Beautiful Numbers

Problem

We consider a number to be *beautiful* if it consists only of the digit 1 repeated one or more times. Not all numbers are beautiful, but we can make any base 10 positive integer beautiful by writing it in another base.

Given an integer **N**, can you find a base *B* (with *B* > 1) to write it in such that all of its digits become 1? If there are multiple bases that satisfy this property, choose the one that maximizes the number of 1 digits.

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each test case consists of one line with an integer **N**.

Output

For each test case, output one line containing `Case #x: y`, where `x` is the test case number (starting from 1) and `y` is the base described in the problem statement.

Limits

1 ≤ **T** ≤ 100.
Time limit: 30 seconds per test set.
Memory limit: 1GB.

Small dataset (Test set 1 - Visible)

3 ≤ **N** ≤ 1000.

Large dataset (Test set 2 - Hidden)

3 ≤ **N** ≤ 10^{18}.

Sample

Sample Input	Sample Output
2 3 13	Case #1: 2 Case #2: 3

In case #1, the optimal solution is to write 3 as 11 in base 2.

In case #2, the optimal solution is to write 13 as 111 in base 3. Note that we could also write 13 as 11 in base 12 or as 1 in base 13, but neither of those representations has as many 1s.