Playing With Bits

Prateek Bhayia likes to play with bits. One day Prateek bhayia decides to assign a task to his student Sanya. You have help Sanya to complete this task. Task is as follows - Prateek Bhayia gives Q queries each query containing two integers a and b. Your task is to count the no of set-bits in for all numbers between a and b (both inclusive)

Input Format:

Read Q - No of Queries, Followed by Q lines containing 2 integers a and b.

Constraints:

Q,a,b are integers.

output format

Q lines, each containing an output for your query.

sample input

2

1 1

10 15

sample output

1

17

Unique Number - I

We are given an array containg n numbers. All the numbers are present twice except for one number which is only present once. Find the unique number without taking any extra spaces and in linear time. ( Hint - Use Bitwise )

Input Format:

First line contains the number n. Second line contains n space separated number.

Constraints:

n < 10^5

output format

Output a single line containing the unique number

sample input

7

1 1 2 2 3 3 4

sample output

4

Unique Numbers - II

We are given an array containg n numbers. All the numbers are present twice except for two numbers which are present only once. Find the unique numbers in linear time without using any extra space. ( Hint - Use Bitwise )

Input Format:

First line contains the number n. Second line contains n space separated number.

Constraints:

n < 10^5

output format

Output a single line containing the unique numbers separated by space

sample input

4

3 1 2 1

sample output

2 3

Unique Number - III

We are given an array containg n numbers. All the numbers are present thrice except for one number which is only present once. Find the unique number. Only use - bitwise operators, and no extra space.

Input Format:

First line contains the number n. Second line contains n space separated number.

Constraints:

N < 10^5

output format

Output a single line containing the unique number

sample input

7

1 1 1 2 2 2 3

sample output

3

Ultra Fast Mathematicians

Prateek is an extremely gifted student. He is great at everything including Combinatorics, Algebra, Number Theory, Geometry, Calculus, etc. He is not only smart but extraordinarily fast!.

One day Prateek was trying to find out if any one can possibly do calculations faster than him. As a result he made a very great contest and asked every one to come and take part.

In his contest he gave the contestants many different pairs of numbers. Each number is made from digits 0 or 1. The contestants should write a new number corresponding to the given pair of numbers. The rule is simple: The i-th digit of the answer is 1 if and only if the i-th digit of the two given numbers differ. In the other case the i-th digit of the answer is 0.

Prateek made many numbers and first tried his own speed. He saw that he can perform these operations on numbers of length ∞ (length of a number is number of digits in it) in a glance! He always gives correct answers so he expects the contestants to give correct answers, too. He is a good fellow so he won't give anyone very big numbers and he always gives one person numbers of same length.

Now you are going to take part in Shapur's contest. See if you are faster and more accurate.

Input Format:

The first line contains an integer t , the no. of testcases. There are two inputs in each line. Each of them contains a single number. It is guaranteed that the numbers are made from 0 and 1 only and that their length is same. The numbers may start with 0. The length of each number doesn't exceed 100.

Constraints:

output format

Write t lines — the corresponding answer to the corresponding input. Do not omit the leading 0s.

sample input

1

10111 10000

sample output

00111

XOR Profit Problem

We are given two coins of value x and y. We have to find the maximum of value of a XOR b where x <= a <= b <= y.

Input Format:

We are given two integers x and y

Constraints:

l <= r <= 1000

output format

Print the maximum value of a XOR b

sample input

5

6

sample output

3

Not So Easy Math

After the release of Avengers, *Ironman* and *Thor* got into a fight and Ironman challenged Thor to find out the number of numbers between 1 and n which are divisible by any of the prime numbers less than 20. Ironman being great at maths quickly answered the question but then Thor asked him to write a program for it. Ironman however found it quite difficult as he did not wanted to write so many lines of code. he knows that you are smart and can code this up easily. Can you do it?

Input Format:

The first line consists of number of test cases t. then follow t lines which consists of number n for each test case.

Constraints:

1 <= test cases <= 10 1 <= n <= 10^18

output format

the answer to each test case each in different line

sample input

5

5

10

12

15

18

sample output

4

9

11

14

17