

# Two Binary Strings Problem

Input file:            **standard input**  
Output file:           **standard output**  
Time limit:            1 second  
Memory limit:         512 megabytes

Given an integer  $n$  and two binary strings  $a_1a_2\cdots a_n$  (denoted by  $A$ ) and  $b_1b_2\cdots b_n$  (denoted by  $B$ ) of length  $n$ .

Define function:

$$f(l, r) = \begin{cases} 1, & \text{if } \sum_{i=l}^r a_i > \frac{r-l+1}{2} \\ 0, & \text{otherwise} \end{cases}$$

We say an integer  $k$  is lucky, iff for each  $i$  ( $1 \leq i \leq n$ ),  $f(\max(i - k + 1, 1), i) = b_i$  holds.

For each integer  $k$  ( $1 \leq k \leq n$ ), determine if it is lucky.

## Input

The first line contains one integer  $T$  ( $1 \leq T \leq 50000$ ), denoting the number of the test cases.

For each test case:

The first line contains one integer  $n$  ( $1 \leq n \leq 50000$ ), denoting the length of the two binary strings.

The second line contains one binary string  $A$ .

The third line contains one binary string  $B$ .

It is guaranteed that  $\sum n \leq 50000$ .

## Output

For each test case:

Output one line containing a binary string  $c_1c_2\cdots c_n$  of length  $n$ , where  $c_i = 1$  iff  $i$  is lucky while  $c_i = 0$  iff  $i$  is not lucky.

## Example

standard input	standard output
2	01000
5	00001100
11010	
11000	
8	
11110000	
11111100	