**University of Nevada, Las Vegas Computer Science 477/677 Spring 2015**

**Assignment 6: Due March 19, 2015**

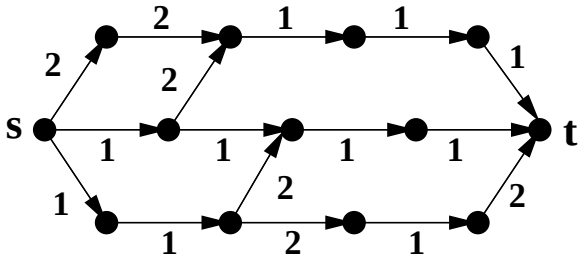
**Name:**_____

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. You may attach extra sheets, using a stapler.

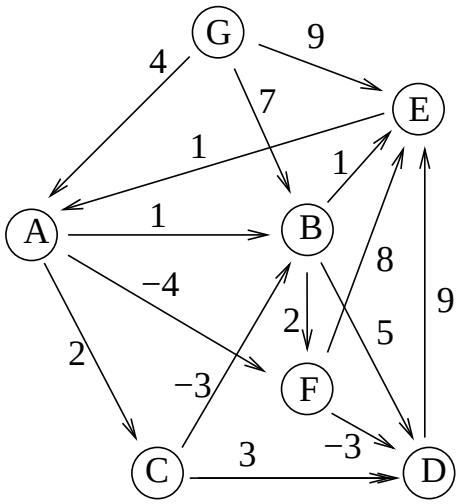
"Designing" an algorithm does not mean writing code. In fact, explicit hand-written pseudo-code can be hard to grade (and you don't want to upset the grader, do you?) You should describe your algorithm in English, although you can use **small** bits of hand-written pseudo-code to clarify, as needed.

Of course, you may actually wish to encode and then execute your algorithm. This does not relieve you of the obligation to completely explain your algorithm in your own handwriting.

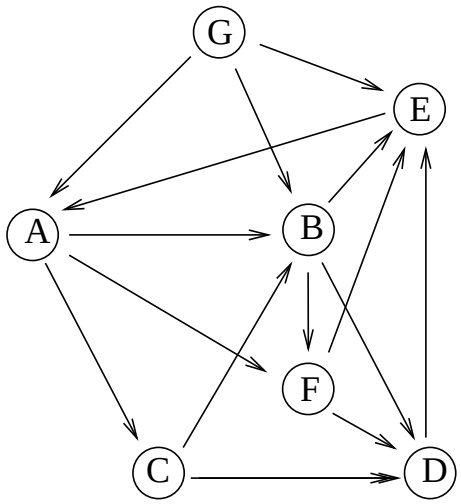
1. Find the least cost pair of edge-wise disjoint paths from $s$ to $t$ in the weighted directed graph shown below.



2. Place non-negative weights on graph (b) so that the new weighted graph is equivalent to the weighted graph in (a) for shortest path problems.

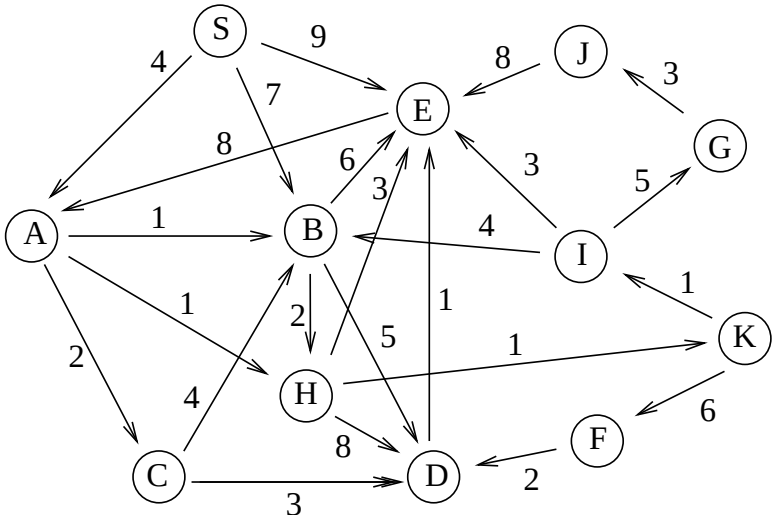


(a)



(b)

3. Solve the single source shortest path problem for the following weighted directed graph, where the source vertex is $S$, using Dijkstra's algorithm. Show the arrays, as well as the current content of the heap, at each step.



4. Use the A* algorithm to find the least cost path from $s$ to $t$ in the graph below, using the heuristic $h$ shown as a circled number, in blue, at each node. For each node $x$, $h(x)$ is an estimate of the distance from $x$ to $t$, and it is never an overestimate. After adjusting the edge weights, you must use Dijkstra's algorithm. Show the arrays and the heap at each step. Did you save any time by using the A* algorithm, as opposed to Dijkstra's?