A. Stable Matching

Description

There are `N` single boys and `N` single girls waiting to be matched.

Each boy has his own preference order of all `N` girls, and each girl has her own preference order of all `N` boys.

As you are a well-known matching master, they wish that you find a **stable matching** for them!

Input format

The first line includes one integer N.

The next line contains N strings separated by spaces, representing the name of boy $1, 2, \ldots, N$ respectively.

The next line contains N strings separated by spaces, representing the name of girl $1, 2, \ldots, N$ respectively.

For the next N lines, line i contains a permutation of N girls' names, representing the preference order of boy i, from passionate to indifferent.

For the next N lines, line i contains a permutation of N boys' names, representing the preference order of girl i, from passionate to indifferent.

It is guaranteed that no two person share a same name.

Output format

Your program should output N lines.

Each line contains a boy's name and a girl's name separated by a space, representing a pair in the matching. Please output the boy's name before the girl.

You must make sure that your solution is a stable matching.

If there are multiple solution, output any one.

Samples

Sample Input

```
3
A B C
a b c
b a c
b a c
b c a
C B A
B C A
A C B
```

Sample Output

```
A a
B b
C c
```

B.College Admission

Description

N students are making college application among M colleges.

The students are numbered as $1 \dots N$ and colleges are numbered as $1 \dots M$. Each student can be enrolled to at most one college. College i can enroll at most cap_i students.

Each student has his/her evaluation towards these M colleges. Student i's evaluation towards college j is a nonzero integer $s_{i,j}$ (possibly negative). It is guaranteed that $s_{i,j}$ is unique among $s_{i,1}, s_{i,2}, \dots, s_{i,m}$.

Each college has its evaluation towards these N students. College i's evaluation towards student j is a nonzero integer $c_{i,j}$ (possibly negative). It is guaranteed that $c_{i,j}$ is unique among $c_{i,1}, c_{i,2}, \dots, c_{i,n}$.

If student i is eventually enrolled to some college j, his/her satisfaction value will be $s_{i,j}$. Otherwise, the value will be 0. Note that a student may not be enrolled to any college because of either being rejected, or he/she prefers not going to college than any other choices.

If college i eventually enrolls a set of students (denoted by A), its satisfaction value will be $\sum_{x \in A} c_{i,x}$.

Each student or college will try to maximize its satisfaction value. Please find a **stable matching** for this scenario, where:

- No student prefers not to go to college than to reserve his/her current admission.
- No college prefers to abandon an enrolled student than to reserve him/her.
- There is not any pair (s, c), such that
  - student s is not enrolled to college c
  - student s prefers college c than s's current admission state (i.e. being enrolled to some college, or unmatched)
  - either c is capable to enroll more student and s can increase c's satisfaction value, or c prefers s than some other student s' that has been enrolled to c

If there are multiple solutions, output any one.

Input format

The first line includes two integers N, M.

The next line contains M integers $cap_1, cap_2, \dots, cap_M$.

For the next N lines, line i contains M integers $s_{i,1}, s_{i,2}, \dots, s_{i,M}$.

For the next M lines, line i contains N integers $c_{i,1}, c_{i,2}, \dots, c_{i,N}$.

Output format

Your program should output M lines.

Line i depicts the admission of college i. First, output the number of students enrolled to college i. Then, output the IDs of those students.

You must make sure that your solution is a stable matching.

Samples

Sample Input

```
3 2
3 3
3 4
-1 2
3 2
2 3 -1
-1 2 3
```

Sample Output

```
1 1
2 2 3
```