

# Hard Fibonacci

The problem author is not a very nice person. He wants you to calculate the  $N^{\text{th}}$  fibonacci number, which is defined as:

$$f(n) = \begin{cases} 0 & \text{if } n = 0 \\ 1 & \text{if } n = 1 \\ F(n-1) + F(n-2) & \text{if } n > 1 \end{cases}$$

Because the author is not very nice, the size of  $N$  can be huge, really huge. The exact size of  $N$  is in the **Constraints** section.

## Input

The first line contains a single integer  $T$ , the number of test cases.

The next  $T$  lines contain a single integer  $N$ .

## Output

For each of the  $T$  lines, output the  $N^{\text{th}}$  fibonacci number, modulo 998244353.

## Example

**Input:**

```
5
0
1
1234
345639696828452375
419384601238473729475639183948326177846782649592628790267300203877
```

**Output:**

```
0
1
4936310
213237811
389871463
```

## Constraints

- $0 \leq N \leq 10^{15000000}$
- $1 \leq T \leq 100$

## Notes

- The size of the file will not exceed **15MB**.
- Fast input may be required.

- **Fast languages like C / C++** are recommended.