Minority Report

SEASON 9 – FINAL ROUND

Thanks to the technological innovations in astrology and the production of psychotropic substances, predicting the future is now possible. The newly created INternational Group for Suppression of Organized Crime (INGSOC) has detailed reports about when, where and what types of criminal activities will happen in the near future. The forces with which to prevent them are, however, very limited.

Your task is to write a program that takes for input:

- the map of the country where INGSOC operates.
- information about when and where the crimes will take place and how severe they are.
- the number of available police officers

and finds the most efficient way to use these police officers to reduce crime.

In order to stop a given crime **i** there has to be at least $\mathbf{W_i}$ police officers in the city at the time of the crime - the aforementioned “severity” of the crime.

At any given time each police officer is either in a city or traveling between two cities. All roads in the country are bidirectional. There is at most one direct road between each pair of cities and it is possible to reach each city from any other city.

Time is divided into discrete minutes, starting from minute 0. Let’s say a police officer begins in city X, stays there for 3 minutes, then goes to city Y, which is 2 minutes away, and stays there for 1 minute. Then he will be: in city X during minutes 0, 1 and 2; on the road during minutes 3 and 4; in city Y during minute 5.

Scoring

For each stopped crime with severity W your score increases by W^2. For each test you will receive $(\text{yourScore}+1) / (\text{maxScore}+1) * 100$ percent of the points for the test, where yourScore is the score of your program and maxScore is the highest score among all the participants. If your output is invalid you will receive 0 points.

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Input

Read the input from the file `minority_report.in`.

The first line contains 4 natural numbers - N (cities), E (roads), P (police officers) and C (crimes).

The next E lines contain 3 numbers each - A, B and D - denoting a two-way road between the cities A and B with length D (it takes D minutes to travel between A and B).

The last C lines contain 3 numbers each - X, T and W - denoting that in city X during minute T there will be a crime with severity W.

The crimes will be entered in the order in which they happen.

The indices of the cities start from 0.

Output

Print your output in the file `minority_report.out`.

For each police officer print their route:

- On single line print how many (not necessarily different) cities the officer should visit.
- On the next line - their indices in the order in which they have to be visited. Each pair of consecutive cities has to be connected by a road. The first city in the route is chosen by you.
- On the next line - for each city (except the last) how many minutes the police officer has to stay there. The officer stays in the last city until the last crime passes. The stay period in a given city could be 0 if the officer only has to pass through it.

Constraints

$1 \leq severity\ of\ the\ crimes\ (Wi)\ \leq\ P \leq 20$

$1 \leq N \leq 1\ 000$

$1 \leq E,\ C \leq 10\ 000$

$1 \leq distance\ between\ the\ cities\ (Di)\ \leq 100$

$0 \leq each\ T \leq 20\ 000$

There are no two crimes in one city that happen at the same time.

Time limit: 2.5 seconds

Memory limit: 256 MB

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Subtasks

№	Percentage of tests	Description
1	15%	It is possible to stop all crimes.
2	15%	There is a single police officer (P=1)
3	15%	All roads are of length 1 (every D=1)
4	15%	All crimes have severity 1 (every W=1)
5	40%	No further constraints

Example

Input (minority report.in)		Output (minority report.out)
4 5 2 4 0 1 2 1 2 5 2 3 1 0 3 7 2 0 4 3 0 2 2 2 1 0 7 1 1 9 2	In blue is the description of the road network In red is the description of the crimes	3 3 2 1 1 2 4 3 2 0 1 1 1 0