

Problem E

Escape

Time limit: 2 seconds

Memory limit: 512 megabytes

Problem Description

You are trapped in a grid maze of size $2 \times n$, and each grid cell is a room. The coordinates of a room can be represented by (r, c) where $r \in [1, 2]$ and $c \in [1, n]$. Room (r, c) is located at the row r and column c .

You are now at room $(1, 1)$ and want to escape. The exits are at $(1, n)$ and $(2, n)$, but there are locked now. To unlock them, you have to press the toxic gas button in every room. Once you press the button, the toxic gas will start to fill in a few seconds. Before releasing the gas, the room opens doors to adjacent rooms. The doors will automatically close when the concentration of toxic gas in the room is high enough to kill people. Fortunately, you can run really fast. You still can escape to an adjacent room before the toxic gas kills you. However, you may not return to the room with toxic gas released.

In this problem, we define two rooms (r_1, c_1) and (r_2, c_2) are adjacent if all following conditions hold.

1. $(r_1, c_1) \neq (r_2, c_2)$
2. $|r_1 - r_2| \leq 1$
3. $|c_1 - c_2| \leq 1$

You must press all toxic gas buttons, and the last button must be in either room $(1, n)$ or $(2, n)$. Otherwise, you cannot escape from the maze. It is better to have some plans to escape. You wonder how many different paths allow you to escape. The answer might be large, output the answer modulo 1,000,000,007.

Input Format

The input contains a positive integer n indicating that the size of maze is $2 \times n$.

Output Format

Print the number of paths allowing you to escape modulo 1,000,000,007 on a line.

Technical Specification

$$1 \leq n \leq 10^{18}$$

Sample Input 1

2

Sample Output 1

4

Sample Input 2

3

Sample Output 2

12

Sample Input 3

999990000099999

Sample Output 3

37422585

Hint

The following figure illustrates the first sample test case.

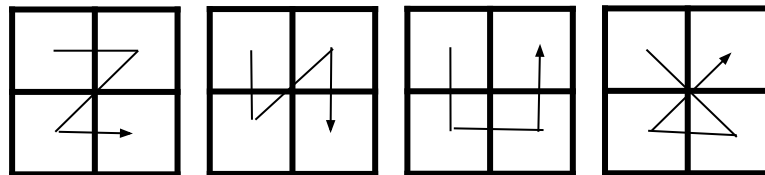


Figure 1: Four paths allow you to escape.