

## 9. Homework

Due **Tuesday 11/20/07** before class

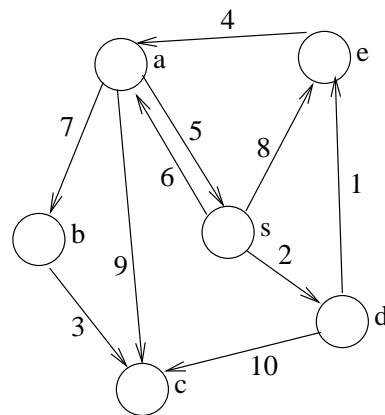
### 1. Faster MST (25 points)

Let  $G = (V, E)$  be a connected undirected graph with edge weights  $w : E \rightarrow \mathbb{R}$ .

If all of the edge weights are integers between 1 and  $|E|$ , how fast can the minimum spanning tree be computed? (Give the *most efficient* algorithm you can think of.)

### 2. Dijkstra (25 points)

Run Dijkstra's algorithm on the graph below. Show all the different stages of the algorithm (vertex weights, tree edges, and the priority queue). You may use a copy of the next page for your convenience.



### 3. Prim (25 points)

Run Prim's algorithm on the graph above. Show all the different stages of the algorithm (vertex weights, tree edges, and the priority queue). You may use a copy of the next page for your convenience. (Notice that in class we defined a minimum spanning tree only for an undirected graph. The same algorithm can be run on a directed graph as well. Note that in general a directed graph does not have to have a spanning tree at all because of connectedness issues, but in this example an MST exists.)

### 4. Kruskal (25 points)

Run Kruskal's algorithm on the graph above. Show all the different stages of the algorithm (vertex weights, tree edges, and the set of vertex subsets). You may use a copy of the next page for your convenience.

