Set	**: 2**
Exercise No.	**: 2**
Topics Covered	**: Basic Math, Array, Strings, Bit Manipulation, Control Flow Statements, Recursion**
Date	**: 03-06-2024**
Level	**: Medium**

Solve the following problems

1. **Factorial Trailing Zeroes**

   Problem Statement: Given an integer n, return the number of trailing zeroes in on. Note that n! = n * (n - 1) * (n - 2) * ... * 3 * 2 * 1.

   Example 1:
   Input: n = 3
   Output: 0
   Explanation: 3! = 6, no trailing zero.

   Example 2:
   Input: n = 5
   Output: 1
   Explanation: 5! = 120, one trailing zero.

   Example 3:
   Input: n = 0
   Output: 0
   Constraints:
   - $0 <= n <= 10^4$

2. **Beautiful number**
   Problem Statement: Lara loves beautiful numbers and also has two integers, 'L' and 'R', denoting an interval [L, R].
   Given the interval [L, R], Lara wants you to find the number of Beautiful numbers in the interval.
   A Beautiful Number is a number that:

Becomes 1 by repeatedly replacing the number with the sum of squares of its digits.

If the number does not become 1, then it’s not a Beautiful Number.

For example, given interval = [1, 3]

We see that 1 is a Beautiful Number but 2,3 are not. Hence the answer is 1.

Output the single integer, the sum of all Beautiful Numbers in the given range.

Input 1 :

2

31 33

1 3

Output 1 :

63

1

Explanation:

For the first test case:

Both 31 and 32 can be shown to be Beautiful Numbers as shown below.

31 -> 3^2 + 1^2 = 10

10 -> 1^2 +0^2 = 1

32 -> 3^2 + 2^2 = 13

13 -> 1^2 + 3^2 = 10

10 -> 1^2 = 1

Hence the num = 31 + 32 = 63. It can be shown that no other numbers in the given interval are beautiful.

Input 2 :

2

13 20

2 23

Output 2 :

32

72

Constraints :

- 1 <= T <= 50
- 1 <= L <= R <= 10^5

3. Find the Minimum Number of Fibonacci Numbers Whose Sum Is K

Problem statement : Given an integer k, return the minimum number of Fibonacci numbers whose sum is equal to k. The same Fibonacci number can be used multiple times.

The Fibonacci numbers are defined as:

- F1 = 1
- F2 = 1
- Fn = Fn-1 + Fn-2 for n > 2.

It is guaranteed that for the given constraints we can always find such Fibonacci numbers that sum up to k.

Example 1:

Input: k = 7

Output: 2

Example 2:

Input: k = 10

Output: 2

Constraints:

- 1 <= k <= 10^9

4. **Maximum Score From Removing Stones**

Problem Statement: You are playing a solitaire game with three piles of stones of sizes a, b, and c respectively. Each turn you choose two different non-empty piles, take one stone from each, and add 1 point to your score. The game stops when there are fewer than two non-empty piles (meaning there are no more available moves). Given three integers a, b, and c, return the maximum score you can get.

Example 1:

Input: a = 2, b = 4, c = 6

Output: 6

Example 2:

Input: a = 4, b = 4, c = 6

Output: 7

Constraints:

1 <= a, b, c <= 10^5

5. Lucky Numbers

Problem statement : Lucky numbers are subset of integers. Process of arriving at lucky numbers,

Take the set of integers

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19,……

First, delete every second number, we get following reduced set.

1, 3, 5, 7, 9, 11, 13, 15, 17, 19,…………

Now, delete every third number, we get

1, 3, 7, 9, 13, 15, 19,….….

Continue this process indefinitely……

Any number that does NOT get deleted due to above process is called "lucky".

You are given a number N, you need to tell whether the number is lucky or not. If the number is lucky return 1 otherwise 0.

Example 1:

Input:

N = 5

Output: 0

Explanation: 5 is not a lucky number as it gets deleted in the second iteration.

Example 2:

Input:

N = 19

Output: 1

Explanation: 19 is a lucky number because it does not get deleted throughout the process.

