University of Nevada, Las Vegas Las Vegas Computer Science 477/677 Spring 2020

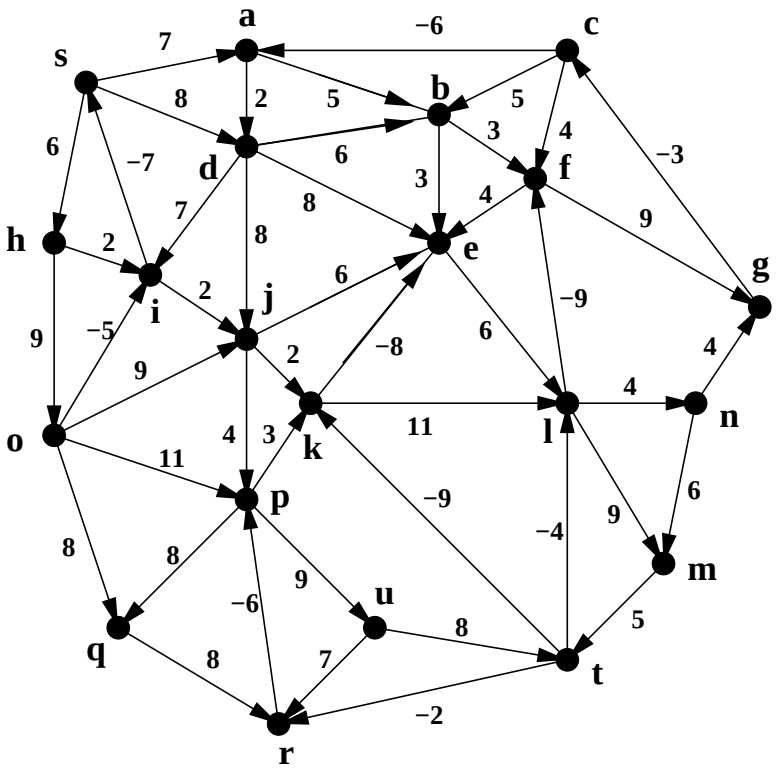
Assignment 6: Due Thursday April 9, 2020

Name:_____

You are permitted to work in groups, get help from others, read books, and use the internet. But the handwriting on this document must be your own. Print out the document, staple, and fill in the answers. You may attach extra sheets, but only by stapling. ~~Turn in the pages to the graduate assistant at the beginning of class, April 7.~~

