Problem K. Anti-hash Test

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

It is well-known that the following string $s(n) = s_0 s_1 \dots s_{2^n-1}$ can challenge almost every solution that uses polynomial hashes modulo 2^{64}:

$$s_i = \begin{cases} \text{“a”}, & \text{popcount}(i) \bmod 2 = 0 \\ \text{“b”}, & \text{popcount}(i) \bmod 2 = 1 \end{cases}$$

where popcount(i) means the number of ones in binary representation of number i.

Given a string u and an integer n, find the number of occurrences of u in string $s(n)$ and the number of distinct strings v which have the same number of occurrences in string $s(n)$. As both the numbers may be very large, you are only asked to calculate them modulo $10^9 + 7$.

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:

The first line contains an integer n ($1 \le n \le 10^{18}$).

The second line contains a string u ($1 \le |u| \le \min(10^6, 2^n)$) consisting only of letters “a” and “b”.

It is guaranteed that the sum of $|u|$ over all test cases does not exceed 10^6.

Output

For each test case, if the string u does not appear in string $s(n)$, you should simply output -1. Otherwise, output two integers denoting the the number of occurrences of u in string $s(n)$ modulo $10^9 + 7$ and the number of distinct strings v which have the same number of occurrences in string $s(n)$ modulo $10^9 + 7$.

Example

standard input	standard output
4 10 a 10 abba 5 abbabaabbaababbabaababbaabbabaab 20 ababab	512 2 171 4 1 344 -1