



## Problem D

### Fibonacci Words

Problem ID: fibonacci

The Fibonacci word sequence of bit strings is defined as:

$$F(n) = \begin{cases} 0 & \text{if } n = 0 \\ 1 & \text{if } n = 1 \\ F(n-1) + F(n-2) & \text{if } n \geq 2 \end{cases}$$

Here + denotes concatenation of strings. The first few elements are:

$n$	$F(n)$
0	0
1	1
2	10
3	101
4	10110
5	10110101
6	1011010110110
7	101101011011010110101
8	1011010110110101101011011010110110
9	101101011011010110101101101011011010110110101101101011010110101

Given a bit pattern  $p$  and a number  $n$ , how often does  $p$  occur in  $F(n)$ ?

### Input

The first line of each test case contains the integer  $n$  ( $0 \leq n \leq 100$ ). The second line contains the bit pattern  $p$ . The pattern  $p$  is nonempty and has a length of at most 100 000 characters.

### Output

For each test case, display its case number followed by the number of occurrences of the bit pattern  $p$  in  $F(n)$ . Occurrences may overlap. The number of occurrences will be less than  $2^{63}$ .

#### Sample Input

#### Output for Sample Input

6	Case 1: 5
10	Case 2: 8
7	Case 3: 4
10	Case 4: 4
6	Case 5: 7540113804746346428
01	
6	
101	
96	
10110101101101	

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