Closest Derangement

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	1024 megabytes

Blackbird has a permutation p of length n. He wants to find a derangement q of p, which means q is another permutation of length n satisfying $q_i \neq p_i$ for each $i = 1, 2, \ldots, n$. At the same time, $\sum_{i=1}^{n} |p_i - q_i|$ should be minimized. A permutation q that satisfies the above conditions is called the closest derangement of p.

There may be multiple closest derangements of p, and your task is to output the k-th smallest closest derangement in lexicographical order. If there are fewer than k closest derangements of p, output -1.

A permutation of length n refers to a sequence of length n where all elements are distinct and are positive integers from 1 to n. Permutations can be sorted in lexicographical order. Let a and b be two distinct permutations of length n. Then, $a < b$ if and only if at the smallest index i where $a_i \neq b_i$, it holds that $a_i < b_i$.

Input

The first line contains an integer T ($1 \leq T \leq 10^4$), representing the number of test cases.

For each test case, the first line contains two positive integers n ($2 \leq n \leq 2 \cdot 10^5$) and k ($1 \leq k \leq 10^9$). The second line contains n positive integers $p_1, p_2, \ldots, p_n$, representing the permutation p.

It is guaranteed that the sum of n over all test cases does not exceed 10^6.

Output

For each test case, if there are at least k closest derangements, output n positive integers $q_1, q_2, \ldots, q_n$ in a single line separated by spaces, representing the k-th smallest closest derangement of p in lexicographical order. Otherwise, output -1.

Example

standard input	standard output
2 2 2 2 1 3 2 1 2 3	-1 3 1 2

Note

For the first test case, $[1, 2]$ is the only closest derangement, so output -1.

For the second test case, $[2, 3, 1]$ and $[3, 1, 2]$ are closest derangements of p, and $[3, 1, 2]$ is larger than $[2, 3, 1]$ in lexicographical order.