Problem F
Expected Value

Time Limit: **1 second**
Mem limit: **256 Megabytes**

Having a permutation $p=(p_1, p_2, \ldots p_N)$ of the first N positive integers, let's define:

$g_i(p)$ equals the greatest common divisor of the first i element of $p (1 \le i \le N)$.

$f(p)$ equals the number of distinct integers in the array g.

For example, if $p=(2,4,6,3,1,5)$ then

- $g_1 = GCD(2) = 2$
- $g_2 = GCD(2,4) = 2$
- $g_3 = GCD(2,4,6) = 2$
- $g_4 = GCD(2,4,6,3) = 1$
- $g_5 = GCD(2,4,6,3,1) = 1$
- $g_6 = GCD(2,4,6,3,1,5) = 1$

Thus, $f(p)$ equals 2.

Given an integer N, we generate a random permutation p of size N (uniform random), your task is to calculate the expected value of $f(p)$.

Input

The input contains only one integer $(1 \le N \le 200{,}000)$.

Output

You should print the expected value of $f(p)$ modulo 10^9+7.

Formally, let $M=10^9+7$, it can be shown that the answer can be expressed as an irreducible fraction u/v where u and v are integers and $v != 0 (mod\ M)$. You should output the integer equal to $u * v - 1 (mod\ M)$. In other words, output such an integer x that $0 \le x < M$ and $x * v = u (mod\ M)$.

Sample input	Sample output
2	500000005