Programming Assignment #2

Travelling Salesman Problem

Due: 2021/12/8 23:59

Problem Description

Write a program to solve the Travelling Salesman Problem (TSP) problem by using branch-and-bound strategy.

I/O Format

Use standard I/O. (stdin, stdout)

Input

There is only one test case per input file.

The first line contains one positive integer n, which represents the number of cities in the weighted, directed graph. The graph is represented by an adjacent matrix. The following n lines present an adjacent matrix, and every line contains n values. Each of value represents the distances between each pair of cities. If there are no edge from city i to city j, the value is 0.

Cities are indexed from 1 to n.

$10 \leq n \leq 30$

0<distance between any pair of cities≤10000

Output

For each test case, output the length of an optimal tour and the optimal tour.

Time limit: 30000ms.

Example

Input

Please refer to tsp_input.txt

Output

2085\n

1 4 13 7 8 6 17 14 15 3 11 10 2 5 9 12 16\n

Program Submission

1. Please use C/C++ and write your program in a single source file.
2. Your source file must be named as “<Student_ID>_hw2.cpp” and make sure that all characters in the filename are in lower case. For example, if your student ID is 106062000, the name of your program file should be 106062000_hw2.cpp .
3. Your program will be compiled in a GNU/Linux environment with: g++ -O2 –std=c++14 <Student_ID>_hw2.cpp
4. The source file must be uploaded directly. Do not compress the file.
5. 0 point will be given to plagiarism. NEVER SHOW YOUR CODE to others and you must write your code by yourself. If the codes are similar to other people and you cannot explain your code properly, you will be identified as plagiarism.

Report

1. Your report must contain the flowchart or pseudo code of your program. You have to describe how your approach works.
2. You have to analyze the time complexity of your program and prove it.
3. The report filename must be “<Student_ID>_hw2.pdf”. Please make sure that all characters of the filename are in lower case.

Grading Policy

You must submit both your source code and report.
Follow the submission rules as mentioned or you will get deduction on your score.

Test cases: 50%
Report: 50%