CSE 6331 – Algorithms – Spring, 2015 – Prof. Supowit

Homework 6 – Due: Wednesday, March 4

This is a programming assignment. Your task is to implement the dynamic programming algorithm that we saw in class to find an optimal traveling salesman tour of a given undirected, complete, weighted graph. All weights are positive. Your grade will be based on your program's correctness and its efficiency.

Instructions:

1. Use Java.

2. Write the code in a single file. The name of the public class should be Salesman and the name of the single source code file should be Salesman.java.

3. Do no use any third-party library or any class/function in the standard library that deals with graphs.

4. Submit the file Salesman.java using Dropbox in Carmen. Add comments in the source code file, including your **name** and **e-mail address** in the beginning. You should also submit a README file to tell the grader how to compile and to run your program; any specific requirement on the version of the compiler should be explicitly state in this README. Of course, the procedure (running and compiling) must be doable in a terminal without any GUI and must a widely and freely available compiler.

5. The grader will print out the source code files and write the grade on the hard copies, though the grading is based on the output of the program after running it.

6. Name the input file "input.txt" and the output file "output.txt". Anything that your program writes to the screen or to any file other than "output.txt" will be ignored by the grader.

7. Details of the input format: A graph of n nodes is read from a file of $n+1$ lines. The first line lists the number of nodes. After that comes a sequence of n lines, the ith of which lists the weights on the edges connected

to node *i*. The main diagonal of this input matrix will be all 0's, the other numbers will be positive integers.

8.   Your program must output an optimal traveling salesman tour. The output must consist of two lines: The first line is a permutation of the numbers $\{1, 2, \ldots, n\}$, on one line separated by spaces. It must begin with vertex 1. The second line has one number, which is the length of the optimal tour.
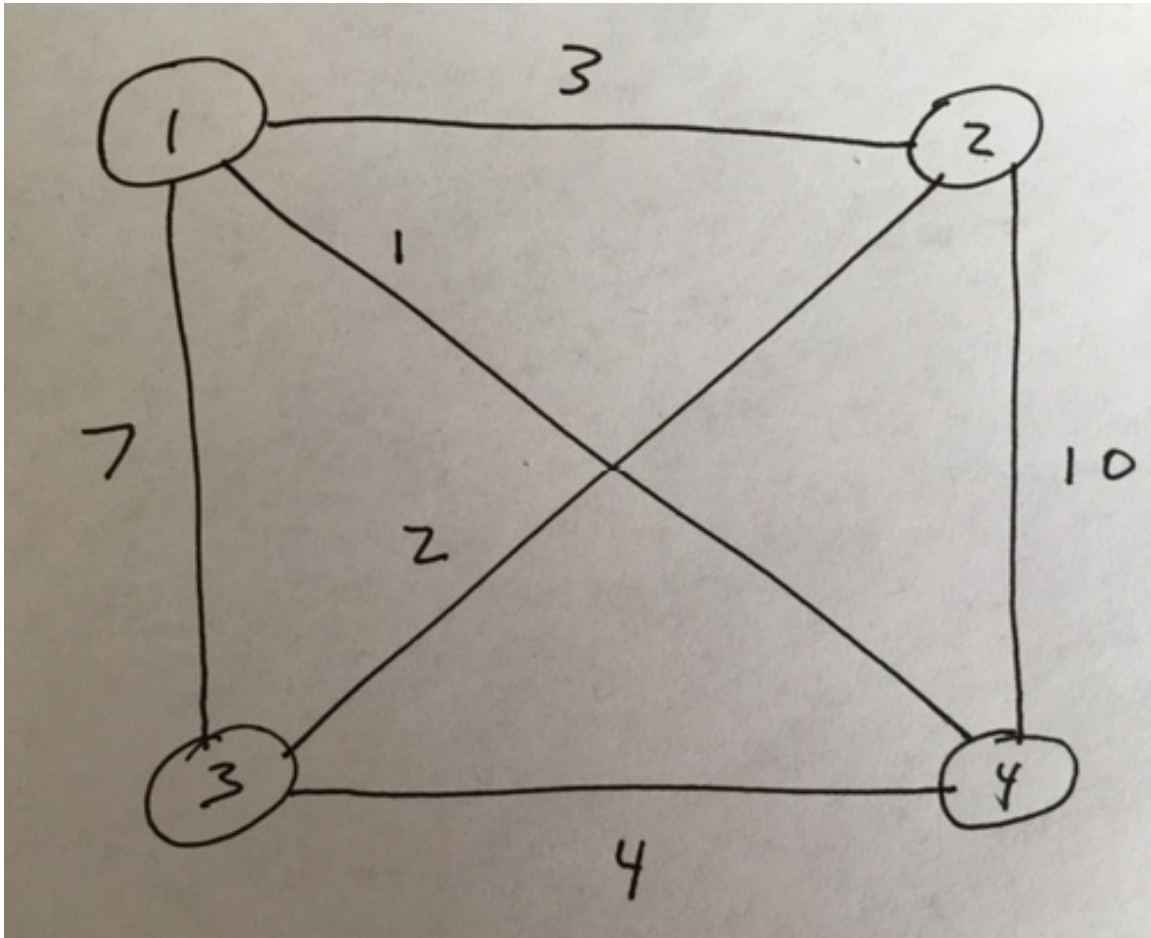
Here's an example input file:

4

0 3 7 1

3 0 2 10

7 2 0 4

1 10 4 0

Note that this input represents the graph:

For this input, there are two correct outputs.   One is:

1 4 3 2

10

This represents the Hamiltonian cycle $\langle 1, 4, 3, 2, 1 \rangle$, which has length 10.

The other correct output for this input is:

1 2 3 4

10

which represents the Hamiltonian cycle $\langle 1, 2, 3, 4, 1 \rangle$, which also has length 10.

9.   Any questions about this assignment should be e-mailed to the grader, Nan Deng, deng.72@osu.edu, with a cc to me, supowit.1@osu.edu.