Problem J. 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 $i\,(1\le i\le n)$, $f\big(\max(i-k+1,1),i\big)=b_i$ holds.

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

Input

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

For each test case:

The first line contains one integer $n\,(1\le n\le 50000)$, 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 $\sum n\le 50000$.

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 5 11010 11000 8 11110000 11111100	01000 00001100