IOITC 2021

Odd sum partition

You are given an array A consisting of zeroes and ones of length N. You want to partition it into blocks consisting of consecutive indices such that each block has an odd sum and has size $\leq m$. For each m from 1 to n, find the minimum number of blocks required.

Input

- The first line contains T, the number of testcases. Each testcase contains two lines:

- The first line of each testcase contains N.

- The second line of each testcase contains a string $A = a_1 a_2 \ldots a_N$.

Output

For each testcase, print n space separated integers. The m-th of these integers should be the minimum number of blocks of size $\leq m$ the array can be partitioned into, such that each block has an odd sum, or -1 if it is impossible to do so.

Test Data

In all inputs,

- $1 \leq N$

- The sum of N over all testcases doesn't exceed 10^6.

Subtask 1 (6 Points): The sum of N over all testcases doesn't exceed 20.

Subtask 2 (8 Points): The sum of N over all testcases doesn't exceed 200.

Subtask 3 (13 Points): The sum of N over all testcases doesn't exceed 1600.

Subtask 4 (20 Points): The sum of N over all testcases doesn't exceed 15000.

Subtask 5 (16 Points): The sum of N over all testcases doesn't exceed 50000.

Subtask 6 (23 Points): The sum of N over all testcases doesn't exceed 250000.

Subtask 7 (14 Points): No additional constraints

Sample Input

```
1
5
01101
```

Sample Output

```
-1 3 3 3 1
```

Explanation

Clearly, if $m = 1$, no such partitioning is possible, as the first block must consist of a single 0.

For $m = 2, 3, 4$, we can partition it as $\boxed{01}\ \boxed{10}\ \boxed{1}$. Note that $\boxed{01}\ \boxed{1}\ \boxed{01}$ is also a valid partition.

If $m = 5$, the partition consisting of a single block $\boxed{01101}$ is valid as the total sum(3) is odd.

Limits

Time: 3 seconds

Memory: 256 MB