

B. Binary Path

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given a $2 \times n$ grid filled with zeros and ones. Let the number at the intersection of the i -th row and the j -th column be a_{ij} .

There is a grasshopper at the top-left cell $(1, 1)$ that can only jump one cell right or downwards. It wants to reach the bottom-right cell $(2, n)$. Consider the binary string of length $n + 1$ consisting of numbers written in cells of the path without changing their order.

Your goal is to:

- Find the lexicographically smallest[†] string you can attain by choosing any available path;
- Find the number of paths that yield this lexicographically smallest string.

[†] If two strings s and t have the same length, then s is lexicographically smaller than t if and only if in the first position where s and t differ, the string s has a smaller element than the corresponding element in t .

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 10^4$). The description of the test cases follows.

The first line of each test case contains a single integer n ($2 \leq n \leq 2 \cdot 10^5$).

The second line of each test case contains a binary string $a_{11}a_{12} \dots a_{1n}$ (a_{1i} is either 0 or 1).

The third line of each test case contains a binary string $a_{21}a_{22} \dots a_{2n}$ (a_{2i} is either 0 or 1).

It is guaranteed that the sum of n over all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output two lines:

- The lexicographically smallest string you can attain by choosing any available path;
- The number of paths that yield this string.

Example

input	Copy
<pre>3 2 00 00 4 1101 1100 8 00100111 11101101</pre>	
output	Copy
<pre>000 2 11000 1 001001101 4</pre>	

Note

In the first test case, the lexicographically smallest string is 000. There are two paths that yield this string:

Codeforces Round 930 (Div. 2)

Finished

Practice

→ Virtual participation >

→ Clone Contest to Mashup ▾

You can clone this contest to a mashup.

Clone Contest

→ Submit?

Language: Python 3.8.10 ▾
Almost always, if you send a solution on PyPy, it works much faster

Choose file: Choose File No file chosen

Submit

→ Last submissions

Submission	Time	Verdict
265900670	Jun/15/2024 18:08	Accepted

→ Problem tags

dp greedy implementation *1300

No tag edit access

→ Contest materials

Announcement (en) ✕

Tutorial (en) ✕

