

H. Pokermion League challenge

time limit per test: 5 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

Welcome to the world of Pokermion, yellow little mouse-like creatures, who absolutely love playing poker!

Yeah, right...

In the ensuing Pokermion League, there are n registered Pokermion trainers, and t existing trainer teams each of which belongs to one of two conferences. Since there is a lot of jealousy between trainers, there are e pairs of trainers who hate each other. Their hate is mutual, there are no identical pairs among these, and no trainer hates himself (the world of Pokermion is a joyful place!). Each trainer has a wish-list of length l_i of teams he'd like to join.

Your task is to divide players into teams and the teams into two conferences, so that:

- each trainer belongs to exactly one team;
- no team is in both conferences;
- total hate between conferences is at least $e / 2$;
- every trainer is in a team from his wish-list.

Total hate between conferences is calculated as the number of pairs of trainers from teams from different conferences who hate each other.

Input

The first line of the input contains two integer n ($4 \leq n \leq 50\,000$) and e ($2 \leq e \leq 100\,000$) — the total number of Pokermion trainers and the number of pairs of trainers who hate each other.

Pokermion trainers are numbered from 1 to n . Next e lines contain two integers a and b ($1 \leq a, b \leq n$) indicating that Pokermion trainers a and b hate each other. Next $2n$ lines are in a following format. Starting with Pokermion trainer 1, for each trainer in consecutive order: first number l_i ($16 \leq l_i \leq 20$) — a size of Pokermion trainers wish list, then l_i positive integers $t_{i,j}$ ($1 \leq t_{i,j} \leq T$), providing the teams the i -th trainer would like to be on.

Each trainers wish list will contain each team no more than once. Teams on the wish lists are numbered in such a way that the set of all teams that appear on at least 1 wish list is set of consecutive positive integers $\{1, 2, 3, \dots, T\}$. Here T might be up to 1 000 000.

Output

Print two lines. The first line should contain n numbers, specifying for each trainer the team he is in.

The second line should contain T numbers, specifying the conference for each team (1 or 2).

Example

input
4 3
1 2
2 3
4 1
16
1 2 3 4 5 6 7 8 9 10 11 12 13 14 16 15
16
2 3 4 5 6 7 8 9 10 11 12 13 14 15 17 18
16
2 3 4 5 6 7 8 9 10 11 12 13 14 15 18 19
16
1 2 3 4 5 6 7 8 9 10 11 12 13 14 16 19

output

16 15 19 14
2 2 2 1 1 1 2 1 1 2 1 1 1 2 2 1 1 1 1

Note