Multiplicative Inverse

Given a number n. Print the multiplicative inverse of “n modulo 1000000007” .

Input Format:

Single line containing an integer value.

Constraints:

1<=n<=1000000

output format

Integral value representing the multiplicative inverse.

sample input

3

sample output

333333336

Virat and Factorials

Virat Kohli now wants to learn coding. So Dhoni gave him a simple task of calculating factorial of a number. Help him finish this task.

Input Format:

Single line containing an integral value N.

Constraints:

1<=N<=100

output format

Print the integral value denoting factorial of 'N'.

sample input

3

sample output

6

Evaluating functions

Alice is learning mathematical functions. In his assignment, teacher has asked him to evaluate h(x)= f(x)+g(x) where   
f(x)=3x2-x+10 and   
g(x)=4x3+2x2-5x+4.  
As he is weak in mathematics, help him finish this task.

Hint: Since X is large, you need to work with Big Integers!

Input Format:

Single line containing an integral value denoting the value of x.

Constraints:

0<=x<=10^50

output format

Print integral value denoting value of h(x).

sample input

1

sample output

17

T-Prime

We know that prime numbers are positive integers that have exactly two distinct positive divisors. Similarly, we'll call a positive integer t Т-prime, if t has exactly three distinct positive divisors.

You are given an array of n positive integers. For each of them determine whether it is Т-prime or not.

Input Format:

First Line : n , Number of elements in an array Second Line : xi ( i from 1 to n)

Constraints:

n <= 10^5 xi <= 10^12

output format

YES if its T-Prime NO if its not a T-Prime

sample input

3

4 5 6

sample output

YES

NO

NO

Deepak and Primes

Deepak is learning Sieve of Eratosthenes, He is stuck somewhere. Help him printing prime numbers.

Input Format:

Single line containing integral value n.

Constraints:

1<=n<=5000000

output format

Integral value denoting nth prime number.

sample input

1

sample output

2

Deepak and Primes II

After learning sieve of Eratosthenes, Deepak wants to play more with the primes. This time he is trying to print primes between two integers. Help him in this task.

Input Format:

First line contains a single integer 'T' denoting number of test cases. Then 'T' lines follow each containing two integers 'm' and 'n'.

Constraints:

1<=T<=10 1<=m<=n<=1000000000, n-m<=100000

output format

Print the prime numbers from 'm' till 'n' (both inclusive), one number per line and each test case is separated by an empty line.

sample input

2

5 10

11 20

sample output

5

7

11

13

17

19

Number Of Divisors

Little Bob and Mary once got into a fight over rating on codeforces. Bob asked Mary to share her ice-cream with him if she couldn't answer the question. Mary agreed as she was so confident of herself. Bob asked you are given a number n find its number of divisors. Mary answered it in a flash and started laughing. Bob said the question isn't over yet. Since n can be as large as having 50 digits you are only given some numbers <= 1000000 whose product is n. Mary got a bit surprised and started working on the question. Now you have to help Mary find the number of divisors of (a1\* a2\* a3 ….an) where you are given a1 a2 a3.. an. Since the answer can be large output it modulo 10^9+7.

Input Format:

first line consist of number of test cases. First line of every text case consists of integer n. the second line consists of n integers.

Constraints:

1 <= n <= 15 1 <= ai <= 1000000 1 <= test cases <= 10

output format

the number of divisors modulo 10^9 + 7.

sample input

3

3

13 50 70

3

22 41 60

2

5 5

sample output

48

64

3

Find It

You are given ***N*** numbers.  
Now you have ***Q*** queries.  
For each query you will be given an integer ***K***.   
You have to find out the number of multiples of K among the given N numbers.

Input Format:

The first line consists of number N.  
Next N line contains N numbers. Next line contains number of queries Q. Next Q lines contains Integer K for each query

Constraints:

1 <= N <= 10^5 1 <= numbers <= 10^5 1 <= Q <= 10^5 1 <= K <= 10^5

output format

Output Q lines the answer for every query.

sample input

4

5

8

10

8

1

2

sample output

3

Playing With Divisors Is Fun

You are given an *integer array* ***A*** of size x denoting the prime powers of an integer N.  
Ai denotes the **power** of ith prime in the **prime factorization of N**.   
To make it more clear, A1 will denote the power of 2 in the prime factorization of N A2 will denote the power of 3 in the prime factorization of N and so on. Consider a number ***P***.  
P equals to the ***product of all the divisors of N*** You have to ***find the number of divisors of P***.  
Output it modulo **109+7**.

