

**ECE 465/565 Computer Networks and Protocols
Fall 05**

Dr. Thinh Nguyen

**Homework 3
Due 11/15/05 at the beginning of the class**

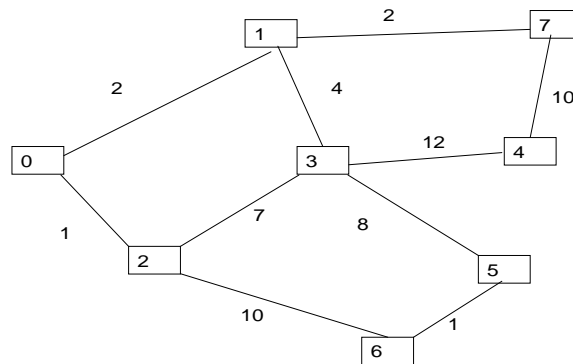
1. Problem 14 from the problem section of chapter 4 from the text book (2 pts)
2. Problem 18 from the problem section of chapter 4 from the text book (2 pts)
3. Problem 19 from the problem section of chapter 4 from the text book (2 pts)
4. Problem 23 from the problem section of chapter 4 from the text book (2 pts)

Programming Assignment (4pts)

In this programming assignment, you are asked to implement the Dijkstra's algorithm. The format of the input network topologies is specified in an Nx3 table where N is the number of edges in the input topology. The values in the first and second columns in the table show the node IDs between edges while the values in the third column indicate the costs of edges. Furthermore, node IDs are always numbered between 0 and N-1 for a topology consisting of N nodes. The values in first column are always sorted in order from 0 to N-1. There is no duplicate edge in the table. In other words, if there is a row "1 2 8", there will not be a row "2 1 8". As example, the table below would represent the topology on the right.

Node1 Node2 Cost

0	1	2
0	2	1
1	3	4
1	7	2
2	3	7
2	6	10
3	4	12
3	5	8
4	7	10
5	6	1



Input to your program:

- 1) a file consisting of a table with format describe above
- 2) a source node ID

Output of your program:

Your program should print out list of shortest paths from the source node to all other nodes and their associated costs. For example, the shortest path between node 0 and 7 in the Figure above is “0 1 7” and the associated cost is 4.

The TA will run your program with different input files and source nodes to determine the correctness of your program.

Bonus Problem (1 pt)

Suppose you have a network of N nodes. On average, a node is connected to m nodes. Define the diameter of the network as the largest number of links between any two nodes. What is the approximate diameter of this network in terms of N and m ?