Constraints:

1 <= N <= 10^5

6. Power Of Numbers

Problem statement: Given a number and its reverse. Find that number raised to the power of its own reverse.

Note: As answers can be very large, print the result modulo 10^9 + 7.

Example 1:

Input:

N = 2, R = 2

Output: 4

Explanation: The reverse of 2 is 2 and after raising power of 2 by 2 we get 4 which gives remainder as 4 when divided by 1000000007.

Example 2:

Input:

N = 12, R = 21

Output: 864354781

Explanation: The reverse of 12 is 21 and 1221 when divided by 1000000007 gives remainder as 864354781.

Constraints:

1 <= N <= 10^9

7. **Carpet into Box**

Problem Statement: There is a carpet of a size a*b [length * breadth]. You are given a box of size c*d. The task is, one has to fit the carpet in the box in a minimum number of moves.

In one move, you can either decrease the length or the breadth of the carpet by half (floor value of its half).

Note: One can even turn the carpet by 90 degrees any number of times, wont be counted as a move.

Example 1:

Input:

A = 8, B = 13

C = 6, D = 10

Output:

Minimum number of moves: 1

Example 2:

Input:

A = 4, B = 8

C = 3, D = 10

Output:

Minimum number of moves: 1

Constrains:

1<= A,B,C,D <= 10^9

8. Triangle of numbers

Problem statement : You are given a pattern. Now you need to print the same pattern for any given 'N' number of rows.

For example, Pattern for 'N' = 4 will be.

```
   1
  232
 34545
4567654
```

Sample Input1 :

1

5

Sample Output1 :

```
    1
   232
  34543
 4567654
567898765
```

Explanation of Sample Input 1:

For test case 1:

We print the given pattern for the given 5 rows where each row prints spaces initially for each row decrementing for each consecutive row and printing the values corresponding to each row according to the given pattern.

Sample Input2 :

1

4

Sample Output2 :

```
   1
  232
 34545
4567654
```

Explanation of Sample Input 2:

For test case 1:

We print the given pattern for the given 4 rows where each row prints spaces initially for each row decrementing for each consecutive row and printing the values corresponding to each row according to the given pattern.

9. Next small palindrome

Problem statement : You are given a number 'N' in the form of a string 'S', which is a palindrome. You need to find the greatest number strictly less than 'N' which is also a palindrome.

Note:

1. A palindrome is a word, number, phrase, or another sequence of characters that reads the same backward as forward, such as madam, racecar, 1234321, etc.
2. The numerical value of the given string S will be greater than 0.
3. A single-digit number is also considered a palindrome.
4. The answer number should not contain any leading zeros, except for the case when the answer is 0.
5. Note that the length of the string is nothing but the number of digits in N.

Sample Input 1:

1

12321

Sample Output 1:

12221

Explanation For Sample Input 1:

The next smaller palindrome to 12321 is 12221, as it is strictly less than 12321 and it reads the same from the front and back both.

Sample Input 2:

2

11

101

Sample Output 2:

9

99

Constraints:

1 <= T <= 100

1 <= |S| <= 10^4

Where |S| donates the size of string 'S'.

10.Nth Digit of infinite sequence

Problem statement : Given an integer n, return the nth digit of the infinite integer sequence [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, ...].

Example 1:

Input: n = 3

Output: 3

Example 2:

Input: n = 11

Output: 0

Explanation: The 11th digit of the sequence 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, ... is a 0, which is part of the number 10.

