Problem A : Income

(blue balloon)

The amount of income tax imposed on any taxpayer depends on his/her income. For an income less than or equal to 1,000,000 Nairas, no tax is paid. For an income greater than 1,000,000 and less than or equal to 5,000,000 Nairas, the tax is 10% of the income. For an income over 5,000,000 Nairas, the tax is 20% of the income. You should write a program to calculate the net income of any given employee after the deducted tax.

Standard Input

There are multiple lines in the input. Each line contains an employee's income before the tax, which is a positive integer, a multiple of 1000, and not greater than 10,000,000. The input terminates with a line containing 0 which should not be processed.

Standard Output

For each employee, output a line containing the net income after the deducted tax.

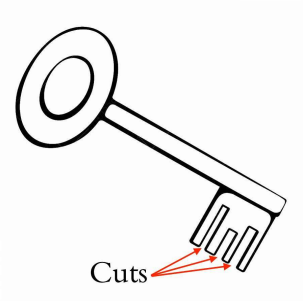
Sample Input	Sample Output
10000 50000 2000000 7500000 0	10000 50000 1800000 6000000

Problem B: Hassan

(red balloon)

Hassan is a happy key maker. Every customer arrives with a safe-box key, and asks him to create some copies of the key. Each key has several cuts of different depths. The picture below shows a safe-box key with 3 cuts. To make a copy, Hassan needs to make the same number of cuts with exactly the same sequence of depths in a new blank key.

In the first days of his job, Hassan wasted many blank keys to make copies. Most of the copied keys, however, did not match the customer keys and he could not sell them. He collected those copied keys in a trash-box, and now he is thinking of recycling them.



When a new customer arrives, Hassan looks into the trash-box, collects all keys with the same number of cuts as the customer's key, and counts the keys that can match the customer's key. A key can match the customer's key if it already has exactly the same sequence of cut depths, or the depth of some of its cuts can be increased to reach the same sequence. Since this job is too hard for him, he has asked your help. For simplicity, you can assume that in any two keys with the same number of cuts, the position of the cuts along the keys are identical.

Standard Input

There are multiple test cases in the input. The first line of each test case contains two space-separated integers m as the number of cuts in the customer's key ($1 \leqslant m \leqslant 10$), and n as the number of keys with the same number of cuts in the trash-box ($1 \leqslant n \leqslant 100$). The second line of the test case consists of m space-separated integers, as the depths of cuts in the customer's key. Each of the next n lines also contains m integers, as the depths of cuts in a trash-box key. The depth of cuts in each of these n + 1 keys are 1-digit positive integers given in the left-to-right order. The input terminates with a line containing 0 0 which should not be processed.

Standard Output

For each test case, print a single line containing the number of keys in the trash-box that either match the customer's key or can be cut to match it.

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

Problem C : Logo
(yellow balloon)

In order to design a logo, the organizing committee of the competition decided to publicly call for logos. It was not surprising that many logos were received in a short time as the young generation is actively taking part in any event. In the first round, logos were judged by some professional graphic designers, and the best logos being artistically capable to be the choosen logo were selected to be judged in the second round.

The selected logos are now presented to the organizing-committee members for voting. The voting system is a little bit complicated: each member can vote for at most three different logos in some order. The first, second and third choices of each member are awarded 3, 2 and 1 points, respectively. The score of a logo is the total points the logo receives from all members. The logo with the highest score is the winner. In the case of ties, the winner is the logo with higher number of first votes. Again, if some logos have the same score and first votes, the logo with more second votes is the winner. If we still have ties, all of them would be winners. Given the voting information, your job is to identify the winner logo (or logos).

Standard Input

There are multiple test cases in the input. The first line of each test case contains a positive integer n denoting the number of voters ($1 \leqslant n \leqslant 100$). Each of the next n lines starts with an integer di, representing the number of logos chosen by the i-th voter ($1 \leqslant di \leqslant 3$), followed by di different logo IDs showing the choices of that voter (from left to right). Each logo ID is a positive integer not exceeding 106. All integers in a line are separated with a single space. The input terminates with a line containing 0 which should not be processed.

Standard Output

For each test case, output a line containing the winner logos in the increasing order of their IDs. Logo IDs in a line must be separated with a single space.

