and θ (you only need to write the non-zero elements of f^r).