Mock CCO '18 Contest 1 Problem 5 - A Counting Problem

Consider the $3N$ lattice points with x-coordinates between 0 and 2 and y-coordinates between 0 and $N-1$. Define two points to be neighbors if their x-coordinates differ by at most 1 and their y-coordinates differ by at most 1. Compute the number of ways to connect all $3N$ points to form a polygon such that the polygon is simple and any two adjacent points in the polygon are neighbors.

Constraints

$1 \leq N \leq 10^9$

For at most 30% of marks, $N \leq 200$.

For at most 70% of marks, $N \leq 10^5$.

Input Specification

The first line will contain a single integer, N.

Output Specification

Output the number of polygons mod 10^9.

Sample Input

```
3
```

Sample Output

```
8
```

Sample Input

```
4
```

Sample Output

```
40
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