An AtCoder-style Problem

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

You are given a sequence of positive integers $A = (A_1, A_2, \ldots, A_N)$. For each $i = 1, 2, \ldots, N$, answer the following question:

- Determine if there exists a permutation $B = (B_1, B_2, \ldots, B_{i+M})$ of length $i+M$ and a permutation $C = (C_1, C_2, \ldots, C_i)$ of length i, such that

$$\max_{j \le k \le j+M} B_k = A_{C_j}$$

  for all $j = 1, 2, \ldots, i$.

You are given T test cases. Solve each of them.

Constraints

- All input values are integers.
- $1 \le T \le 10^4$.
- $1 \le N \le 2 \cdot 10^5$.
- $0 \le M \le 10^9$.
- $1 \le A_i \le N + M$.
- The sum of N over all test cases doesn't exceed $2 \cdot 10^5$.

Input

Input is given from Standard Input in the following format:

T
case_1
case_2
$\vdots$
case_T

case_k denotes the k-th test case. Each test case is given in the following format:

N M
A_1 A_2 $\ldots$ A_N

Output

Output T lines. The k-th line ($1 \le k \le T$) should contain the answer for the k-th test case.

For each test case, output a binary string S of length N. The i-th character should be `1` if such B and C exist for prefix $(A_1, A_2, \ldots, A_i)$, and `0` if it doesn't exist.

Example

standard input	standard output
3 4 1 3 3 5 5 4 2 3 3 5 5 6 1 6 5 4 3 2 1	0101 1000 000010

Note

In the first sample case:

- For $A = (3, 3)$, we can construct $B = (2, 3, 1)$ and $C = (1, 2)$.
- For $A = (3, 3, 5, 5)$, we can construct $B = (4, 5, 1, 3, 2)$ and $C = (3, 4, 2, 1)$.