Factorial vs Power

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 <= **t** <= 100000
2 <= **a** <= 10^6

Output

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

Example

Input:
3
2
3
4

Output:
4
7
9