

# Median Operations

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

You are given a positive **odd** integer  $N$  and a permutation  $P = (P_1, P_2, \dots, P_N)$  of  $(1, 2, \dots, N)$ .

You have a sequence  $A$ , which is initially equal to  $P$ . You can repeatedly perform the following operation on sequence  $A$ :

- Choose a contiguous subsequence of odd length from  $A$ . Let  $m$  be the median of this subsequence. Remove the selected subsequence from  $A$  and insert  $m$  at its position.
  - More precisely, choose integers  $l$  and  $r$  such that  $1 \leq l \leq r \leq |A|$  ( $|A|$  is the length of  $A$ ) and  $r - l + 1$  is odd. Replace  $A$  with  $(A_1, \dots, A_{l-1}, m, A_{r+1}, \dots, A_{|A|})$ , where  $m$  is the median of  $(A_l, A_{l+1}, \dots, A_r)$ .

For each  $k = 1, 2, \dots, N$ , determine if you can transform  $A$  into a sequence  $(k)$  of length 1 through these operations.

You have  $T$  test cases; solve each of them.

## Input

The input is given from Standard Input in the following format:

```
T
case1
case2
⋮
caseT
```

Each test case is given in the following format:

```
N
P1 P2 ... PN
```

- $1 \leq T \leq 10^4$
- $3 \leq N \leq 2 \times 10^5$
- $N$  is odd.
- $(P_1, P_2, \dots, P_N)$  is a permutation of  $(1, 2, \dots, N)$ .
- The total sum of  $N$  over all test cases does not exceed  $2 \times 10^5$ .
- All input values are integers.

## Output

Output  $T$  lines.

The  $i$ -th line should contain a string of length  $N$  representing the answer for the  $i$ -th test case. The  $k$ -th character of this string should be 1 if it is possible to transform the sequence into  $(k)$  through the given operations, and 0 otherwise.

## Example

standard input	standard output
2	00110
5	0101010
2 3 1 5 4	
7	
7 6 3 4 5 2 1	

## Note

In the first test case,

- For  $k = 3$ , by choosing  $(l, r) = (1, 5)$ , we can transform  $A$  into  $(3)$ .
- For  $k = 4$ , by first choosing  $(l, r) = (1, 3)$  to transform  $A$  into  $(2, 5, 4)$ , then choosing  $(l, r) = (1, 3)$  again, we obtain  $A = (4)$ .
- For  $k = 1, 2, 5$ , no such sequence of operations exists.