Xor Triangle

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

You are given a positive integer N.

Find the number of pairs of integers (a, b) such that $1 \leq a, b < 2^N$ and the following condition is satisfied, modulo the prime 998244353.

- There exists a non-degenerate triangle whose side lengths are $a, b, a \oplus b$.

Here, for integers x, y, $x \oplus y$ denotes the bitwise XOR of x and y.

Input

The first line contains an integer N. $(1 \leq N \leq 10^{18})$

Output

Print the number of pairs of integers (a, b) satisfying the condition, modulo the prime 998244353.

Examples

standard input	standard output
2	0
5	390
10000	851087540

Note

For the second example, for instance, $(a, b) = (13, 24)$ satisfies the condition. Since $a \oplus b = 13 \oplus 24 = 21$, there exists a non-degenerate triangle whose side lengths are $13, 24, 21$.

There are exactly 390 pairs of integers (a, b) satisfying the condition.

The bitwise XOR $x \oplus y$ of non-negative integers x, y is defined as follows.

- In the binary representation of $x \oplus y$, the digit at the 2^k $(k \geq 0)$ place is 1 if and only if exactly one of the digits at the 2^k place in the binary representations of x and y is 1; otherwise, it is 0.

For example, $3 \oplus 5 = 6$ (in binary, $011 \oplus 101 = 110$).