Project Euler #206: Concealed Square

This problem is a programming version of Problem 206 from projecteuler.net

Find the unique positive integer whose square's decimal representation has the form

$a_1x_1a_2x_2\ldots a_{n-1}x_{n-1}a_n$

where $a_i, 1 \leq i \leq n$ are known single digits and $x_i, 1 \leq i \leq n-1$ are unknown single digits.

In other words, find the unique positive integer when given the every other digit of its square, including the first and the last digits of the square.

Input Format

The first line contains a single positive integer n denoting the number of the given known digits.

The second line contains the list of single-space separated known digits.

It is guaranteed that the answer exists and it is unique.

Constraints

- $3 \leq n \leq 15$ as the number of known digits;
- The first known digit cannot be zero.

Output Format

On a single line print the answer.

Sample Input 0

```
3
8 7 6
```

Sample Output 0

```
286
```

Explanation 0

We need to find a positive integer whose square has the form $8 * 7 * 6$ where each $*$ is a single unknown digit. It is easy to validate that

$286^2 = 81796$

Therefore the answer is 286.

Sample Input 1

```
4
1 2 3 4
```

Sample Output 1

```
1312
```

Explanation 1

We are looking for a positive integer whose square has the form $1 * 2 * 3 * 4$. Given the total number of the digits in the square, we can speculate that the answer is an integer less than 10^4. Exhaustive search shows that

$$1312^2 = 1721344$$

Therefore the answer is 1312.