

BRACU জয়যাত্রা'50 Techfest Inter University Individual Programming Contest Mock

<https://toph.co/c/bracu-joyjatra-50-techfest-inter-university-mock>



Schedule

The contest will run for **1h0m0s**.

Rules

This contest is formatted as per the official rules of ICPC Regional Programming Contests.

You can use Bash 5.0, Brainf*ck, C# Mono 6.0, C++11 GCC 7.4, C++14 GCC 8.3, C++17 GCC 9.2, C11 GCC 9.2, Common Lisp SBCL 2.0, Erlang 22.3, Free Pascal 3.0, Go 1.13, Haskell 8.6, Java 1.8, Kotlin 1.1, Node.js 10.16, Perl 5.30, PHP 7.2, PyPy 7.1 (2.7), PyPy 7.1 (3.6), Python 2.7, Python 3.7, Python 3.8, Ruby 2.6, Swift 5.3, and Whitespace in this contest.

Be fair, be honest. Plagiarism will result in disqualification. Judges' decisions will be final.

Notes

There are 4 challenges in this contest.

Please make sure this booklet contains all of the pages.

If you find any discrepancies between the printed copy and the problem statements in Toph Arena, please rely on the later.

A. Multiplication Table

Spider man has learnt the multiplication table, now he can multiply two integers between **1** and **10** together. His teacher Ironman wants to test Spiderman. So he gives an integer **N**, and asks him to determine whether **N** can be represented as the product of two integers between **1** and **10**(inclusive).

If Spiderman can determine the answer, print **Yes**, else **No**.

Input

First line of input contains an integer **$1 \leq T \leq 100$** - denoting number of testcases.

Next T line contain single integer **$1 \leq N \leq 1000$** - the number to check.

Output

For each test case, print in a single line **Yes**, If Spiderman can determine the answer, otherwise print **No**.

Samples

<u>Input</u>	<u>Output</u>
5	Yes
28	Yes
5	Yes
45	No
22	Yes
32	

B. Joker's GCD Test

Joker has a sequence **P** of **n** integers. Each two elements in the sequence are **pairwise distinct**.

He defines the strength of the sequence as the **expected value** of the greatest common divisor (**gcd**) of any **two** randomly chosen **distinct** numbers from the sequence.

Joker will perform **q** updates on the sequence. The updates will be of the form :

1 x : Add **x** to the sequence. It is guaranteed that **x** does not exist in the sequence.

2 x : Remove **x** from the sequence. It is guaranteed that **x** exists in the sequence.

To save Gotham from Joker, you must answer him the strength of the sequence after each update.

Input

First line of input contains **n** - denoting the initial length of the sequence ($1 \leq n \leq 106$).

Second line contains **n** space separated integers - the initial elements of the sequence ($1 \leq P_i \leq 106$).

Third line contains **q** - denoting the number of updates ($1 \leq q \leq 106$).

Each of the next **q** lines describes an update of the form : either **1 x** or **2 x** ($1 \leq x \leq 106$).

There will be at least one **Add** and one **Remove** update.

The sequence will always contain at least two elements at any point.

Output

For each update, output in a single line the strength of the sequence after the update.

It can be shown that the strength can be always expressed as a fraction P / Q , where **P** and **Q** are coprime integers, $P \geq 0$, $Q > 0$ and **Q** is co-prime with **998244353**. You should compute **$P \cdot Q^{-1}$ modulo 998244353**, where **Q^{-1}** denotes the multiplicative inverse of **Q** modulo **998244353**.

Samples

<u>Input</u>	<u>Output</u>
3 1 3 5 5 1 2 2 3 1 4 2 1 1 3	1 1 166374060 332748119 166374060

C. Find the Good Sequence

Let's say two numbers are called "good" if their difference is at least 2.

Similarly, a sequence is also called good if the sequence is increasing and each adjacent two elements in this sequence are good as well. A sequence must consist of at least 2 elements.

Given an array of length n , For each index i ($1 \leq i \leq n$), print the maximum length of a consecutive good sequence starting from position i .

Input

The first line contains single positive integer n ($1 \leq n \leq 10^6$) — the number of integers.

Then each of the next i th line contains i th element of the array ($0 \leq \text{array element} \leq 10^7$).

Output

For each index i , print the maximum length of a consecutive good sequence starting from position i .

Samples

<u>Input</u>	<u>Output</u>
7	3
1	2
3	0
5	3
6	2
8	0
10	0
11	

D. Efficient Multiplication

Pantho is given two non-negative numbers x and y . He needs to multiply them. He does not know how to multiply numbers, but, he knows only how to add 2 numbers. Pantho knows, when x is added y times, $x \times y$ is produced. This process requires $y-1$ additions. Since Pantho is very lazy, he wants to know if he can find his result in fewer steps.

Can you tell him, minimum how many times he must add 2 numbers to get his result?

Input

Two non-negative integers x and y ($0 \leq x, y \leq 109$).

Output

Print one integer - the minimum number of additions needed to multiply x and y .

Samples

<u>Input</u>	<u>Output</u>
3 6	2

<u>Input</u>	<u>Output</u>
8 12	3

<u>Input</u>	<u>Output</u>
6 8	3

<u>Input</u>	<u>Output</u>
15 16	4

<u>Input</u>	<u>Output</u>
14 15	5

Explanation

Sample Case 1

Step 1. $6+6=12$
Step 2. $12+6=18$

Sample Case 2

Step 1. $12+12=24$
Step 2. $24+24=48$
Step 3. $48+48=96$

Sample Case 3

Step 1. $6+6=12$
Step 2. $12+12=24$
Step 3. $24+24=48$

Sample Case 4

Step 1. $15+15=30$
Step 2. $30+30=60$
Step 3. $60+60=120$
Step 4. $120+120=240$

Sample Case 5

Step 1. $15+15=30$
Step 2. $30+30=60$
Step 3. $60+60=120$
Step 4. $120+60=180$
Step 5. $180+30=210$