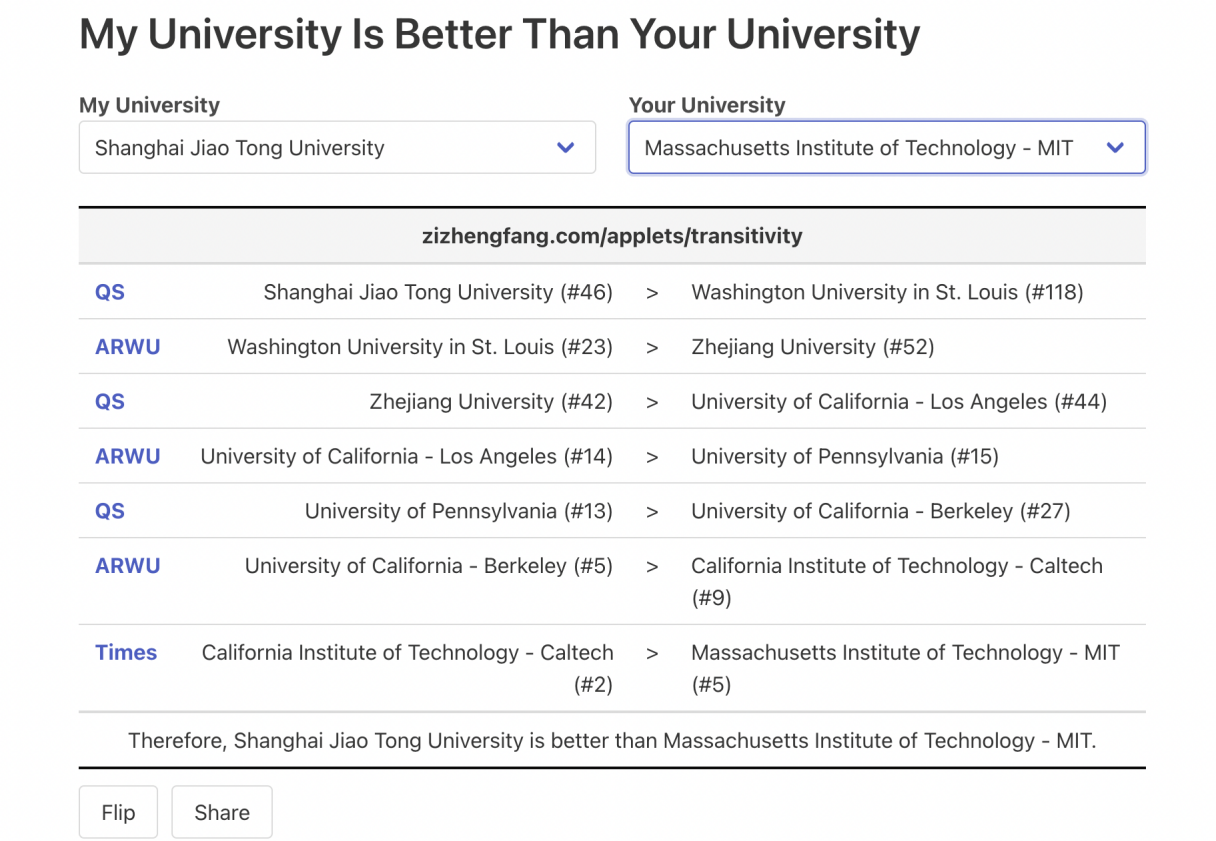
My University Is Better Than Yours

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

People rank for things. Yes, ranking is nothing for most of the time, except when you are doing year-end report to your boss.

Under the promotion of the construction of world-class universities, a lot of universities are struggling to improve ranking in every way. Publishing papers, applying for funds, improving diversity... They are too hard and your result may not be fairly judged by institutions like US News and Times! However, *some* universities are more *clever* – they publish their own rankings, which makes the ranking *indirectly better*. For example, using Shanghai Ranking's Academic Ranking of World Universities (ARWU) produced by Shanghai Jiao Tong University, Desprado2 can prove that his school is better than MIT.



My University Is Better Than Your University

My University: Shanghai Jiao Tong University

Your University: Massachusetts Institute of Technology - MIT

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QS	Shanghai Jiao Tong University (#46)	>	Washington University in St. Louis (#118)
ARWU	Washington University in St. Louis (#23)	>	Zhejiang University (#52)
QS	Zhejiang University (#42)	>	University of California - Los Angeles (#44)
ARWU	University of California - Los Angeles (#14)	>	University of Pennsylvania (#15)
QS	University of Pennsylvania (#13)	>	University of California - Berkeley (#27)
ARWU	University of California - Berkeley (#5)	>	California Institute of Technology - Caltech (#9)
Times	California Institute of Technology - Caltech (#2)	>	Massachusetts Institute of Technology - MIT (#5)

Therefore, Shanghai Jiao Tong University is better than Massachusetts Institute of Technology - MIT.

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Anyway, that is a joke unless you are finding jobs and need to brag about your school. But at the same time, Desprado2 comes out a problem: assume there are n universities in total, and he has collected m university rankings. For simplicity, all the universities are denoted by a number from 1 to n. Here, Desprado2 defines that university x is **directly better** than university y, if and only if there exists a university ranking such that university x ranks higher than university y. Furthermore, Desprado2 defines that university x is **better** than university y, if and only if there exists a sequence $\{s_1, s_2, ..., s_k\}$ $(k \geq 2)$, such that:

- $s_1 = x,\ s_k = y$
- $\forall i \in \{1, 2, \ldots, k-1\}$, university s_i is **directly better** than university s_{i+1}

For each university, Desprado2 want you to tell him it is **better** than how many of **other** universities.

Input

The first line contains two integers n and m ($1 \leq n \leq 5 \times 10^5$, $1 \leq m \leq 5 \times 10^5$, $1 \leq n \times m \leq 10^6$), denoting the number of universities considered, and the number of university rankings.

Then follows m lines. The i-th line contains n distinct integers $s_{i,1},\ s_{i,2},\ ...,\ s_{i,n}$ ($1 \leq s_{i,j} \leq n$), denoting the order of the i-th university ranking (from high to low).

Output

Output one line with n integers $a_1, a_2, \ldots, a_n$, separated by spaces. The i-th number a_i denotes the number of universities that university i is **better** than.

Examples

standard input	standard output
4 2 1 2 3 4 1 3 2 4	3 2 2 0
4 2 1 2 3 4 4 3 2 1	3 3 3 3
5 2 5 4 3 2 1 5 4 3 2 1	0 1 2 3 4