Problem G. Factorial vs Power

Time Limit	1000 ms
Mem Limit	1572864 kB
Code Length Limit	50000 B
OS	Linux

Consider two integer sequences $f(n) = n!$ and $g(n) = a^n$, where n is a positive integer. For any integer $a > 1$ the second sequence is greater than the first for a finite number of values. But starting from some integer k, $f(n)$ is greater than $g(n)$ for all $n >= k$. You are to find the least positive value of n for which $f(n) > g(n)$, for a given positive integer $a > 1$.

Input

The first line of the input contains number t – the amount of tests. Then t test descriptions follow. Each test consist of a single number a.

Constraints

$1 \le t \le 100000$

$2 \le a \le 10^6$

Output

For each test print the least positive value of n for which $f(n) > g(n)$.

Example

Input	Output
3 2 3 4	4 7 9