A. Check Bit Flip

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Suppose you are counting votes but due to some technical fault some bits in your database have flipped (1s have become 0s and vice-versa).

Since you are smart you had stored a backup of the database. On examination, you store all the bytes that don't match up in both databases.

Given the pair of bytes in the original and backed up database print the value of bit that has the discrepancy.

Note: There is exactly only one bit flip in each pair of bytes.

Input

The first line of input contains t the number of test cases.

Next t lines each contain 2 space-separated integers a,b denoting the data of the bytes in the original and backed up database.

$1 \leq t \leq 10^5$

$0 \leq a, b \leq 255$

Output

For each test case print the value of the bit that was flipped in a single line.

Example

input
2 1 0 5 7
output
1 2

Note

For the input $1\ 0$: the value of the bit flipped is 1

For the input $5\ 7$: the value of the bit flipped is 2.

B. It's Wedding Season

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

It's wedding season and Bob and Alice are doing preparations for the same. Currently, they are making special garlands. A special garland is a garland in which you can insert the flowers between any two flowers. Since the task is quite boring, Alice decided to make it interesting. Every flower has a garland score.

A garland score is the **minimum** of the diameter of the neighbouring flowers **currently present** in the garland (consider the flowers to be spherical). Alice decided that they would insert the flowers in the garland one by one in such a way that the sum of the garland score of all the flowers is maximum.

A garland is an arrangement of flowers such that they form a closed loop.

Find the maximum value of the sum of the garland score of all the flowers.

Bob is unable to find the maximum sum of scores that he can achieve after arranging. Help Bob to find the **maximum** sum of the scores.

Input

The first line of input consists of n, denoting the number of flowers.

The next line consists of n space-separated numbers(a_i) denoting diameters of the flowers.

$2 \leq n \leq 2 \cdot 10^5$

$1 \leq a_i \leq 10^9$

Output

Print on a new line for every test Case, the maximum sum.

Example

input
4 7 2 1 3
output
13

Note

Consider flowers with diameters [7, 2, 1, 3].

Alice can insert first flower with diameter 7(since it has 0 neighbours), its score becomes 0. Then she can insert flower with diameter 3, its score becomes 7 followed by 2 in between 3 and 7, and finally 1 in between 3 and 7. The sum of all the score is 13.

C. Win the archer !!

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Magnus decided to to play chess. Classic chess doesn't seem interesting to him, so he discovers a new kind of chess.

In this variation archer is the piece that captures all squares on its vertical, horizontal and diagonal lines(Similar to a queen). If the cell is located on the same vertical, horizontal or diagonal line with archer, and the cell contains a piece of the color that is not same with your piece's color , the archer is able to move to this square. After that the opponent's piece is removed from the board. The archer cannot move to a cell containing an enemy piece if there is some other piece between it and the archer.

There is an n × n chessboard. We'll denote a cell on the intersection of the r-th row and c-th column as (r, c). The square $(1, 1)$ contains the blue archer and the square $(1, n)$ contains the red archer. All other squares contain green pawns that don't belong to anyone.

The players move in turns. The player that moves first plays for the blue archer, his/her opponent plays for the red archer.

On each move the player has to capture some piece with his archer (that is, move to a square that contains either a green pawn or the enemy archer). The player loses if either he cannot capture any piece during his move or the opponent took his/her archer during the previous move.

Help Magnus determine who wins if both players play with an optimal strategy on the board n×n.

Input

The input contains a single number n ($2 \le n \le 32$) — the size of the board.

Output

On the first line print the answer to problem — string "blue" or string "red", depending on who wins if the both players play optimally.

If the answer is "blue", then you should also print two integers r and c representing the cell (r, c) on next line , where the first player should make his first move to win. If there are multiple such cells, print the one with the minimum r. If there are still multiple squares, print the one with the minimum c. If the answer is "red" you only need to print "red".

Example

input
2
output
blue 1 2

D. Gray Similar Code

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Alice recently learned about Gray codes (Sequence with subsequent elements differing by only one bit). She realized that if the numbers to be included in the code are finite the standard sequence isn't the only Gray code possible.

Help Alice calculate the total number of sequences that follow the rules:

1. Subsequent elements differ by only one bit.
2. All elements are unique and less than the size of the sequence.

Alice calls such sequences Gray similar code sequences.

Given a number n find all the valid Gray similar code sequences of size 2^n. As the number of sequences can be large print your answer modulo $10^9 + 7$

Input

The first line of input contains an integer t : the number of test cases.

Next t lines contain a single integer n as input.

$1 \leq t \leq 10^5$

$1 \leq n \leq 10^6$

Output

For each test case print a single integer in a new line.

Example

input
2 1 2
output
2 8

Note

For the first test case, there are 2 sequences possible:

1 0 and 0 1

For the second test case, there are 8 sequences possible.

E. Magical Numbers

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Consider the decimal presentation of an integer. Let's call a number magic number if no digit appears in decimal presentation of the number consecutively thrice i.e. no three consecutive digits are same.

For example, the numbers 1727374, 17, 1 are magic but 777, 1117, 12223, 33334, 7771 are not magic. Find the number of magic numbers which contains exactly n number of digits and magic numbers do not contain zero at any position. Because the answer can be very huge you should only find its value modulo 1000000007 (so you should find the remainder after dividing by 1000000007).

Input

The first line contains n the parameters from the problem statement.

$1 \leq n \leq 10^5$

Output

Print the only integer the remainder after dividing by 1000000007 of the number of magic numbers which have exactly n digits.

Examples

input
1
output
9

input
2
output
81

F. Triplet Sum

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given an array A of N integers.

We define triplet sum as a function $F(t)$ where t is a triplet.

If for any triplet t given conditions are true then it is a valid triplet and $F(t) = \sum_{i=1}^{3} t_i$

- $i < j < k$
- $A_i < A_j < A_k$

Find out the sum of $F(t)$ over all the **valid triplet**.

Note : A triplet is a set of three items, which may be in a specific order, or unordered.

Input

The first line contains a single integer N $(1 \leq N \leq 2 * 10^5)$ - Number of Array elements.

The second line contains N integers $A_1, A_2, A_3, .., A_N$ $(0 \leq A_i \leq 10^9)$

Output

Print a single integer the answer to the problem. As answer can be very large print it modulo $(10^9 + 7)$

Example

input

5 4 1 2 3 4
output
30