

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.

Sample

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
```

Hint

For formal definitions of **many-to-one stable matching** and algorithm hints, you can refer to [this document \(p37\)](#).

For 40% testcases:

- $N, M \leq 100$

For 100% testcases:

- $1 \leq N, M \leq 1000$
- $1 \leq cap_i \leq N$
- $1 \leq |s_{i,j}|, |c_{i,j}| \leq 5 \times 10^4$