Constraints:

1 <= n <= 2^31 – 1

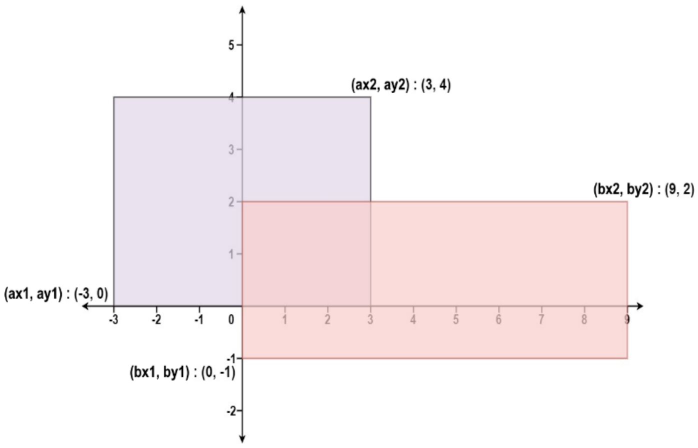
11.Rectangle Area

Problem statement : Given the coordinates of two rectilinear rectangles in a 2D plane, return the total area covered by the two rectangles.

The first rectangle is defined by its bottom-left corner (ax1, ay1) and its top-right corner (ax2, ay2).

The second rectangle is defined by its bottom-left corner (bx1, by1) and its top-right corner (bx2, by2)

Example 1 :



Input: ax1 = -3, ay1 = 0, ax2 = 3, ay2 = 4, bx1 = 0, by1 = -1, bx2 = 9, by2 = 2

Output: 45

Example 2:

Input: ax1 = -2, ay1 = -2, ax2 = 2, ay2 = 2, bx1 = -2, by1 = -2, bx2 = 2, by2 = 2

Output: 16

Constraints:

- $-10^4 <= ax1 <= ax2 <= 10^4$
- $-10^4 <= ay1 <= ay2 <= 10^4$
- $-10^4 <= bx1 <= bx2 <= 10^4$
- $-10^4 <= by1 <= by2 <= 10^4$

12.Abundant number

Problem statement: Lara has assigned a task where she needs to check if a number is an Abundant number. A number n is said to be Abundant Number to follow these condition

- The sum of its proper divisors is greater than the number itself
- The difference between these two values is called the abundance.

The first few Abundant Numbers are: 12, 18, 20, 24, 30, 36, 40, 42, 48, 54, 56, 60, 66 …

Input Number	Proper Divisors	Sum of Divisors	Abundance	Abundant Number?
12	1,2,3,4,6	16	4	Yes
18	1,6,3,9,2	21	3	Yes
21	1,7,3	11	-	No

Sample Input 1:
12
Sample Output 1:
12 is abundant number

Sample Input 1:
16
Sample Output 1:
Not an abundant number

Constraints:

- 1<=N<=1000

13. **Prime palindrome**

Problem statement : Given an integer n, return the smallest **prime palindrome** greater than or equal to n. An integer is **prime** if it has exactly two divisors: 1 and itself. Note that 1 is not a prime number.

- For example, 2, 3, 5, 7, 11, and 13 are all primes.

An integer is a **palindrome** if it reads the same from left to right as it does from right to left.

- For example, 101 and 12321 are palindromes.

The test cases are generated so that the answer always exists and is in the range [2, $2 * 10^8$].

Example 1:

Input: n = 6

Output: 7

Example 2:

Input: n = 8

Output: 11

Constraints:

- $1 <= n <= 10^8$

14.Descending diagonal number

Problem statement : Your task is to generate a pattern where the numbers decrease from *N* to 1 horizontally from left to right and vertically from bottom to top.

Each row should contain the numbers in descending order from *N* to 1, and the remaining positions should be filled with the highest number.

Sample Input 1:

2

5

2

Sample Output 1:

55555

45555

34555

23455

12345

22

12

Explanation of Sample Input 1:

Test case 1:

In the first test case, as 'N' is equal to '5', We will have to print five lines. We have a print a square-like pattern where the upper right triangle along with the main diagonal will be filled with the input number and the lower-left triangle will be a triangle wherein each row, number of elements increases from '1' to 'N' - 1;

Test case 2:

In the second test case, as 'N' is equal to '2', We will have to print two lines.

Sample Input 2:

2

1

4

Sample Output 2:

1

4444

3444

2344

1234

Explanation of Sample Input 2:

Test case 1:

As 'N' is equal to '1', we just need to print one line i.e 1.