Input Format:

The first line contains an integer x denoting the size of array. Next line contains x space separated integers, denoting the array.

Constraints:

1 <= x <= 10^6 (number of numbers in array) 0 <= A[i] <= 10^9 (prime powers in array)

output format

Print one integer, denoting the number of divisors of P modulo 10^9+7.

sample input

3

1 1 1

sample output

125

Alice and Totient

Alice is given the task of finding totient φ of a positive integer n (the number of positive integers less than or equal to n that are co-prime to n). As Alice is going on a date, he asks you to write a program for this.

Input Format:

First line of input of consists of an integer 't' denoting the number of test cases. Then 't' lines follow each containing integer values 'n' to calculate totient.

Constraints:

1<=t<=50000 1<=n<=10^6

output format

Print 't' lines

sample input

2

2

3

sample output

1

2

Modular Exponentiation

Given three numbers a,b,c. Calculate (a^b)mod c.

Input Format:

Single line containing three integers a,b,c separated by space.

Constraints:

1<=a,b,c<=100000

output format

Print (a^b)mod c.

sample input

2 2 3

sample output

1

Virat and nCr

Virat is learning to calculate nCr. Dhoni gave him some n and r values to solve for nCr. As the result can be large, he asked him to print (nCr % 1000000007).

Input Format:

Single line containing two integers 'n' and 'r'.

Constraints:

1<=n,r<=1000000 1<=r<=n

output format

Print the required output.

sample input

3 2

sample output

3

Linear Congruence

Alice has mastered number theory, now he gives you the task of solving linear congruence. You need to print the minimum positive value of x which satisfy the following conditions:  
x mod a0 = r0   
x mod a1 = r1   
.  
.  
x mod ak-1 = rk-1   
Every pair in a0…….ak-1 is co-prime.

Input Format:

First line contains single integer k. Second line contains numbers array 'a'. Third line contains remainder array 'r'.

Constraints:

The product of all numbers in array 'a' will fit in long long int.

output format

Print integral value denoting minimum positive value of x satisfying the equations.

sample input

3

3 4 5

2 3 1

sample output

11

Max XOR Array

You are given an array containing n elements. Xor of an array is defined as the xor of all the elements present in the array. You can remove atmost one element from the array to maximize the value of XOR of array. Find the maximum XOR value you can get for the resulting array.

Input Format:

First line of input contains an integer n denoting the size of the array. After that n lines follow, where the i th line contains the i'th element of the array.

Constraints:

1 <= n <= 1000000 0 <= elements of array <= 10^18

output format

You have to print a single integer denoting the maximum xor you can get for the resulting array.

sample input

3

1

2

3

sample output

3

Factorization Game

Mancunian and his arch-enemy Liverbird are playing a game. They have a multiset of positive integers available and they alternate turns. Mancunian always starts.

Each move consists of choosing some prime number p and then choosing a non-empty subset of the multiset such that each element of the subset is divisible by p. Then, the player divides each member of the subset by some non-zero power of p.

Note that the element must be divisible by pa if you are performing division by **pa** For example, if the chosen prime is 3 then 18 is divisible by 9 but not by 27 Also, it is not necessary to divide each element of the subset with the same power of p.

Input Format:

The first line contains a single integer T denoting the number of test cases. The first line of each test case contains a single integer N denoting the number of elements in the multiset S The second line of each test case contains N integers denoting the elements of the multiset.

Constraints:

1≤T≤20 1≤N≤10000 1 <= each element <= 10^6

output format

For each test case, print the name of the winning player in a new line.

sample input

2

4

1 2 3 5

4

3 18 2 2

sample output

Mancunian

Liverbird

Fibonacci meets GCD

Let Fib(x) denote the value of fibonacci of x. For example F(1) =1 , F(2) = 1, F(3) = 2 and so on for all x.   
Let GCD(a,b) denote the greatest common divisor of two numbers a and b.  
You are given an array **A** of **N** integers.  
You will be given **Q** queries of the form **L R**.  
For each query you have to find out the value of ***GCD ( F(A[L] , FA[L+1]….. FA[R] ) % mod***.   
mod = 10^9+7.

