

Problem C
Primes

Input File: C.in
Output File: standard output
Time Limit: 1 second (C/C++)
Memory Limit: 256 megabytes

Define a *mass split* operation for the multiset of positive integers **K**: for each integer $\mathbf{k_i}$ in the multiset we will replace it with the pair $\mathbf{d_i}$ and $\mathbf{k_i}/\mathbf{d_i}$, where $\mathbf{d_i}$ is the random integer divisor of $\mathbf{k_i}$, which is greater than 1, and less than $\mathbf{k_i}$. If $\mathbf{k_i}$ is prime, it remains untouched. All divisors can be chosen equiprobably.

For example, let's take the multiset {2, 10, 12, 12}. Then {2, 2, 3, 3, 4, 4, 5}, {2, 2, 2, 3, 4, 5, 6} and {2, 2, 2, 2, 5, 6, 6} will be the possible outcomes of the first mass split (first and third with probability 0.25, second with probability 0.5), and {2, 2, 2, 2, 2, 2, 3, 3, 5} will be the only possible outcome of the second mass split.

If we start with a multiset containing one integer **N**, find the expected number of mass splits needed to obtain a multiset with prime numbers only, where the expected number is the probability-weighted average of all possible values.

Input
First line of the input contains integer **T** ($1 \le \mathbf{T} \le 10^4$) – number of test cases. Each test case consists of one integer **N** – the starting multiset ($2 \le \mathbf{N} \le 10^{10}$).

Output
For each test case, print one number – the expected number of mass splits, with absolute or relative
error not worse than $\mathbf{10^{-6}}$.

Sample input	Sample output
3 3 12 48	0 2.0 3.3333333