**NCIT Expo on Technology [NEXT]**

**Logic Battle Questions**

**Number of questions: 6 question**

**Full Marks: 600**

**Weightage: (4:200),(1,6:50),(2,3,5:100)**

**Domain: Mathematics, Data Structures, Problem Solving, Algorithms**

1. **Maximum Draws**

**Problem domain:**

Nirwachan is off to a party and is searching for a matching pair of socks. His drawer is filled with socks, each pair of a different color. In its worst-case scenario, how many socks (x) should Nirwachan remove from his drawer until he finds a matching pair?

**InputFormat**

The first line contains the number of test cases T.

Next T lines contains an integer N which indicates the total pairs of socks present in the drawer.

**Output Format**

Print the number of Draws (x) Jim makes in the worst-case scenario.

**Constraints**

1 ≤ T ≤ 1000 [number of test cases]

0 < N < 106 [input data]

**Sample Input**

2

1

2

**Sample Output**

2

3

**Explanation**

Case 1: A pair of socks are present, hence exactly 2 draws for the socks to match.

Case 2: 2 pair of socks are present in the drawer. The first and the second draw might result in 2 socks of different color. The 3rd sock picked will definitely match one of previously picked socks. Hence, 3.

1. **Summing the n series**

You are given a sequence whose  term is



You have to evaluate the series



Find  .

# Input Format

The first line of input contains T, the number of test cases. Each test case consists of one line containing a single n integer .

**Constraints**



**Output Format**

For each test case, print the required answer in a line.

# Sample Input

2

2

1

**Sample Output**

4

1

**Explanation**

Case 1: We have 4 = 1+3

Case 2 : We have 1 = 1

1. **Closest Number**

You are given 3 numbers a, b and x. You need to output the multiple of x which is closest to ab. If more than one answer exists , display the smallest one.

Input Format

The first line contains T, the number of testcases.

T lines follow, each line contains 3 space separated integers (a, b and x respectively)

Constraints

1 ≤ T ≤ 105

1 ≤ x ≤ 109

0 < ab ≤ 109

1 ≤ a ≤ 109

-109 ≤ b ≤ 109

Output Format

For each test case , output the multiple of x which is closest to ab

Sample Input 0

3

349 1 4

395 1 7

4 -2 2

Sample Output 0

348

392

0

Explanation 0

The closest multiple of 4 to 349 is 348.

The closest multiple of 7 to 395 is 392.

The closest multiple of 2 to 1/16 is 0.

1. **Magic Suare Forming**

We define a magic square to be an n x n matrix of distinct positive integers from 1 to n2 where the sum of any row, column, or diagonal of length n is always equal to the same number: the magic constant .

You will be given a 3 x 3 matrix of integers in the inclusive range [1,9] . We can convert any digit a to any other digit b in the range [1,9] at cost of |a-b|. Given s, convert it into a magic square at minimal cost. Print this cost on a new line.

Note: The resulting magic square must contain distinct integers in the inclusive range . For example, we start with the following matrix :

5 3 4

1 5 8

6 4 2

We can convert it to the following magic square:

8 3 4

1 5 9

6 7 2

This took three replacements at a cost of |5-8| + |8-9|+|4-7| = 7.

**Input Format**

Each of the lines contains three space-separated integers of row . Constraints

Output Format Print an integer denoting the minimum cost of turning matrix into a magic square.

**Explanation 1**

Using 0-based indexing, if we make

S[0][1] 🡪 9 at a cost of |9-8| = 1

S[1][0] 🡪 3 at a cost of |3-4| = 1

S[2][0] 🡪 8 at a cost of |8-6| = 2

**Sample Input 0**

4 9 2

3 5 7

8 1 5

**Sample Output 0**

1

**Explanation 0**

If we change the bottom right value, , s[2][2], from 5 to 6 at a cost of |6-5|=1, s becomes a magic square at the minimum possible cost.

**Sample Input 1**

4 8 2

4 5 7

6 1 6

**Sample Output 1**

4

**5.Diwali Lights**

On the eve of Diwali, Hari is decorating his house with a serial light bulb set. The serial light bulb set has N bulbs placed sequentially on a string which is programmed to change patterns every second. If at least one bulb in the set is on at any given instant of time, how many different patterns of light can the serial light bulb set produce?

Note: Lighting two bulbs \*-\* is different from \*\*

**Input Format**

The first line contains the number of test cases T, T lines follow. Each line contains an integer N, the number of bulbs in the serial light bulb set.

**Output Format**

Print the total number of patterns modulo 10 Constraints 1 <= T <= 1000 0< N < 105

Sample Input

2

1

2

Sample Output

1

3

Explanation

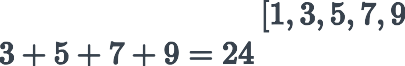
Case 1: 1 bulb can be lit in only 1 way.

Case 2: 2 bulbs can be lit in -\*, \*-, \*\* i.e. 3 ways.

**6.Min Max Sum**

Given five positive integers, find the minimum and maximum values that can be calculated by summing exactly four of the five integers. Then print the respective minimum and maximum values as a single line of two space-separated long integers.

For example, . Our minimum sum is  and our maximum sum is



. We would print

# Function Description



16 24

It should print two space-separated integers on one line: the minimum sum and the maximum sum of 4 of 5 elements.

# Input Format

A single line of five space-separated integers.

# Constraints





**Output Format**

Print two space-separated long integers denoting the respective minimum and maximum values that can be calculated by summing exactly *four* of the five integers. (The output can be greater than a 32 bit integer.)

# Sample Input

**Sample Output**



1 2 3 4 5

**Explanation**



10 14

Our initial numbers are , , , , and . We can calculate the following sums using four of the five integers:

|  |  |  |
| --- | --- | --- |
| 1. If we sum everything except | , our sum is | . |
| 2. If we sum everything except | , our sum is | . |
| 3. If we sum everything except | 3, our sum is | . |
| 4. If we sum everything except | 4, our sum is | . |
| 5. If we sum everything except | , our sum is | . |