Constraints:

1 <= T <= 5

1 <= N <= 200

15.X shaped pattern of numbers

Problem statement : Micheal wanted to go to a party along with his friends. However, his mom wanted him to go only if he completes a task assigned by her.

She gave Micaheal a value and asked him to print an X-shaped pattern.

Example : Pattern for N = 3 (No. of rows = 5, No. of columns = 5) :

```
1   1
 2 2
  3
 2 2
1   1
```

Since Michaeal is in a hurry and doesn't want to be late for the party; he asks you to solve the problem. Can you help solve this problem?

Sample Input 1:

```
2
3
2
```

Sample Output 1:

```
1   1
 2 2
  3
 2 2
1   1

 1 1
  2
 1 1
```

Explanation for Sample Input 1:

In the first test case, 'N' is 3, so print the rows from 1 to ' 2*N -1 ', and if the conditions are followed correctly, the above pattern is printed for N=3.

In the second test case, the value of 'N' is 2, so print the rows from 1 to '2*N - 1', and if the conditions are followed correctly, the above pattern is printed for N=2.

Sample Input 2:

2

4

5

Sample Output 2:

```
1     1
 2   2
  3 3
   4
  3 3
 2   2
1     1

1       1
 2     2
  3   3
   4 4
    5
   4 4
  3   3
 2     2
1       1
```

Constraints:

1 <= T <= 50

1 <= N <= 1000

16.Divide Two Integers

Problem Statement: Given two integers dividend and divisor, divide two integers **without** using multiplication, division, and mod operator. The integer division should truncate toward zero, which means losing its fractional part. For example, 8.345 would be truncated to 8, and -2.7335 would be truncated to -2. Return the quotient after dividing dividend by divisor.

Example 1:
Input: dividend = 10, divisor = 3
Output: 3
Explanation: 10/3 = 3.33333.. which is truncated to 3.

Example 2:
Input: dividend = 7, divisor = -3
Output: -2
Explanation: 7/-3 = -2.33333.. which is truncated to -2.

Constraints:

- -2^31 <= dividend, divisor <= 2^31 - 1
- divisor != 0

17. Recursive Multiply

Problem Statement: You are given two positive integers. Your task is to multiply the two numbers using recursion by performing a minimum number of operations. Note that you can use addition, subtraction, and/ or bit shifting, but you cannot use the multiplication or division operation.

Sample Input 1:
2
5 10
3 9
Sample Output 1:
50
27
Explanation of sample input 1: For the first test case we have, M = 5 and N = 10. Therefore, our result is M*N = 5*10 = 50.

Sample Input 2:
3
1 5

3 4

1 1

Sample Output 2:

5

12

1

Constraints:

1 <= T <= 10

1 <= M, N <= 10^8

18. Find The Original Array of Prefix Xor

Problem Statement : You are given an **integer** array pref of size n. Find and return the array(arr)of size n that satisfies:

- pref[i] = arr[0] ^ arr[1] ^ ... ^ arr[i].

Note that ^ denotes the bitwise-xor operation..

Example 1:

Input: pref = [5,2,0,3,1]

Output: [5,7,2,3,2]

Explanation: From the array [5,7,2,3,2] we have the following:

- pref[0] = 5.
- pref[1] = 5 ^ 7 = 2.
- pref[2] = 5 ^ 7 ^ 2 = 0.
- pref[3] = 5 ^ 7 ^ 2 ^ 3 = 3.
- pref[4] = 5 ^ 7 ^ 2 ^ 3 ^ 2 = 1.

Example 2:

Input: pref = [13]

Output: [13]

Constraints:

- 1 <= pref.length <= 10^5
- 0 <= pref[i] <= 10^6

19. Sum of Product

Problem Statement: Given an array arr[] of size n. Calculate the sum of Bitwise ANDs ie: calculate sum of arr[i] & arr[j] for all the pairs in the given array arr[] where i < j.

Example 1:

Input:

n = 3

arr = {5, 10, 15}

Output:15

Explanation:

The bitwise Ands of all pairs where i<j are (5&10) = 0, (5&15) = 5 and (10&15) = 10.

