Fibonacci

https://vjudge.csgrandeur.cn/problem/POJ-3070

In the Fibonacci integer sequence, $F_0 = 0$, $F_1 = 1$, and $F_n = F_{n-1} + F_{n-2}$ for $n \geq 2$. For example, the first ten terms of the Fibonacci sequence are:

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

An alternative formula for the Fibonacci sequence is

$$\begin{bmatrix} F_{n+1} & F_n \\ F_n & F_{n-1} \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}^n = \underbrace{\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} \cdots \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}}_{n \text{ times}}.$$

Given an integer n, your goal is to compute the last 4 digits of F_n.

Input

The input test file will contain multiple test cases. Each test case consists of a single line containing n (where $0 \leq n \leq 1{,}000{,}000{,}000$). The end-of-file is denoted by a single line containing the number -1.

Output

For each test case, print the last four digits of F_n. If the last four digits of F_n are all zeros, print '0'; otherwise, omit any leading zeros (i.e., print F_n mod 10000).

Sample

Input	Output
0 9 999999999 1000000000 -1	0 34 626 6875

Hint

As a reminder, matrix multiplication is associative, and the product of two 2×2 matrices is given by

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} = \begin{bmatrix} a_{11}b_{11} + a_{12}b_{21} & a_{11}b_{12} + a_{12}b_{22} \\ a_{21}b_{11} + a_{22}b_{21} & a_{21}b_{12} + a_{22}b_{22} \end{bmatrix}.$$

Also, note that raising any 2×2 matrix to the 0th power gives the identity matrix:

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}^0 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}.$$