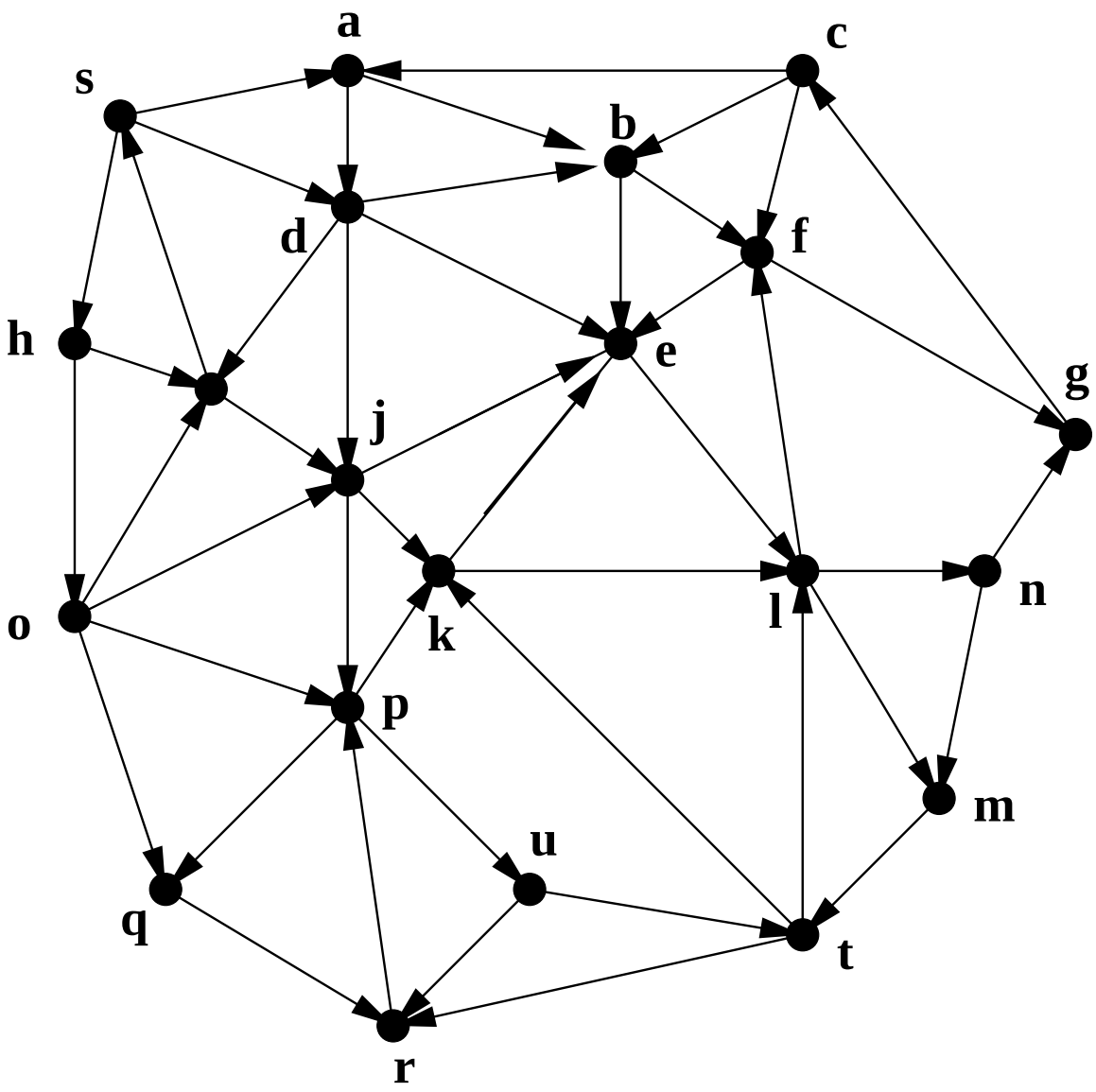
We will not meet in the classrom on April7. There are instructions for turning in your homework on the assignments page.

1. Consider the all pairs shortest path problem on the weighted directed graph shown below in (a). The first step of Johnson's algorithm is to compute a "heuristic" $h(x)$ for each vertex x. In Figure (b), indicate the value of h at every vertex. Recall that $h(x) \leq 0$ for all x.



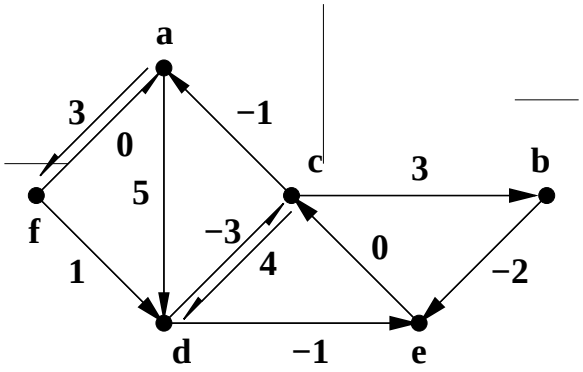
(a)

The second step of Johnson's algorithm is to compute an "adjusted" weight on each edge. That adjusted weight is always non-negative. Also in Figure (b), indicate that adjusted weight on each edge.



(b)

2. Let G be the weighted directed graph shown in the figure below. Assume you execute an algorithm for the all pairs problem on G. The ouput of that program consist of two $n \times n$ matrices, where $n = 6$. Fill in the matrices for that output. (You are not required to use any particular algorithm; you can even try to "eye-ball" the answers, if you **dare**.)



3. Find the minimum weight path from S to T for the weighted graph given below, by walking through the $A^\star$ algorithm. Use the technique shown in the Youtube video. The heuristics are given by the green numerals.