

Homework 5 – Graph

TA: Edward

Deadline: 11:59pm, December 9, 2020

1. Descriptions

Given a set of points Q on a road network, an optimal meeting point (OMP) query returns the point on a road network $G = (V, E)$ with the smallest sum of network distances to all the points in Q .

Consider your team need to find a location for gathering. There are N members of the team (Team ID:1~ N). You need to decide the meeting place with the smallest sum of distances to all the members. **The total cost is defined as the total distance from everyone to the the meeting point.**

2. Objective

Find the minimal cost of a given **weighted undirected graph** by using the **graph theory algorithms learned in the class (BFS, DFS, Dijkstra ..etc.)**.

3. Input and Output Formats

Input

The first row of each test data contains two numbers N ($1 \leq N \leq 20$), representing the number of group members (i.e., Vertexs in G), and M , representing the number of edges (i.e., Edges in G).

There will be N rows which are the names of all team members. Each group member's name can be up to 20 lowercase letters (there will be no blank). Each of the next M rows contains three integers i, j ($1 \leq i, j \leq N$) and k , which means it takes cost k to get from location i to location j . If it costs k from location i to location j , then it also costs k from location j to location i .

If $N = M = 0$ is read, it means the end of the input.

Output

For each test data, you should output the following text:

Case # i XXX

i is the number of test data, and XXX is replaced by the name of the group member which has the least cost to meet at his house. If there are two or more team members with the same minimum cost. **You should output the name of the first group member that appears.**

Sample test cases:

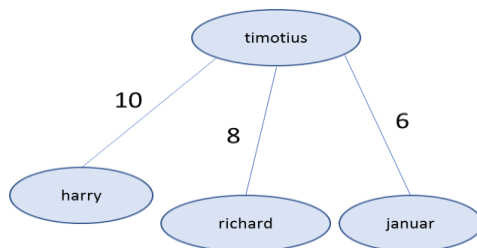
Input

```
4 3\n
timotius\n
harry\n
richard\n
januar\n
1 2 10\n
1 3 8\n
1 4 6\n
4 3\n
rocky\n
herwin\n
gaston\n
jefry\n
1 2 5\n
1 3 5\n
1 4 5\n
0 0\0
```

Output

```
Case #1 timotius\n
Case #2 rocky\0
```

Illustation of Case #1:



	timotius	harry	richard	januar	The sum of meeting cost for each node
timotius	x	10	8	6	If <i>timotius</i> is the assembly point, the sum is 24.
harry	10	X	18	16	If <i>harry</i> is the assembly point, the sum is 44.
richard	8	18	X	14	If <i>richard</i> is the assembly point, the sum is 40.
januar	6	16	14	X	If <i>januar</i> is the assembly point, the sum is 36.

Output:

4. Readme, comments and style

An indicator for good source code is readability. To keep source code maintainable and readable, you should add comments to your source code where reasonable. A consistent coding style also helps a lot when tracing the source code. For this assignment, please also compose a readme file in *.txt format and name it as “README.txt”. This file should contain a **brief explanation of how to use your program**. Please remember to have your source code comments and readme file in **English**.

5. Submission

To submit your files electronically, login DomJudge website through the following url :

<https://140.123.102.98:12345/>

Press the submit button and choose the homework questions you want to submit. After submitting your code, DomJudge will give you a result to tell you whether your code is correct or not. However, during the demo time, your code will be evaluated by different sets of test cases. Please make sure your code can work correctly based on the description above. Additionally, you must compress your code and the **README** file into a zip file and **upload it to Ecourse2**.

6. Grading policies

The TA(s) will mark and give points according to the following rules:

95% - Correctness of answer.

5% - Readme, comments and coding style.