Computer Science 134

Homework 8
Due: 2 December 2009

Question 1. Table 1 shows the results of executing the main loop of Dijkstra's shortest path algorithm several times to build a forwarding table for the router named A. Unfortunately, the table is incomplete and much of the information about the neighbors of the routers disappeared during a freak transcription accident involving cod liver oil and a small rodent.

Please follow the steps of Dijkstra's Algorithm to complete the entries in the *Best Route Length* and *First Step* columns of the table. The columns in which the *connections to neighboring routers* rows are completely empty are the places where the information disappeared. Luckily, you will discover you do not need this information to complete the *Best Route Length* and *First Step* columns of the table if you simply follow algorithm 1.

Algorithm 1 DISJKSTRA'S SHORTESTPATH

```
Mark starting point as KNOWN with length 0
Identify each neighbor of start as ADJACENT
Set first step of each neighbor of start to itself
Set route length of each neighbor to first step distance
While you don't know how to reach all the cities:
    Select adjacent city with shortest route
    Identify adjacent city with shortest route as KNOWN
    Mark neighbors of new KNOWN city that were DISTANT as ADJACENT
    Update path lengths and record first steps to ADJACENT neighbors of new KNOWN city.
```

Table 1: Shortest Path Table

Cities	Best Route Length	First Step	Status	Neighbors			
A	0	-	*Known*				
B	11	C	*Adjacent*	K: 1	H: 6	D: 5	J:2
C	3	C	*Known*				
D	11	L	*Adjacent*	B: 1	H: 2		
E	7	E	*Adjacent*	C: 3	L: 3	H: 1	D: 2
F	-		*Distant*	L: 3	J: 2		
G	6	L	*Known*				
H	10	C	*Adjacent*	I: 1	D: 2		
I	10	C	*Adjacent*	K: 3	H: 6	D: 5	G: 3
J	5	C	*Known*				
K	14	C	*Adjacent*	F: 1	C: 3	L: 2	
L	4	L	*Known*				
M	7	C	*Known*				