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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:
 $9 \times 8 + 70 \times 0 + 9 = 81$, $98 \times 7 \times 0 + 0 \times 9 = 0$,
 $9 + 8 + 7 + 0 + 09 = 9 + 8 + 7 + 0 + 9 = 33$. Note that the number 09 is considered valid and is simply transformed into 9.
- From this string, the following arithmetic expressions cannot be obtained:
 $+9 \times 8 \times 70 + 09$ (symbols should only be placed between digits), $98 \times 70 + 0 + 9$ (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 ($1 \leq t \leq 10^4$) — the number of test cases. Then follows their description.

The first line of each test case contains a single integer n ($2 \leq n \leq 20$) — 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

input

Copy

```
18
2
10
2
74
2
00
2
01
3
901
3
101
```

Codeforces Round 954 (Div. 3)

Contest is running

00:00:44

Contestant



→ Submit?

Language: GNU G++20 13.2 (64 bit, wi)

Choose file: No file chosen

```

5
23311
6
987009
7
1111111
20
99999999999999999999
20
00000000000000000000
4
0212
18
057235283621345395
4
1112
20
19811678487321784121
4
1121
4
2221
3
011

```

output

Copy

```

10
74
0
1
9
1
19
0
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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