A binary string consists of ones and zeros. Given a binary string $T$, if there is no binary string $S$ such that $SSS$ (concatenate three copies of $S$ together) is a substring of $T$, we say $T$ is triple-free.

A pattern consists of ones, zeros and asterisks, where an asterisk($*$) can be replaced by either one or zero. For example, the pattern `0**1` contains strings 0001, 0011, 0101, 0111, but not 1001 or 0000.

Given a pattern $P$, how many triple-free binary strings does it contain?

## Input

Each line of the input represents a test case, which contains the length of pattern, $n$ ($0 < n < 31$), and the pattern $P$. There can be maximum 35 test cases.

The input terminates when $n = 0$.

## Output

For each test case, print the case number and the answer, shown below.

## Sample Input

```
4 0**1
5 *****
10 **01**01**
0
```

## Sample Output

```
Case 1: 2
Case 2: 16
Case 3: 9
```