Input Format:

First line : Two integers N and Q. Second line : N space separated integers denoting array A. Next Q lines : Two space separated integers L and R.

Constraints:

1 <= N,Q <= 10^5 1 <= A[i] <= 10^9 1 <= L , R <= N

output format

Output the result of each query in a separate line.

sample input

3 2

2 4 8

1 3

2 3

sample output

1

3

Big GCD

Alice recently learnt calculating greatest common divisor. Now Bob wants to test his knowledge and gives him two numbers (one of them being extremely large) to calculate gcd. Alice needs your help to finish this task.

Input Format:

Single line containing two integral values (N and M).

Constraints:

0<=N<=10000000 and N <= M < 10^250

output format

Print the Greatest Common Divisor of two numbers.

sample input

3 9

sample output

3

Primality Testing

Alice thinks he has mastered number theory. Now Bob gave him some integers to check whether they are prime or not. Alice wants to watch a movie. So he needs your help to finish this task quickly.

Input Format:

First line contains an integral value 'n' denoting the number of test cases. Then n lines follows each containing an integral value 'm'.

Constraints:

1<=n<=1000 1<=m<=2^63-1

output format

Print "YES" or "NO" (without quotes) corresponding to each number whether they are prime or not.

sample input

2

1

2

sample output

NO

YES

Let's Play Game

Alice is fond of playing mathematical games. This time he comes up with a unique game. He takes a number 'N' and calls magic fraction of N as:

1. It is a proper fraction (The value is < 1)
2. It cannot be reduced further
3. The product of the numerator and the denominator is factorial of N. i.e. if a/b is the fraction, then a\*b = N!   
   For example magic fractions for 3 are 2/3 and 1/6.   
     
   Now given a number N, you need to print the total number of magic fractions that exist, for all numbers from 1 till N (both inclusive).

Input Format:

Single line containing integral value 'N'.

Constraints:

1<=N<=500

output format

Print integral value denoting total number of magic fractions.

sample input

3

sample output

3

Vivek and Factors

Vivek loves to play number games with his friend Ujjawal. One day they were playing a game where one of them will speak out a positive number and the other have to tell the sum of its factors. The first one to say it correctly wins. After a while they got bored and wanted to try out a different game. Vivek then suggested about trying the reverse. That is, given a positive number 'S' , they have to find a number whose factors add up to 'S'. Realizing that this task is tougher than the original task, Vivek came to you for help. Luckily Vivek owns a portable programmable device and you have decided to burn a program to this device. Given the value of 'S' as input to the program, it will output a number whose sum of factors equal to 'S' .

Input Format:

There are several cases . Each case of input will consist of a positive integer 'S'<= 100000 . The last case is followed by a value of 0 .

Constraints:

0 < S <= 10000

output format

print the integer whose factors sum is equal to 'S'. Print the largest Integer whose factors sum is 'S' . If no such number exists, output '-1' .

sample input

1

102

1000

0

sample output

1

101

-1

Even and odd divisors

Vivek likes to solve mathematical problems. So, Dheer tries to challenge him with a problem. But Vivek is quite busy these days, So he asks for your help.

The problem is as follows: You are given an integer q which denotes the number of queries. For each query, You are given an integer n. You have to find the result of number n.

The result of a number n is defined as the sum of even divisors of n minus the sum of odd divisors of n.

More Formally, result = (Sum of even divisors of n) - (Sum of odd divisors of n)

A divisor of a number n is defined as a positive integer i such that n is divisible by i.

Input Format:

First line of input contains an integer q denoting the number of queries. After that q lines follow, Each line consists an integer n for which you have to find the value of result.

Note: Use fast input output as input is quite large;

Constraints:

1 <= q <= 100000 1 <= n <= 100000

output format

You have to print q lines, where the output of the ith line is the result of the ith query.

sample input

2

3

6

sample output

-4

4