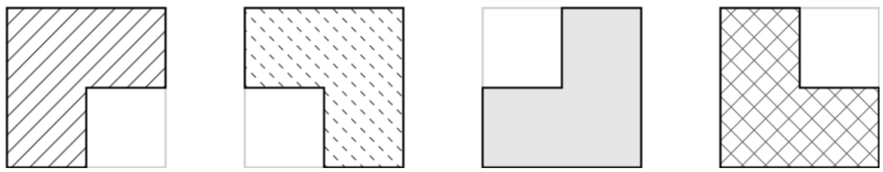
Hallway Tilling

Problem ID: hallwaytilling

In today's *Indoor Creative Pattern Competition* (ICPC), participating teams need to decorate a long hallway. The hallway floor has a rectangular shape, which can be seen as a $2 \times n$ grid of cells.

Normally, we can use 1×1 or 2×2 tiles to tile the floor. However, to ensure the creative nature of the competition, the ICPC jury requires all teams to use L-shape tiles instead. L-shape tiles are tiles that fit into a 2×2 grid and have one of the following shapes:



Each team can use a number of L-shape tiles to tile the hallway. A team can choose not to use any tiles if they think that the hallway is already beautiful and no further decoration is required. All teams must place the tiles on the floor so that:

- Each L-shape tile covers exactly three cells on the floor.
- No cell on the floor is covered by more than one tiles.

Let's define the *coverage* of a *tiled hallway* as the number of covered cells in the hallway. The ICPC jury wants to make some predictions before the competition, so they would like to know the sum of *coverage* over all *tiled hallways*.

Two *tiled hallways* are considered different, if and only if at least one of the below statements are true:

- There exists a cell which is covered in one *tiled hallways* but is not covered in the other.
- There exists a pair of cells which are covered by the same L-shape tile in one *tiled hallways*, but are covered by two different L-shape tiles in the other.

Given n — the number of columns of the hallway floor. Find the *sum of coverage* over all *tiled hallways* modulo $998\,244\,353$.

Input

The first and only line contains an integer n ($2 \leq n \leq 10^{18}$) — the number of columns of the hallway floor.

Output

Output the *sum of coverage* over all *tiled hallways* modulo $998\,244\,353$.

Explanation of the samples

- In the first sample, $n = 2$. The hallway floor has size 2×2. There are:
  - 1 *tiled hallway* with 0 coverage (no L-shapes tile are used).
  - 4 *tiled hallways* with 3 coverage (one L-shape tile is used, with 4 choices).

  Therefore, the *sum of coverage* over all *tiled hallways* is $1 \cdot 0 + 4 \cdot 3 = 12$
- In the second sample, $n = 3$. The hallway floor has size 2×3. There are:
  - 1 *tiled hallway* with 0 coverage.
  - 8 *tiled hallways* with 3 coverage.
  - 2 *tiled hallways* with 6 coverage.

  Therefore, the *sum of coverage* among all *tiled hallways* is $1 \cdot 0 + 8 \cdot 3 + 2 \cdot 6 = 36$

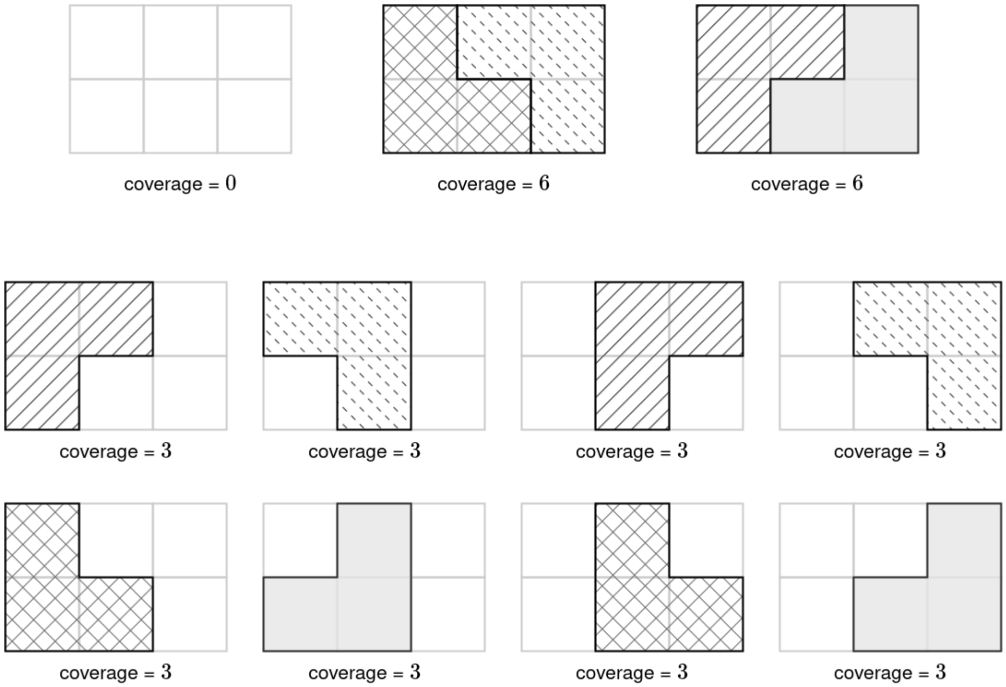


Figure 1: All *tiled hallways* for $n = 3$ with their respective coverages.

Sample Input 1	**Sample Output 1**
`2`	`12`

Sample Input 2	**Sample Output 2**
`3`	`36`

Sample Input 3	**Sample Output 3**
`177013`	`912417795`