Therefore, the total sum = (0+5+10) = 15.

Example 2:

Input:n = 4

arr = {10, 20, 30, 40}

Output:46

Constraints:

1 <= n <= 10^5

1 <= arr[i] <= 10^8

20. X or Y

Problem Statement: Given a number X. Find a positive number Y required to make binary representation of (X+Y) palindrome. Also Y should be such that most significant set bit of (X+Y) should be same as the most significant set bit of X.

Sample Input 1:

2

6

10

Sample Output 1:

YES

YES

Constraints:

- 1 <= 'T' <= 10
- 1 <= 'X' <= 10^18

21. **Sum of bit differences**

Problem Statement: Given an array integers arr[], containing n elements, find the sum of bit differences between all pairs of element in the array. Bit difference of a pair (x, y) is the count of different bits at the same positions in binary representations of x and y.
For example, bit difference for 2 and 7 is 2. Binary representation of 2 is 010 and 7 is 111 respectively and the first and last bits differ between the two numbers.
Note: (x, y) and (y, x) are considered two separate pairs.

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Example 1:
Input:
n = 2
arr[] = {1, 2}
Output: 4
Explanation: All possible pairs of an array are (1, 1), (1, 2), (2, 1), (2, 2).
Sum of bit differences = 0 + 2 + 2 + 0 = 4

Example 2:
Input:
n = 3
arr[] = {1, 3, 5}
Output: 8

Constraints:

- 1 <= n <= 10^5
- 1 <= arr[i] <= 10^5

22. **Minimum Flips to Make a OR b Equal to c**

Problem Statement: Given 3 positives numbers a, b and c. Return the minimum flips required in some bits of a and b to make (a OR b == c). (bitwise OR operation).

Flip operation consists of change **any** single bit 1 to 0 or change the bit 0 to 1 in their binary representation.

Example 1:
Input: a = 2, b = 6, c = 5
Output: 3
Explanation: After flips a = 1 , b = 4 , c = 5 such that (a OR b == c)

Example 2:
Input: a = 4, b = 2, c = 7
Output: 1

Constraints:

- 1 <= a <= 10^9
- 1 <= b <= 10^9
- 1 <= c <= 10^9

23. Game of XOR

Problem Statement: Given an array A of size N. The value of an array is denoted by the bit-wise XOR of all elements it contains. Find the bit-wise XOR of the values of all subarrays of A.

Example 1:
Input:
N = 3
A = [1,2,3]
Output:
2
Explanation:
xor[1] = 1
xor[1, 2] = 3
xor[2, 3] = 1
xor[1, 2, 3] = 0
xor[2] = 2
xor[3] = 3
Result : 1 ^ 3 ^ 1 ^ 0 ^ 2 ^ 3 = 2

Example 2:

Input:

N = 2

A = [1,2]

Output:

0

Constraints:

1 <= N <= 10^6

0 <= A[i] <= 10^9

24. **Minimum Platforms**

Problem Statement: Given arrival and departure times of all trains that reach a railway station. Find the minimum number of platforms required for the railway station so that no train is kept waiting.

Consider that all the trains arrive on the same day and leave on the same day. Arrival and departure time can never be the same for a train but we can have arrival time of one train equal to departure time of the other. At any given instance of time, same platform can not be used for both departure of a train and arrival of another train. In such cases, we need different platforms.

Example 1:

Input: n = 6

arr[] = {0900, 0940, 0950, 1100, 1500, 1800}

dep[] = {0910, 1200, 1120, 1130, 1900, 2000}

Output: 3

Explanation:

Minimum 3 platforms are required to safely arrive and depart all trains.

Example 2:

Input: n = 3

arr[] = {0900, 1100, 1235}

dep[] = {1000, 1200, 1240}

Output: 1

Explanation: Only 1 platform is required to safely manage the arrival and departure

of all trains.

