Problem A
Political Development
Problem ID: politicaldevelopment

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A certain political party with N members wants to develop some brand new politics. In order to do so, the party plans to make a committee for new political development. Clearly, the best politics is developed when all committee members disagree with each other, and when the committee is as large as possible.

In order to figure out which pairs of politicians disagree and which don't, the party then arranged for every possible pair of politicians to discuss a randomly selected topic. Whenever two politicians couldn't agree on their assigned topic, this was recorded in the party's *Book of Great Achievements*.

Armed with this book, you have now been assigned the task of finding the largest comittee where everyone disagrees. However, finding a large comittee can prove challenging; careful analysis have revealed that for *any* non-empty group of party members, there is always at least one member of the group who disagrees with (strictly) less than K of the other group members. Obviously, then, the committee can not have more than K members. But is there a choice of committee of this size? Find the size of a largest possible committe such that nobody in that committee agrees.

Input

The first line contains two integers, N the number of members in the party, and K as described above. Each member is indicated by an integer i between 0 and $N-1$. After the first line follow N lines, one for each politician i, starting with $i = 0$. The line for politician i begins with an integer D_i, and is followed by D_i integers indicating with which other party members the i-th politician disagrees according to the *Book of Great Achievements*.

Constraints We always have $0 \leq D_i < N \leq 50\,000$, and $1 \leq K \leq 10$. For subcases, the inputs have these further restrictions:

4 points $K \leq 2$, $N \leq 5\,000$

12 points $K \leq 3$, $N \leq 5\,000$

23 points Each party member disagrees with at most 10 other members.

38 points $N \leq 5\,000$

23 points $K \leq 5$

Output

Output a single integer, the size of the largest possible comittee.

Sample Input 1

```
5 3
2 1 2
3 0 2 3
3 0 1 4
2 1 4
2 2 3
```

Sample Output 1

```
3
```

Sample Input 2	Sample Output 2
5 3 3 1 2 4 1 0 1 0 0 1 0	2

Problem B
Toll
Problem ID: toll

A trucking company wants to optimize its internal processes—which mainly means saving money. The company serves a region where a toll must be paid for every single street. Each street connects two places (cities, villages etc.) directly. The company serves a set of orders; each order tells them to carry goods from one place to another. When serving an order, the company wants to pay the minimum overall toll. As the region's street network can be modeled by a graph where each edge has a specific cost (the toll for the respective street), the company actually wants to know (the cost of) the cheapest path between two nodes in this graph.

However, the region's street network graph has an interesting property: it is directed (i.e. all streets are oneway), and there can only be an edge from a to b if $\lfloor b/K \rfloor = 1 + \lfloor a/K \rfloor$ (for some constant K).

Write a program that for each of a given list of orders outputs the minimum toll the company has to pay to serve the respective order.

Input

The first line contains four integers: K (with the meaning described above), N (the number of places), M (the number of streets), and O (the number of orders).

Each of the next M lines contains three integers a, b, t ($0 \leq a, b < N$). This means that there is a (oneway) street from a to b with toll t. You are guaranteed that $\lfloor b/K \rfloor = 1 + \lfloor a/K \rfloor$ is satisfied, and that no two locations are connected by more than one street.

Finally O lines follow, each containing two integers a, b: this means that there is an order to carry goods from place a to place b.

Constraints We always have $1 \leq N \leq 50\,000$, $1 \leq O \leq 10\,000$ and $K \leq 5$. Moreover, we have $0 \leq a < b < N$ for all orders a, b and $1 \leq t \leq 10\,000$ for all tolls t. For subcases, the inputs have these further restrictions:

7 points $K = 1$

10 points All orders have $a = 0$.

8 points $O \leq 100$

31 points $O \leq 3\,000$

44 points No further restrictions.

Output

Your output should consist of O lines, each with one integer. The i-th line should contain the toll on a cheapest path between the two places in order i. If no such path exists, output -1 in this line.

Sample Input 1	Sample Output 1
5 14 5 5 0 5 9 5 12 10 0 7 7 7 12 8 4 7 10 0 12 0 5 0 7 7 12 0 13	15 9 7 8 -1

Problem C
Railway
Problem ID: railway

A couple of years ago the Bergen Ministry of Infrastructure prepared a plan for a new light railway network. This network was supposed to connect all n neighbourhoods in the city with $n-1$ railway tracks in such a way, that there would be a path from every neighbourhood to every other neighbourhood. The planned tracks are identified by numbers from 1 to $n-1$.

Years passed, new elections are approaching, and the railway network still exists only on paper. Therefore the Minister of Infrastructure (representing a party holding disagreement in high regard) decided to construct at least some part of the plan. He asked each of his m deputy ministers to choose which neighbourhoods *they* thought should be connected. That will result in a list of necessary tracks for each deputy minister. If a deputy minister thinks that the neighbourhoods $a_1, \ldots, a_s$ need to be connected, then according to him or her, the necessary tracks are all those which lie on planned paths from a_i to a_j for some $1 \leq i < j \leq s$.

The minister just received all lists from the deputy ministers. He decided to construct in the first place the tracks which are requested by at least k deputy ministers. Your task is to prepare a list of these tracks.

Input

In the first line of the input there are three integers n, m and k. The next $n-1$ lines contain the plan; in the i-th of these lines there are two integers a_i and b_i ($1 \leq a_i, b_i \leq n, a_i \neq b_i$), specifying that the i-th track on the plan is between neighbourhoods a_i and b_i.

In the next m lines there are neighbourhoods chosen by deputy ministers; the i-th of these lines begins with an integer s_i which specify the number of neighbourhoods chosen by the i-th deputy minister. After it there are s_i integers specifying these neighbourhoods. The total length of all lists of deputy ministers is at most S, i.e. $\sum_{i=1}^{m} s_i \leq S$.

Constraints We always have $2 \leq s_i \leq n \leq 100\,000$, $S \leq 100\,000$, and $1 \leq k \leq m \leq 50\,000$. For subcases, the inputs have these further restrictions:

8 points $n \leq 10\,000$, $S \leq 2\,000$,

15 points $n \leq 10\,000$, $m \leq 2\,000$,

7 points Every neighbourhood is the endpoint of at most 2 planned tracks.

29 points $k = m$, $s_i = 2$,

16 points $k = m$,

25 points No further restrictions.

Output

In the first line of the output you should write one integer r, specifying the number of tracks which are requested by at least k deputy ministers. In the second line you should write r identifiers of these tracks in ascending order.

Explanation of sample

The first deputy minister thinks that tracks 1–3, 2–3, 3–4 and 4–5 are necessary. The second deputy minister considers tracks 3–4 and 4–6, and the third one only track 2–3. Tracks 2–3 and 3–4 are necessary according to at least two deputy ministers.

Sample Input 1	Sample Output 1

<pre>6 3 2
1 3
2 3
3 4
6 4
4 5
4 1 3 2 5
2 6 3
2 3 2</pre>
	<pre>2
	2 3</pre>