

Problem F

Expected Value

Time Limit: **1 second**

Mem limit: **256 Megabytes**

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

$g_i(p)$ is the greatest common divisor of the first i elements of p ($1 \leq i \leq N$).

$f(p)$ is 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, $f(p)$ is equal to 2.

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

Input

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

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 $v \neq 0 \pmod{M}$. You should output the integer equal to $u * v^{-1} \pmod{M}$. In other words, output such an integer x that $0 \leq x < M$ and $x * v = u \pmod{M}$.

Sample input

Sample output

2	500000005
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