Problem H. Half-Sequence

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	1024 mebibytes

The Fibonacci sequence f_n is defined as follows:

- $f_1 = 1$
- $f_2 = 2$
- For $n \geq 3$, $f_n = f_{n-1} + f_{n-2}$

The *half-sequence* of this Fibonacci sequence, denoted as a_n, is defined as follows:

- The sequence a_n is the lexicographically smallest sequence among all sequences that satisfy $a_{a_n} = f_n$ for all positive integers n.

Saying that the sequence a_n is lexicographically smaller than b_n means that there exists some i such that, for all j less than i, $a_j = b_j$ and $a_i < b_i$.

Given a positive integer n, find a_n.

Input

The first line contains the number of test cases T ($1 \leq T \leq 10^4$). The test cases follow.

Each test case is given as a single line containing a single integer n ($1 \leq n \leq 10^{18}$).

Output

For each test case, output the value of a_n. If $a_n > 10^{18}$, output -1 instead.

Example

standard input	*standard output*
7 1 2 3 4 5 6 10000000	1 2 3 6 13 5 -1