AUST ACM Lab 02 Selection Contest 1 (Fall 21)

https://toph.co/c/ttaxl8k

Toph

Schedule

The contest will run for **3h0m0s**.

Authors

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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, C++20 GCC 12.1, C11 GCC 12.1, C11 GCC 9.2, Common Lisp SBCL 2.0, Erlang 22.3, Free Pascal 3.0, Go 1.18, Haskell 8.6, Java 1.8, Kotlin 1.1, Lua 5.4, 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, Ruby 2.6, Rust 1.57, 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 6 challenges in this contest.

Please make sure this booklet contains all of the pages.

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

Disclaimer

The contents of this contest have not been reviewed by Toph and do not necessarily represent Toph's views.

A. Meme Points

We all love memes. Have you seen one of those memes floating around your feed where there is a list of tasks and a point assigned to each of those tasks? It asks you to add the points of all your tasks and post the total.

Now you want to create a meme where there will be exactly **N** tasks listed and a point assigned to each of them. But whenever someone comments their total point, you want to be able to tell exactly which tasks they have done. Your task in this problem is to assign points to each of the tasks of your meme. If there are multiple possible

solutions, choose the one where the total sum of all points is minimized. If there are multiple solutions with the lowest total sum, you can print any of them. But make sure that all the points are positive integers and sorted in non-decreasing order.

For example, let's consider you have **N = 2** tasks in your meme. If you assign 1 point to the first task and 2 points to the second task, you can uniquely identify the set of crimes someone has done from their answer. If the sum is 0, that person hasn't done anything. If the sum is 1, that person has done the first task only. If the sum is 2, that person has done the second task only. If the sum is 3, that person has done both the first and the second tasks. Note that you could also achieve your objective by assigning, let's say, 5 to the first crime and 13 to the second crime. But since you have to minimize the total sum of all the points, this solution is invalid. In our solution, the total sum is 3, and it can be shown that no such arrangement is possible with a lower total sum.

Input

The first line of the input contains a positive integer **T** ($1 \leq T \leq 50$) denoting the number of test cases. Each of the next **T** lines contains a single integer **N** ($1 \leq N \leq 50$) denoting the number of tasks in your meme.

Output

Print N numbers in a single line for each T test case. The i-th of these numbers denotes the point assigned to the i-th task ($1 \leq i \leq N$). All the points have to be positive integers and printed in non-decreasing order. Again, if there are multiple possible solutions, choose the one where the total sum of all points is minimized. If there are multiple solutions with the lowest total sum, you may print any of them.

Samples

Input	Output
2 1 2	1 1 2

B. Alchemist Hasib

After years of hard work, a young alchemist- Hasib finally succeeded to created a Philosopher's stone. Alchemists can convert a string to another just by touching the string with a Philosopher's stone. The conversion depends on the power of the stone, **N**.

When an alchemist touches a string with a stone of power **N**, all the characters in the string are shifted left alphabetically by **N**. Philosopher's stone has no effect on white-spaces.

Therefore, if N=1, 'b' is converted into 'a', 'a' is converted into 'z', 'z' is converted into 'y', 'y' is converted into 'x' and so on.

If N=2, 'c' is converted into 'a', 'b' is converted into 'z', 'a' is converted into 'y' and so on.

You are given the power of the stone created by Hasib and a string of lowercase letters, you have to find the converted string that is produced after touching the string with the philosopher's stone.

Note that, the conversion takes place in all the characters of the string individually.

Input

The first line of the input will contain one integer N $(0 < N < 26)$, indicating the power of the Philosopher's stone created by Hasib.

The second line will contain a string in all lower case alphabets and spaces. The string will contain at most 100 characters.

Output

Print the answer in a single line.

Samples

Input	Output
2 hello world	fcjjm umpjb

C. Bro Needs Help

According to Goldbach's Conjecture any even number greater than 2 can be represented by sum of two prime numbers.

For example 10 can be represented as $5 + 5$ where 5 is a prime number and 20 can be represented as $13 + 7$ where both 13 and 7 are prime numbers.

One day Bro was reading Goldbach's Conjecture. Bro loves to overthink about everything so she started wondering whether a number can be represent as sum of four prime numbers(not necessarily unique) .

In this problem given a number N, help Bro to find out whether N can be represented as sum of four prime numbers or not.

Recall that, a prime number is a positive integer that is divisible only by itself and 1.

Input

Input starts with a number $T(1 <= T <= 10^6)$ denoting the number of testcases.

The next T lines contain only integer $(1 <= N <= 10^{18})$.

Output

For each testcase, print "YES" (without quotes) if N can be represented as sum of four prime numbers otherwise print "NO" (without quotes) in a new line.The case of letters in YES and NO do not matter (so yEs and No will also be accepted).

Samples

Input	Output
3 4 21 7	NO YES NO

You can represent 21 as $13 + 3 + 3 + 2$, $11 + 3 + 5 + 2$, $7 + 7 + 2 + 5$ and some other ways.

It can be proved that you can’t make 4 and 7 as the sum of four prime numbers in any way.

D. Strong Bond

There are two groups of students. one group is from EAST WEST UNIVERSITY and the other one is from AHSANULLAH UNIVERSITY.

So, students of two university want to know they have strong bond or not.

If the sum of two student's ID (one from EAST WEST another from AHSANULLAH) is divisible by K, then they have strong Bond.

You will be given two list. One of them is for EAST WEST UNIVERSITY students ID and another is for AHSANULLAH UNIVERSITY students ID. You will also be given the value of **k**. Your program should find out the total number of Strong Bond.

Input

First line will contain three integers **n** (1 ≤ n ≤ 10^5), size of EAST WEST UNIVERSITY students, **m** (1 ≤ m ≤ 10^5), size of AHSANULLAH UNIVERSITY students and **k** (1 ≤ k ≤ 10^6).

Next two lines will contain respectively **n** and **m** integers, which donates the ID's (1 ≤ ID ≤ 10^9).

Output

Print total number of Strong Bonds they will find.

Samples

Input	Output
3 2 3 1 2 4 2 2	2

E. Team and Queries

There are N football teams, and each team has a positive number of players. You are given Q queries.

Query: Given two integers X and K. You are given K extra players, and you can add any number of players in any team from these extra players. You have to find the maximum number of football teams that can be formed so that every team has at least X players.

Note that every query is independent.

Input

The first line contains an integer $\mathtt{N}$ ($1 <= N <= 5 * 10^5$), the number of teams. The next line contains $\mathtt{N}$ integers, the number of players in each team ($1 <= C_i <= 10^9$).

The next line contains an integer $\mathtt{Q}$ ($1 <= Q <= 5 * 10^5$), the number of queries. The next Q lines contain two integers each, $\mathtt{X}$ ($1 <= X <= 10^9$) and $\mathtt{K}$ ($0 <= K <= 10^{15}$).

Output

For each query, print the maximum number of teams that can be formed.

Samples

Input	Output
5 1 5 2 3 7 2 10 3 10 8	1 2

F. Print the Divisors

Baten Ahmed, a legendary competitive programmer of AUST CSE Department is very good at solving number theory problems.Today he wants to find all divisiors of a number. But Unfortunately,his gf calls him and claims to go on a date right now.So, he needs your help to solve the problem. You are given an integer N you need to print all the divisors of N (including 1 and N).

Input

Input will contain one line with an integer N.

Constraints:
1<= N <=10^14

Output

Print all the divisors in ascending order with a single space between them.
Be careful about trailing spaces and be sure to print a new line at the end.

Samples

Input	Output
10	1 2 5 10

Input	Output
13	1 13