

Lexicographic Order 3

An ordering for the Cartesian product x of any two sets A and B with order relations $<_A$ and $<_B$, respectively, such that if (a_1, b_1) and (a_2, b_2) both belong to $A \times B$, then $(a_1, b_1) < (a_2, b_2)$ iff either

- $a_1 <_A a_2$, or
- $a_1 = a_2$ and $b_1 <_B b_2$.

The lexicographic order can be readily extended to cartesian products of arbitrary length by recursively applying this definition, i.e., by observing that $A \times B \times C = A \times (B \times C)$.

When applied to permutations, lexicographic order is increasing numerical order. For example, the permutations of $\{1,2,3\}$ in lexicographic order are 123, 132, 213, 231, 312, and 321.

You will be given a permutation of n first natural numbers. You need to find k -th lexicographically next permutation. Also we will consider that the lexicographically last permutation is followed by the first one in the ordering.

Input

The first line is number t - the amount of test cases. Each test case starts with numbers n and k . Then n natural numbers follow which are the elements of the given permutation.

Constraints

$1 \leq t \leq 100$
 $1 \leq n \leq 250$
 $0 \leq k < n!$

Output

For each test case output the k -th lexicographically next permutation after the given one.

Example

Input:

```
3
3 3
1 2 3
3 2
2 1 3
3 8
2 3 1
```

Output:

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