

Problem F. Inversion Pairs

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

There is an integer sequence of length n , denoted as a_1, a_2, \dots, a_n , where the integers in the sequence can only be 0 or 1, but some positions in the sequence have not yet been determined.

Now you want to fill the undetermined positions in the sequence with 0 or 1 in such a way that the number of inversion pairs is maximized.

The number of inversion pairs in a sequence a_1, a_2, \dots, a_n is defined as the number of integer pairs (i, j) such that $1 \leq i < j \leq n$ and $a_i > a_j$.

Input

The first line contains a positive integer T ($1 \leq T \leq 10^4$), indicating the number of test cases.

For each test case, the first line contains an integer n ($2 \leq n \leq 10^6$), representing the length of the sequence.

The second line contains a string s of length n consisting only of 0, 1, and ?, representing the sequence, where the i -th character s_i being ? indicates that a_i is unknown and needs to be filled in, otherwise it represents a_i .

It is guaranteed that the sum of n across all test cases does not exceed 2×10^6 .

Output

For each test case, output a single integer on a new line, representing the maximum number of inversion pairs.

Example

standard input	standard output
4	2
3	2
110	4
3	8
1?0	
4	
????	
7	
1?0?0?1	

Note

For the first sample case, the number of inversion pairs in 110 is 2.

For the second sample case, it can be filled as 100 or 110, both yielding 2 inversion pairs.

For the third sample case, it can be filled as 1100, resulting in 4 inversion pairs.

For the fourth sample case, it can be filled as 1100001 or 1101001, both yielding 8 inversion pairs.