

Problem E. Expected LCP

Input file: *standard input*
Output file: *standard output*
Time limit: 2 seconds
Memory limit: 256 mebibytes

Consider a sequence s_1, s_2, \dots, s_n of n infinite binary strings (that is, consisting only of zeros and ones), where each character of each string is generated uniformly at random independently from others. Denote

$$f(s_1, s_2, \dots, s_n) = \max_{1 \leq i < j \leq n} LCP(s_i, s_j),$$

where LCP is the maximum common prefix of two strings. Compute the expected value of $f(s_1, s_2, \dots, s_n)$.

Input

The only line of the input contains one integer n ($2 \leq n \leq 10^4$).

Output

Let the answer in the form of an irreducible fraction be P/Q . Then output $P \cdot Q^{-1} \bmod (10^9 + 7)$. It is guaranteed that $Q \bmod (10^9 + 7) \neq 0$.

Examples

standard input	standard output
2	1
3	333333338

Note

Note that the expected value is always finite, that is, $\mathbf{E}f(s_1, \dots, s_n) < \infty$.

In the second sample the answer is $\frac{7}{3}$.