Constraints:

$1 \le n \le 50000$

$0000 \le A[i] \le D[i] \le 2359$

25. **Minimum number of jumps**

Problem Statement: Given an array of N integers arr[] where each element represents the maximum length of the jump that can be made forward from that element. This means if arr[i] = x, then we can jump any distance y such that y ≤ x.

Find the minimum number of jumps to reach the end of the array (starting from the first element). If an element is 0, then you cannot move through that element.

Example 1:

Input:

N = 11

arr[] = {1, 3, 5, 8, 9, 2, 6, 7, 6, 8, 9}

Output: 3

Explanation:

First jump from 1st element to 2nd element with value 3. Now, from here we jump to 5th element with value 9, and from here we will jump to the last.

Example 2:

Input :

N = 6

arr = {1, 4, 3, 2, 6, 7}

Output: 2

Explanation:

First we jump from the 1st to 2nd element and then jump to the last element.

Constraints:

$1 \le N \le 10^7$

$0 \le arr \le 10^7$

26. **The Celebrity Problem**

Problem Statement: A celebrity is a person who is known to all but does not know anyone at a party. If you go to a party of N people, find if there is a celebrity in the party or not.A square NxN matrix M[][] is used to represent people at the party such that if an element of row i and column j is set to 1 it means ith person knows jth person. Here M[i][i] will always be 0.Return the index of the celebrity, if there is no celebrity return -1.

Note: Follow 0 based indexing.

Example 1:

Input:

N = 3

M[][] = {{0 1 0},
        {0 0 0},
        {0 1 0}}

Output: 1

Explanation: 0th and 2nd person both know 1. Therefore, 1 is the celebrity.

Example 2:

Input:

N = 2

M[][] = {{0 1},
        {1 0}}

Output: -1

Explanation: The two people at the party both know each other. None of them is a celebrity.

Constraints:

1 <= N <= 3000

0 <= M[][] <= 1

27. **Maximum Product Subarray**

Problem Statement: Given an array Arr[] that contains N integers (may be positive, negative or zero). Find the product of the maximum product subarray.

Example 1:

Input:

N = 5

Arr[] = {6, -3, -10, 0, 2}

Output: 180

Explanation: Subarray with maximum product is [6, -3, -10] which gives product as 180.

Example 2:

Input:

N = 6

Arr[] = {2, 3, 4, 5, -1, 0}

Output: 120

Explanation: Subarray with maximum product is [2, 3, 4, 5] which gives product as 120.

Constraints:

$1 \le N \le 500$

$-102 \le Arri \le 10^2$

28. Maximum Index

Problem Statement: Given an array a of n positive integers. The task is to find the maximum of j - i subjected to the constraint of a[i] ≤ a[j] and i ≤ j.

Example 1:

Input:

n = 2

a[] = {1, 10}

Output:

1

Explanation:

a[0] < a[1] so (j-i) is 1-0 = 1.

Example 2:

Input:

n = 9

a[] = {34, 8, 10, 3, 2, 80, 30, 33, 1}

Output:

6

Explanation:

In the given array a[1] < a[7] satisfying the required condition(a[i] < a[j]) thus giving the maximum difference of j - i which is 6(7-1).

Constraints:

$1 \leq n \leq 10^6$

$0 \leq a[i] \leq 10^9$

29. Partition Array According to Given Pivot

Problem Statement: You are given a 0-indexed integer array nums and an integer pivot. Rearrange nums such that the following conditions are satisfied:

- Every element less than pivot appears before every element greater than pivot.
- Every element equal to pivot appears in between the elements less than and greater than pivot.
- The relative order of the elements less than pivot and the elements greater than pivot is maintained.
    - More formally, consider every pi, pj where pi is the new position of the ith element and pj is the new position of the jth element. For elements less than pivot, if i < j and nums[i] < pivot and nums[j] < pivot, then pi < pj. Similarly for elements greater than pivot, if i < j and nums[i] > pivot and nums[j] > pivot, then pi < pj.

Return nums after the rearrangement.

