Problem G. Guess

Time limit: 5 seconds
Memory limit: 128 Megabytes

Recently, Stump felt $\sum_{k=1}^{n} \mu^2(k) = \sum_{k=1}^{n} \mu(k)\lfloor \frac{n}{k^2} \rfloor$ with his heart immediately, which shocked Yoshinow2001 for a whole year!!
The above μ is **Möbius function** $\mu(n)$: If n contain square factor (i.e. there are positive integers $a > 1$ makes $a^2|n$) then the $\mu(n) = 0$. Otherwise, might as well set decomposition of prime factors of n type $n = p_1 \cdot p_2 \cdot \cdots \cdot p_k$, then $\mu(n) = (-1)^k$. For example, $\mu(1) = 1, \mu(2) = \mu(3) = -1$.
Recall that $\ln(n)$ denotes the logarithm of n with base $e = \sum_{n=0}^{\infty} \frac{1}{n!} \approx 2.71828$.
Now Yoshinow2001 is furious and pulls out a question! Let

$$S(n) = \sum_{d|n} \mu(\frac{n}{d}) \ln(d)$$

You need to calculate:

$$e^{S(n)} \bmod 998244353$$

Stump was horrified when he saw the formula! Now he asks you to feel it with your heart for him!

Input

The first line of input is a positive integer $T(1 \leq T \leq 2000)$ representing the number of test cases.
The next line has a total of T integers, each of which corresponds to n as described in the problem, where $1 \leq n \leq 10^{18}$.

Output

For each testcase, output an integer representing the answer mod 998244353, separated by a space.

Example

standard input	standard output
3 1 2 3	2 1 2 3