Problem B. Array Challenge

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Consider an array h such that its elements are defined as follows:

$$\begin{aligned} h_0 &= 2, \\ h_1 &= 3, \\ h_2 &= 6, \\ h_n &= 4h_{n-1} + 17h_{n-2} - 12h_{n-3} - 16 \text{ for } n \geq 3. \end{aligned}$$

Additionally, let us define two arrays b and a as shown below:

$$\begin{aligned} b_n &= 3h_{n+1}h_n + 9h_{n+1}h_{n-1} + 9h_n^2 + 27h_nh_{n-1} - 18h_{n+1} - 126h_n - 81h_{n-1} + 192 \text{ for } n > 0, \text{ and} \\ a_n &= b_n + 4^n \text{ for } n > 0. \end{aligned}$$

Your task is to find the value $\lfloor \sqrt{a_n} \rfloor$ for a given integer n. As the answer could be very large, print it modulo $10^9 + 7$.

Input

The first line of input contains an integer T, the number of test cases ($1 \leq T \leq 1000$).

Each test case consists of a single line containing an integer n ($2 \leq n \leq 10^{15}$).

Output

For each test case, print a single line with a single integer: the answer to the problem.

Example

standard input	standard output
3 4 7 9	1255 324725 13185773