A Fi-binary number is a number that contains only 0 and 1. It does not contain any leading 0. And also it does not contain 2 consecutive 1. The first few such number are 1, 10, 100, 101, 1000, 1001, 1010, 10000, 10001, 10010, 10100, 10101 and so on. You are given n. You have to calculate the n-th Fi-Binary number.

Input

The first line of the input contains one integer T the number of test cases. Each test case contains one integer n.

Output

For each test case output one line containing the n-th Fi-Binary number.

Constraints

- $1 \leq N \leq 10^9$

Sample Input

```
4
10
20
30
40
```

Sample Output

```
10010
101010
1010001
10001001
```