

Divisors [III]

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output
points: 100 · problem code: divisors3

The blurb for this problem is the same as Divisors [I], save for the statement of the problem.

Consider the sequence of all natural numbers, and then for each number, listing each of the divisors of this number in increasing order:

123456...

becomes:

11213124151236...

Since this (infinite) sequence has a lot of duplicates, we can notate for each digit whether it is the first, second, third... occurrence using a subscript:

$1_1 1_2 2_1 1_3 3_1 1_4 2_2 4_1 1_5 5_1 1_6 2_3 3_2 6_1 \dots$

For this third problem, we are considering taking the reciprocal of every value in this sequence, and summing it:

$$\frac{1}{1} + \frac{1}{1} + \frac{1}{2} + \frac{1}{1} + \frac{1}{3} + \frac{1}{1} + \frac{1}{2} + \frac{1}{4} \dots$$

For this problem, we want you to estimate the value of the partial sum up to and including some i_1 (The first occurrence of some value i)

Input

Input will contain a single value i , representing the sequence value i_1

Output

Output an estimate of the partial sum up to and including the first occurrence of $\frac{1}{i}$.

In order to receive 30% of the grade, your solution should have maximum error at most $\ln(i)$.

In order to be judged as correct and receive full marks, your solution should have maximum error at most $\frac{1}{i} + 2\sqrt{i} \ln(1 + \frac{\ln i}{i}) + \sqrt{i} * 2^{-55 + \log_2(i)}$. For reference, this error looks like the following (note the logarithmic axis):



Constraints

- $1 \leq i \leq 10^{11}$

Example

Input

5

Output

6.78333333333333

Although anything ± 1.447997 from this answer would suffice.