Example 1:

Input: nums = [9,12,5,10,14,3,10], pivot = 10

Output: [9,5,3,10,10,12,14]

Explanation:

The elements 9, 5, and 3 are less than the pivot so they are on the left side of the array.

The elements 12 and 14 are greater than the pivot so they are on the right side of the array.

The relative ordering of the elements less than and greater than pivot is also maintained. [9, 5, 3] and [12, 14] are the respective orderings.

Example 2:

Input: nums = [-3,4,3,2], pivot = 2

Output: [-3,2,4,3]

Explanation:

The element -3 is less than the pivot so it is on the left side of the array.

The elements 4 and 3 are greater than the pivot so they are on the right side of the array.

The relative ordering of the elements less than and greater than pivot is also maintained. [-3] and [4, 3] are the respective orderings.

Constraints:

- 1 <= nums.length <= 10^5
- -10^6 <= nums[i] <= 10^6
- pivot equals to an element of nums.

30. Find triplets with zero sum

Problem Statement: Given an array arr[] of n integers. Check whether it contains a triplet that sums up to zero.

Note: Return 1, if there is at least one triplet following the condition else return 0.

Example 1:

Input: n = 5, arr[] = {0, -1, 2, -3, 1}

Output: 1

Explanation: 0, -1 and 1 forms a triplet with sum equal to 0.

Example 2:

Input: n = 3, arr[] = {1, 2, 3}

Output: 0

Explanation: No triplet with zero sum exists.

Constraints:

1 <= n <= 10^4

-10^6 <= Ai <= 10^6

31. Dice throw

Problem Statement: Given N dice each with M faces, numbered from 1 to M, find the number of ways to get sum X. X is the summation of values on each face when all the dice are thrown.

Example 1:

Input:

M = 6, N = 3, X = 12

Output:

25

Explanation:

There are 25 total ways to get the Sum 12 using 3 dices with faces from 1 to 6.

Example 2:

Input:

M = 2, N = 3, X = 6

Output:

1

Explanation:

There is only 1 way to get the Sum 6 using 3 dices with faces from 1 to 2. All the dices will have to land on 2.

Constraints:

1 <= M,N,X <= 50

32. Count of sum of consecutives

Problem statement : Given a number N, the task is find the number of ways to represent this number as a sum of 2 or more consecutive natural numbers.

Example 1:

Input:

N = 10

Output:

1

Explanation:

10 can be reprsented as sum of two or more consecutive numbers in only one way.

10 = 1+2+3+4.

Example 2:

Input:

N = 15

Output:

3

Explanation:

15 can be reprsented as sum of two or more consecutive numbers in 3 ways.

(15 1+2+3+4+5); (15 = 4+5+6); (15 = 7+8).

33. Digit Product

Problem statement: Alex's friend challenged him with an interesting problem to test his intelligence. His friend gives him the number 'N', Alex's task is to find the smallest number 'X' such that the product of the digits of 'X' is equal to 'N'.Can you help Alex to solve this problem?

You are given a number 'N', you have to find the minimum number 'X' such that the product of the digits of 'X' is equal to 'N'.If no such number is found, print -1.

Input 1:

36

42

Output 1:

49

67

Explanation of input 1:

For the first test case,

The smallest number is 36 as the product of 4 and 9 is 36.

Hence, the answer is 49.

For the second test case:

The smallest number is 67 as the product of 4 and 9 is 42.

Hence, the answer is 67.

Input 2:

10

21

Output 2:

25

37

Constraints:

- 1 <= T <= 10
- 1 <= N <= 10^6.

34. Count Primes

Problem statement: Given an integer n, return the number of prime numbers that are strictly less than n.

Example 1:
Input: n = 10
Output: 4
Explanation: There are 4 prime numbers less than 10, they are 2, 3, 5, 7.

Example 2:
Input: n = 0
Output: 0

Constraints:
0<= n <= 5 * 10^6

35. Print the pattern

Problem statement: Print the same pattern for any given 'N' number of rows.

Note: There is only one space between the values of each column in a row.

