P7

My birthday is coming up and traditionally I'm serving pie. Not just one pie, no, I have a number N of them, of various tastes and of various sizes. F of my friends are coming to my party and each of them gets a piece of pie. This should be one piece of one pie, not several small pieces since that looks messy. This piece can be one whole pie though.

My friends are very annoying and if one of them gets a bigger piece than the others, they start complaining. Therefore all of them should get equally sized (but not necessarily equally shaped) pieces, even if this leads to some pie getting spoiled (which is better than spoiling the party). Of course, I want a piece of pie for myself too, and that piece should also be of the same size.

What is the largest possible piece size all of us can get? All the pies are cylindrical in shape and they all have the same height 1, but the radii of the pies can be different.

Input

One line with a positive integer: the number of test cases. Then for each test case:

- One line with two integers N and F with $1 \leq N, F \leq 10000$: the number of pies and the number of friends.
- One line with N integers r_i with $1 \leq r_i \leq 10000$: the radii of the pies.

Output

For each test case, output one line with the largest possible volume V such that me and my friends can all get a pie piece of size V. The answer should be given as a oating point number with an absolute error of at most 10^{-3}.

Sample Input

```
3
3 3
4 3 3
1 24
5
10 5
1 4 2 3 4 5 6 5 4 2
```

Sample Output

```
25.1327
3.1416
50.2655
```

P8

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
```