Problem FUELREV: Fuel Revolution

Probably you remember that Leonard was working very hard on a rocket fuel for the government.[1] Sheldon and Leonard use the research results to invent a new kind of car fuel. Producing this fuel is easy and cheap. Furthermore, the cars that consume this fuel are almost as fast as light. But there is one problem they have to face when handling this new resource: The fuel tank has to be very safe because the fuel is highly explosive (remember the elevator). Therefore, the new fuel tank has to be as small as possible.

Thus, Sheldon and Leonard want to know how large their car fuel tank has to be to be useful in practice. While driving to their destinations, Sheldon and Leonard can refuel arbitrarily often at fuel stations. In order to calculate the tank's size, they want to know how far they can go on a trip without refueling. They ask you to calculate the maximal distance between two fuel stations. Of course, they choose optimal paths to minimize this maximal distance and hence the tank's size. Sheldon and Leonard always start and end at their favorite fuel station.

Input

The first line of the input gives the number of test cases C ($0 < C < 100$). The first line of each such test case holds N, M, T, and Q: the number of nodes in the map ($2 \leq N \leq 10\,000$), the number of roads in the map ($0 \leq M \leq 50\,000$), the number of fuel stations ($1 \leq T \leq 20$), and the number of queries ($0 \leq Q \leq 5\,000$). Each of the following M lines holds three integers n_1, n_2, and c that describe a road. Each line specifies one one-way-road from n_1 to n_2 with cost c ($0 \leq n_1, n_2 < N$, $n_1 \neq n_2$, $0 < c \leq 1\,000$). It is assured that for every two nodes n_1 and n_2 there is at most one road from n_1 to n_2. The next line has T integers t_i ($0 \leq t_i < N$) that are nodes with fuel stations – the first fuel station in this list (t_1) is the favorite fuel station of Sheldon and Leonard. Each of the following Q lines gives an integer q_i ($0 \leq q_i < N$, $q_i \neq t_1$) that specifies a possible destination for Sheldon and Leonard.

Output

For each test case print $Q + 1$ lines. The first line should be "`Case C:`" where C is the index of the test case. Each of the following Q lines should give one integer: the best minimal distance between any two fuel stations along all the potential routes from their favorite fuel station to node q_i and back. If it is not possible at all to reach the destination and return to the start node, print "`IMPOSSIBLE`".

Sample Input 1

```
1
7 8 5 6
0 1 5
1 2 5
2 6 5
2 3 4
3 0 7
3 4 3
5 0 17
6 0 10
0 1 5 4 6
1
2
3
4
5
6
```

Sample Output 1

```
Case 1:
10
10
16
IMPOSSIBLE
IMPOSSIBLE
10
```

[1] When experimenting with Howard's rocket, Leonard's math caused the rocket to explode in an elevator.