For example, Pattern for 'N' = 5 will be.
1 2 3 4 5
11 12 13 14 15
21 22 23 24 25
16 17 18 19 20
6 7 8 9 10
Sample Input1 :
1
5
Sample Output2 :
1 2 3 4 5

11 12 13 14 15

21 22 23 24 25

16 17 18 19 20

6 7 8 9 10

Explanation of Sample Input 1:

For test case 1:

We print the given pattern for the given 5 rows where each row has different values in increasing order with a difference in the value of 1 between each element and 1 space between each column in a row.

Sample Input2 :

1

4

Sample Output2 :

1 2 3 4

9 10 11 12

13 14 15 16

5 6 7 8

Explanation of Sample Input 2:

For test case 1:

We print the given pattern for the given 4 rows where each row has different values in increasing order with a difference of 1 in the value of 1 between each element and 1 space between each column in a row.

36. Maximum Product of Word Lengths

Problem Statements: Given a string array words, return *the maximum value of* length(word[i]) * length(word[j]) *where the two words do not share common letters*. If no such two words exist, return 0.

Example 1:

Input: words = ["abcw","baz","foo","bar","xtfn","abcdef"]

Output: 16

Explanation: The two words can be "abcw", "xtfn".

Example 2:

Input: words = ["a","ab","abc","d","cd","bcd","abcd"]

Output: 4

Explanation: The two words can be "ab", "cd".

Constraints:

- 2 <= words.length <= 1000
- 1 <= words[i].length <= 1000
- words[i] consists only of lowercase English letters.

37. Different bits sum Pairwise

Problem Statement: We define f(X, Y) as the number of different corresponding bits in the binary representation of X and Y.
For example, f(2, 7) = 2, since the binary representation of 2 and 7 are 010 and 111, respectively. The first and the third bit differ, so f(2, 7) = 2.You are given an array of N positive integers, A1, A2,..., AN. Find sum of f(Ai, Aj) for all pairs (i, j) such that 1 ≤ i, j ≤ N. Return the answer modulo 109+7.

Example Input
Input 1:
A = [1, 3, 5]
Input 2:
A = [2, 3]

Example Output
Output 1:
8
Output 2:
2

38. Triplet Sum in Array

Problem Statement: Given an array arr of size n and an integer X. Find if there's a triplet in the array which sums up to the given integer X.

Example 1:
Input:
n = 6, X = 13
arr[] = [1 4 45 6 10 8]
Output:
1

Explanation:

The triplet {1, 4, 8} in the array sums up to 13.

Example 2:

Input:

n = 5, X = 10

arr[] = [1 2 4 3 6]

Output:

1

Explanation:

The triplet {1, 3, 6} in the array sums up to 10.

Constraints:

1 ≤ n ≤ 10^3

1 ≤ A[i] ≤ 10^5

39. Kth smallest element

Problem Statement: Given an array arr[] and an integer K where K is smaller than size of array, the task is to find the Kth smallest element in the given array. It is given that all array elements are distinct.

Note: l and r denote the starting and ending index of the array.

Example 1:

Input:

N = 6

arr[] = 7 10 4 3 20 15

K = 3

L=0 R=5

Output: 7

Explanation:

3rd smallest element in the given array is 7.

Example 2:

Input:

N = 5

arr[] = 7 10 4 20 15

K = 4 L=0 R=4

Output: 15

Explanation:

4th smallest element in the given array is 15.

Constraints:

1 <= N <= 10^5

L==0

R==N-1

1<= arr[i] <= 10^5

1 <= K <= N

40. Smallest Positive missing number

Problem Statement: You are given an array arr[] of N integers. The task is to find the smallest positive number missing from the array.

Example 1:

Input:

N = 5

arr[] = {1,2,3,4,5}

Output: 6

Explanation: Smallest positive missing number is 6.

Example 2:

Input:

N = 5

arr[] = {0,-10,1,3,-20}

Output: 2

Explanation: Smallest positive missing number is 2.

Constraints:

1 <= N <= 10^6

-10^6 <= arr[i] <= 10^6