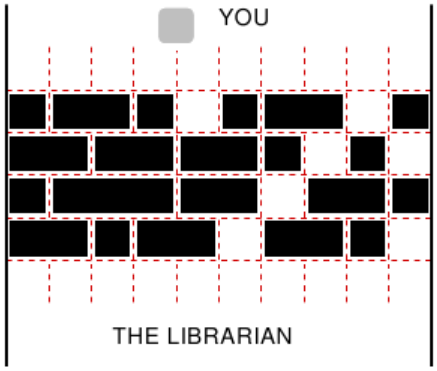
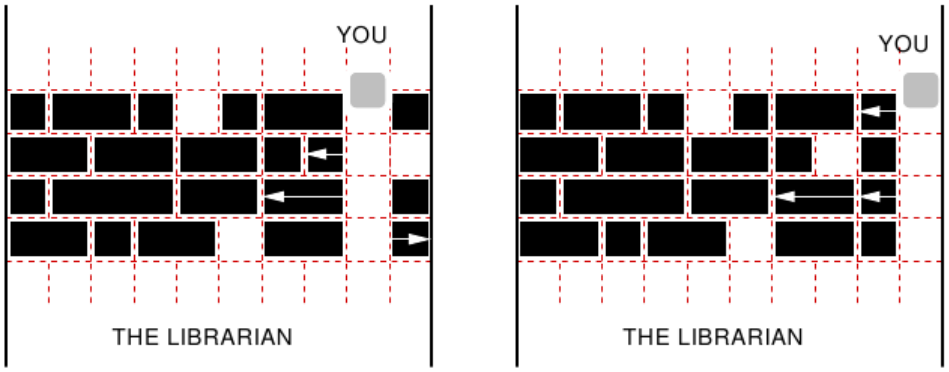
4629 Knowledge for the masses

You are in a library equipped with bookracks that move on rails. There are many parallel rails, i.e., the bookracks are organized in several rows, see figure:



The boockracks in the library. There is no passage to the librarian at the moment.

To borrow a book, you have to find the librarian, who seems to hide on the opposite side of the bookracks. Your task then is to move the racks along the rails so that a passage forms. Each rack has a certain integer width, and can be safely positioned at any integer point along the rail. (A rack does not block in a non-integer position and could accidentally move in either direction). The racks in a single row need not be contiguous — there can be arbitrary (though integer) space between two successive bookracks. A passage is formed at position k if there is no bookrack in the interval $(k, k+1)$ in any row (somehow you don't like the idea of trying to find a more sophisticated passage in this maze.)



The passages formed in the library: at position 8 (the left figure) and at position 9 (the right figure). Both attained at cost 3 by moving the bookracks marked with arrows.

Moving a rack requires a certain amount of efflort on your part: moving it in either direction costs 1. This cost does not depend on the distance of the shift, which can be explained by a well known fact that static friction is considerably higher than kinetic friction. Still, you are here to borrow a book, not to work out, so you would like to form a passage (at any position) with as little efflort as possible.

Input

The input contains several test cases. The first line of the input contains a positive integer $Z \leq 15$, denoting the number of test cases. Then Z test cases follow, each conforming to the format described below.

Two space separated integers R and L ($1 \leq R$, $1 \leq L \leq 10^6$) are given in the first line of an input instance. They denote the number of rows and the width of each and every row, respectively. Then R lines with rows descriptions follow. Each such line starts with an integer n_i, followed by n_i integers $a_{i,1}, a_{i,2}, \ldots a_{i,n_i}$, all separated by single spaces. Number $a_{i,j}$ denotes either the width of a bookrack when $a_{i,j} > 0$ or a unit of empty space when $a_{i,j} = 0$. Note that for any row i, $\sum_j a_{i,j}$ equals L minus the number of $a_{i,j}$ that are equal to zero. You may assume that $n_1 + n_2 + \cdots + n_R \leq 2 * 10^7$. Moreover, there will be at least one '0' in the description of each row, which means that creating a passage is always possible.

Output

For each test case, your program has to write an output conforming to the format described below.

In the first line, your program should output the minimum cost of making a passage through the bookracks. In the second line, it should print out the increasing sequence of all the positions at which a minimum cost passage can be formed.

Sample Input

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

Sample Output

```
3
8 9
```

UVa Online Judge

10243 Fire! Fire!! Fire!!!

The **ACM (Asian Cultural Museum)** authority is planning to install fire exits in its galleries in order to handle the emergency situation arising in case of a sudden fire. The museum is a collection of numerous interconnected galleries. The galleries are connected by corridors in such a way that from any gallery there is exactly one path to reach any other gallery without visiting any intermediate gallery (a gallery that is on that path) more than once.

However, in order to reduce installation cost, it has been decided that not every gallery will have a fire exit. Fire exits will be installed in such a way that if any gallery does not have a fire exit then at least one of its adjacent galleries must have one and for each corridor at least one of the two galleries it connects must have a fire exit. You are hired to determine where to put the fire exits under this constraint.

However, as a first step, you are expected to determine the minimum number of fire exits required.

Input

The input file may contain multiple test cases. The first line of each test case contains an integer N $(1 \leq N \leq 1,000)$ indicating the number of galleries in this test case. Then follow N lines where the i-th $(1 \leq i \leq N)$ line is the adjacency list of the i-th gallery (Each gallery is given a unique identification number from 1 to N for convenience). The adjacency list for gallery i starts with an integer n_i $(1 \leq n_i \leq N-1)$ indicating the number of galleries adjacent to this gallery, followed by n_i integers giving the identification numbers of those galleries.

A test case containing a zero for N terminates the input.

Output

For each test case in the input file print a line containing the minimum number of fire exits required to meet the given constraint.

Sample Input

```
4
3 2 3 4
1 1
1 1
1 1
16
4 6 12 15 16
3 3 8 10
4 2 4 6 9
1 3
1 6
3 1 3 5
1 15
1 2
1 3
1 2
1 16
```

```
1 1
1 15
1 15
4 1 7 13 14
2 1 11
0
```

Sample Output

```
1
6
```