Sample Input	Sample Output
4 3 5 2 1 3 12 5 2 2 1 2 3 2 1 5 2 3 3 2 1 3 2 3 1 0	2 2 3

Problem D : Rank (Orange balloon)

Ahlaam is a computer science student, doing her master thesis on a bioinformatics project about MicroRNAs, special molecule types found in cells. During her thesis, she wants to find microRNAs relevant to a specific health factor in human beings.

Ahlaam has designed k microRNA ranking algorithms, each of which ranks microRNAs from a specific point of view. There are n microRNAs numbered 1 through n, and each algorithm produces one permutation of these n microRNAs. In the permutation produced by each algorithm, the first microRNA is inferred by the algorithm as the most relevant one to the health factor, and the last microRNA is inferred as the least relevant one.

Ahlaam wants to report a *consensus* ranking on microRNAs. In a consensus ranking, if microRNA i is ranked before another mircroRNA j, then at least half of the algorithms should have ranked i before j. Write a program to help Ahlaam find a consensus ranking.

Standard Input

There are multiple test cases in the input. The first line of each test contains two space-separated integers n ($1 \leqslant n \leqslant 1000$) and k ($1 \leqslant k \leqslant 200$), the number of microRNAs and the number of ranking algorithms, respectively. Then, there are k lines, where the i-th line contains a permutation of n numbers $1, \ldots, n$, representing the output of the i-th ranking algorithm. The input terminates with a line containing `0 0` which should not be processed.

Standard Output

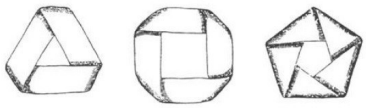
For each test case, print a single line containing a permutation of n numbers $1, \ldots, n$, representing a possible consensus ranking. If there are more than one correct consensus rankings, print the first one in lexicographic order (a sequence $a_1, \cdots, a_n$ is lexicographically less than a sequence $b_1, \cdots, b_n$ if there exists a positive integer j such that $a_i = b_i$ for all $1 \leqslant i \leqslant j - 1$ and $a_j < b_j$). If no such a ranking exists, write "`No solution`" instead.

Sample Input	Sample Output
5 3 3 2 4 1 5 4 1 5 2 3 2 4 5 1 3 5 2 5 4 3 2 1 1 2 3 4 5 4 3 1 4 2 3 4 2 3 1 3 1 2 4 0 0	2 4 1 5 3 1 2 3 4 5 No solution

Problem E : Strip
(Purple balloon)

A Möbius strip is obtained by taking a long strip of paper, twisting the paper through 180 degrees (or in other words, a half-twist) and then, joining one end back to the other end of the strip. A möbius strip is shown in the figure to the right.

Instead of performing only one half-twist, we can also do zero, two, three, four, or more half-twists, and then tape the two ends. The resulting shape for three, four, and five half-twists respectively looks like below:



The "*type*" of each strip is a non-negative integer denoting the number of its half- twists. Now given a strip, consider a line along the length of the strip that lies one-third of the width away from one edge of the strip. Next, cut the strip along that line using scissors as shown in the figure to the right. The cutting is continued until it reaches its starting point.

After we cut the strip as above, we get a number of strips each with some number of half-twists. For example, if we begin with a strip of type 2, we get two strips of type 2. We are allowed to cut again and again some of the resulting strips if we wish. Some of the resulting strips may be intertwined. In that case, we consider them as two distinct strips and can cut each of the strips independently and separately from the other strip(s).

Now here is the question: Given two sets of strips, can we cut some strips in the two sets such that the two sets of strips are transformed into two new sets of strips with equal number of strips of each type?

Standard Input

There are multiple test cases in the input. The first line of each test case contains two space-separated integers a and b ($1 \leqslant a, b \leqslant 100$), as the number of strips in each of the two sets of strips. The following two lines contain a and b non-negative integers respectively, as the

types of strips in each set. All the given strip types are at most 100. The input terminates with a line containing `-1 -1` which should not be processed.

Standard Output

For each test case, on a separate line, write either the character "Y" denoting that we can make the required transformation or the character "N" denoting otherwise.

Sample Input	Sample Output
1 2 0 0 0 4 4 1 1 2 4 1 2 4 4 2 4 3 4 8 4 4 3 -1 -1	Y N Y