Black Boxes

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A *pattern of length k* is a sequence $a_1, a_2, ..., a_k$ of k pairwise distinct numbers. Two patterns $a_1, a_2, ..., a_k$ and $b_1, b_2, ..., b_k$ are equivalent if $a_i < a_j \Leftrightarrow b_i < b_j$ for all i and j such that $1 \leq i < j \leq k$. A *dictionary* is a list of several pairwise nonequivalent patterns.

A *black box* for a fixed dictionary is a machine that recognizes patterns - given an unknown pattern X, it asks several questions of form "Is the i-th element of the pattern smaller than the j-th one?", and then decides to which of the patterns in the dictionary is X equivalent (in case X is not equivalent to any of the patterns, the black box may answer arbitrarily). The *quality* of the black box is the maximum number of questions the black box asks for any input.

International Blackbox Machine Corporation manufactures black boxes for various dictionaries, and claims that they ask the least number of questions possible. Your task is to help to verify this claim.

Input Specification

The input consists of several instances, the instances are separated by single empty lines. The first line of each instance contains integers D and k ($1 \leq D \leq 120, 1 \leq k \leq 100$) separated by a space, where D is the number of patterns in the dictionary and k is the length of each pattern. Each of the D following lines describes one of the patterns in the dictionary. Each of the lines consist of k distinct integers $a_1, ..., a_k$ ($1 \leq a_i \leq k$) separated by single spaces.

Output Specification

For each input instance, output a single line containing a single integer Q - the quality of the best possible black box that recognizes the given dictionary.

Sample Input

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

1 1
1
```

Output for Sample Input

```
2
0
```

Comment: It is easy to see that no black box may recognize these patterns by just one question. The black box that recognizes them by two questions may work for example this way: It first asks whether the first element a_1 is smaller than the second one a_2. If this is the case, it asks whether the second element is smaller than the third one. On the other hand, if $a_1 > a_2$, it asks whether the third element is smaller than the fourth one.