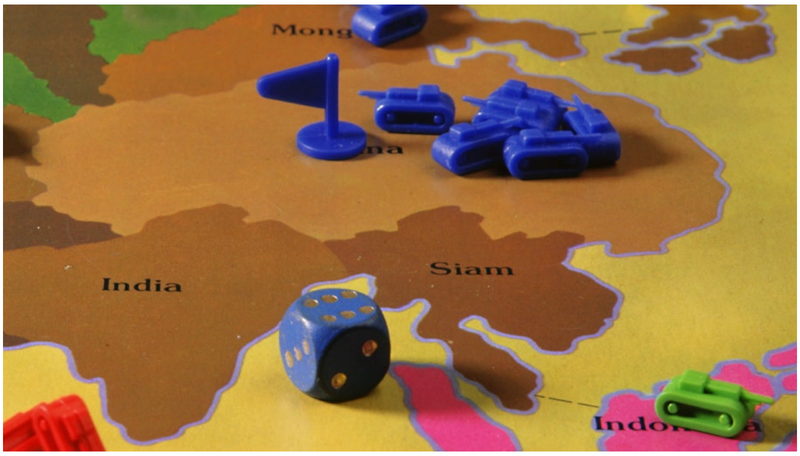
Playing Risiko (`risiko`)

George and Alexander want to play Risiko with an unorthodox ruleset. There are N countries, numbered from 0 to $N-1$, each with a strength S_i. Before the start of the game, the countries are assigned to K players, indexed from 0 to $K-1$. Each country is assigned to exactly one player, and two adjacent countries cannot be assigned to the same player.

The strength of a player is the sum of the strengths of the countries assigned to them. The development index of a player is the number of countries they have, multiplied by 10^9. The *imbalance* of the game is the difference between the strength of the strongest player and that of the weakest one, plus the difference between the development index of the most developed player and that of the least developed one.

Everybody wants the game to be as balanced as possible, i.e., they want to minimize the *imbalance*, but they are having a hard time doing so. Can you help them find an assignment of countries which is as balanced as possible?



Close-up of a Risiko board.

Input

The first line contains the integers N and K: the number of countries and players, respectively.

The second line contains N integers: the S_i strengths of the countries for $i = 0, 1, \ldots, N-1$.

The following N lines describe the adjacencies between countries.

The $3+i$-th line, for $i = 0, 1, \ldots, N-1$, contains an integer L_i, followed by a list $A_i = (A_{i,1}, \ldots, A_{i,L_i})$ of L_i integers: the countries that are adjacent to country i.

Output

You need to output N integers on a single line: the player country i is assigned to, for $i = 0, 1, \ldots, N-1$.

Constraints

- $1 \le K \le 100$.
- $K \le N \le 5\,000$.
- $1 \le S_i \le 10^9$, for $i = 0, 1, \ldots, N-1$.
- $0 \le L_i < K$, for $i = 0, 1, \ldots, N-1$.
- $0 \le A_{i,j} < N$ and $A_{i,j} \ne i$, for $i = 0, 1, \ldots, N-1$, $j = 0, 1, \ldots L_i - 1$.
- For each $i = 0, 1, \ldots, N-1$, the values of $A_{i,j}$ $(j = 0, 1, \ldots L_i - 1)$ are all different.
- Adjacency is symmetric: if country i is adjacent to country j, country j is adjacent to country i.

Scoring

Your program will be tested against 10 test cases. The tests were generated as follows. For each test case, the values of N and K, an upper bound W for all S_i values, and the total number of adjacency relations (E) was set manually. Then, S_i values between 1 and W (inclusive) were generated for each $i = 0, 1, \ldots, N-1$, using uniform distribution. Finally, E adjacency relations were generated by uniformly selecting pairs of countries without violating the constraints $0 \le L_i < K$.

For each test case, its score will be 0 if your output doesn't satisfy the problem requirements. Otherwise, an output with an *imbalance* B_{user} will be compared with the jury's output, with an *imbalance* B_{jury} and will be assigned a score of $10 \cdot \min\left(1, \frac{\max(B_{jury}, 10^9)}{B_{user}}\right)$.

The total score of a submission will be the sum of its scores on all test cases. Your final score will be the maximum total score among all submissions.

Examples

input	output
4 3 3 2 1 4 2 1 2 1 0 2 0 3 1 2	0 1 1 2

Explanation

In the **sample case**, the minimum possible *imbalance* is $10^9 + 1$, and it can be achieved by assigning country 0 to player 0, countries 1 and 2 to player 1, and country 3 to player 2:

- Player 0 has a strength of 3 and a development index of 10^9.
- Player 1 has a strength of 3 and a development index of $2 \cdot 10^9$.
- Player 2 has a strength of 4 and a development index of 10^9.

The *imbalance* is hence $2 \cdot 10^9 - 10^9 + 4 - 3 = 10^9 + 1$, and no player gets adjacent countries.