Connected Points

Consider a regular grid of $3 \times N$ points. Every point in the grid has up to eight neighboring points (see Fig. 1).

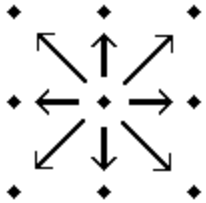

Figure 1: Neighboring points (marked by arrows).

We are interested in counting the number of different ways to connect the points of the grid to form a polygon that fulfills the following conditions:

1. The set of vertices of the polygon consists of all $3 \times N$ points.
2. Adjacent vertices of the polygon are neighboring points in the grid.
3. Each polygon is simple, i.e. there must not be any self-intersections.

Two possible polygons for $N = 6$ are given in the Fig. 2.

Figure 2: Two possible connections of points for $N = 6$.

Write a program that calculates for a given N the number of possible ways to connect the points as described modulo 1,000,000,000.

Input

The input is read from a text file named `points.in`. The first and only line contains one positive integer N ($N \leq 1{,}000{,}000{,}000$).

Output

The output is written into a text file named `points.out`. The only line to be written contains the remainder of the number of ways to connect the points modulo 1,000,000,000.

Examples

points.in	points.out
3	8

points.in	points.out
4	40

Grading

- 30% of the test cases have values of $N \leq 200$.
- 70% of the test cases have values of $N \leq 100{,}000$.