6/23/24, 11:04 PM Problem - D - Codeforces





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D. Mathematical Problem

time limit per test: 2 seconds memory limit per test: 256 megabytes input: standard input output: standard output

You are given a string s of length n>1, consisting of digits from 0 to 9. You must insert exactly n-2 symbols + (addition) or \times (multiplication) into this string to form a valid arithmetic expression.

In this problem, the symbols cannot be placed before the first or after the last character of the string s, and two symbols cannot be written consecutively. Also, note that the order of the digits in the string cannot be changed. Let's consider s=987009:

- · From this string, the following arithmetic expressions can be obtained:
 - $9\times8+70\times0+9=81$, $98\times7\times0+0\times9=0$, 9+8+7+0+09=9+8+7+0+9=33. Note that the number 09 is considered valid and is simply transformed into 9.
- From this string, the following arithmetic expressions cannot be obtained: $+9\times8\times70+09 \text{ (symbols should only be placed between digits), } 98\times70+0+9 \text{ (since there are 6 digits, there must be exactly 4 symbols).}$

The result of the arithmetic expression is calculated according to the rules of mathematics — first all multiplication operations are performed, then addition. You need to find the minimum result that can be obtained by inserting exactly n-2 addition or multiplication symbols into the given string s.

Input

Each test consists of multiple test cases. The first line contains a single integer t ($1 \le t \le 10^4$) — the number of test cases. Then follows their description.

The first line of each test case contains a single integer n ($2 \le n \le 20$) — the length of the string s.

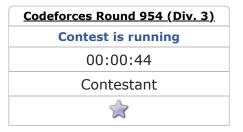
The second line of each test case contains a string s of length n, consisting of digits from 0 to 9.

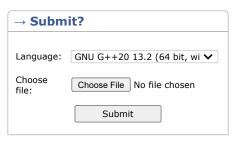
Output

For each test case, output the minimum result of the arithmetic expression that can be obtained by inserting exactly n-2 addition or multiplication symbols into the given string.

Example







```
23311
987009
1111111
99999999999999999
000000000000000000000
0212
057235283621345395
1112
19811678487321784121
1121
2221
3
011
output
                                                                                  Сору
10
74
0
1
9
1
19
a
11
261
0
0
0
12
93
12
24
0
```

Note

In the first four test cases, we cannot add symbols, so the answer will be the original number.

In the fifth test case, the optimal answer looks as follows: $9 \times 01 = 9 \times 1 = 9$.

In the sixth test case, the optimal answer looks as follows: $1 \times 01 = 1 \times 1 = 1$.

In the seventh test case, the optimal answer looks as follows: 2+3+3+11=19.

In the eighth test case, one of the optimal answers looks as follows:

$$98 \times 7 \times 0 + 0 \times 9 = 0.$$

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