Dependency Hell

You want to install m specific programs on your computer from a library of n programs, $p_1, p_2, \ldots, p_n$; however, some of the programs have *dependencies*, meaning that they cannot be installed until the programs they're dependent on are installed first. In other words, to install some program p_i that depends on some program p_j, you must first install p_j first before installing p_i; if there are additional programs p_j is dependent on, they too must be installed prior to installing p_j.

You are given q queries, where each query consists of n (the total number of programs), a list of dependencies for the n programs, and a list of the m specific indices of the programs you wish to install. For each query, perform the following tasks:

1. Find the minimum number of programs that must be installed in order for you to install the m specific programs you want, then print this number on a new line.
2. Find the order in which you must install each program such that the following conditions are satisfied:

   - The m specific programs you wanted to install are all installed.
   - The number of installed programs is minimal.
   - None of the dependencies are broken.

   Then print this installation sequence as a single line of space-separated integers. If there is more than one way to accomplish this, then print the lexicographically smallest installation sequence.

Input Format

The first line contains an integer, q, denoting the number of queries. The subsequent lines describe each query in the following format:

1. The first line contains two space-separated integers describing the respective values of n (the total number of programs) and m (the number of specific programs you want to install).
2. Each line i (where $1 \leq i \leq n$) of the n subsequent lines describes the depencencies for p_i; the first integer is always d_i (the number of programs that must be installed before installing p_i), followed by d_i space-separated integers describing the indices of the programs that must be installed before installing p_i.
3. The next line contains m space-separated integers describing the programs you want to install.

Constraints

- $1 \leq q \leq 10$
- $1 \leq n \leq 2 \cdot 10^4$
- $1 \leq m \leq n$
- $1 \leq p_i \leq n$, where $1 \leq i \leq n$.
- $0 \leq d_i \leq n$

Output Format

For each query, print the following two lines:

1. On the first line, print a single integer denoting the minimum number of programs that must be installed in order for you to install the m specific programs you want without breaking any of the dependencies.
2. On the second line, print the space-separated indices of each program you must install, in the order in which you must install them. Recall that the installation sequence must satisfy the following

conditions:

- The m specific programs you wanted to install are all installed.
- The number of installed programs is minimal.
- None of the dependencies are broken.
- The installation sequence is lexicographically small.

Sample Input 0

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

Sample Output 0

```
8
2 5 6 7 3 4 8 1
```

Explanation 0

There are $n = 8$ total programs and you want to install the following $m = 3$ programs: p_1, p_5, and p_6. The dependencies for each program are as follows:

1. p_1 has $d_1 = 1$ dependency: p_8.
2. p_2 has $d_2 = 0$ dependencies.
3. p_3 has $d_3 = 1$ dependency: p_7.
4. p_4 has $d_4 = 1$ dependency: p_7.
5. p_5 has $d_5 = 1$ dependency: p_2.
6. p_6 has $d_6 = 1$ dependency: p_2.
7. p_7 has $d_7 = 0$ dependencies.
8. p_8 has $d_8 = 2$ dependencies: p_3 and p_4.

To install p_1, we must install p_8; however, before we can do that, we must install p_3 and p_4. Before we can install those two, we must install p_7; because this program has no dependency, we know that the only way to install p_1 is to perform the following sequence of installations: $p_7 \to p_3 \to p_4 \to p_8 \to p_1$.

To install p_5, we must install p_2. Because p_2 has no dependency, we insert it into the lexicographically smallest place in the above sequence. We then insert p_5 into the lexicographically smallest place after p_2, so the installation sequence becomes $p_2 \to p_5 \to p_7 \to p_3 \to p_4 \to p_8 \to p_1$.

To install p_6, we must install p_2. Because p_2 is part of the installation sequence above, we simply insert p_6 into the lexicographically smallest place after p_2 in the sequence above so it becomes $p_2 \to p_5 \to p_6 \to p_7 \to p_3 \to p_4 \to p_8 \to p_1$.

As you can see, it was necessary to install a total of 8 programs to install the $m = 3$ specific programs you wanted, so we print 8 on a new line. We then print the indices from the lexicographically small installation sequence explained above as our second line of output.