Set : 2

Exercise No. : 1

Topics Covered : Basic Math, Array, Matrix, Bit Manipulation, Control Flow Statements, Recursion

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Level : Easy

Solve the following problems

1. **Arranging Coins**

Problem Statement :

You have n coins and you want to build a staircase with these coins. The staircase consists of k rows where the ith row has exactly i coins. The last row of the staircase may be incomplete.

Given the integer n, return the number of complete rows of the staircase you will build.

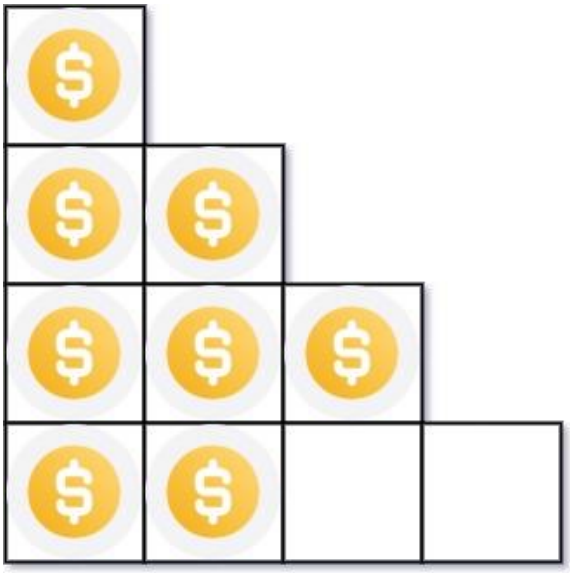
Example 1:

Input: n = 5

Output: 2

Explanation: Because the 3rd row is incomplete, we return 2.

Example 2:



Input: n = 8

Output: 3

Explanation: Because the 4th row is incomplete, we return 3.

Constraints:

1 <= n <= 2^31 – 1

2. Number Of Vehicles

Problem Statement : There is a person named Bob who is the mayor of a state. He wants to find the maximise number of vehicles that can be registered in his state.

A vehicle normally has a registration number like ST 01 AB 1234. Each registration number has four parts, separated by spaces. The first part has two letters common for all cars in the state. The next two-digit number is the number of the district where the car is registered within the state. It is always two digits and may have a leading zero. After that, the next part consists of two letters (AB), with each letter selected from a range, denoting the series and the last part is a 4-digit number this will always be four digits, even if it has leading zeros). The entire registration number is unique to each vehicle. You have been given the number of districts in the state, a range of letters to be used in the series and a set of digits that can be used for forming a vehicle registration number.

Your task is to find the maximum number of vehicles that can be registered in Bob's state.

Note :

1. No two vehicles can have the same registration number.
2. Two registration numbers are said to be different if they have at least a different character or a digit at the same location. For eg. DL 05 AC 1234 and DL 05 AC 1235 are different, DL 05 AC 1234 and DL 05 AB 1234 are different registration numbers.
3. All the cars will have the same first two characters as they have to be registered in the same state.
4. The numbering of the districts in the state starts from '1' (which will obviously be written as 01 in registration number).

The width of the district column will always be equal to 2.

Example

Sample Input 1 :

1

4

A C B D

5 4 3 4

Sample Output 1 :

21600

Explanation For Sample Input 1 :

There are 4 possibilities for district numbers(12,13,14 and 15) and each district has 3 possibilities for first alphabet of series(A, B, and C) and 3 possibilities for second alphabet of series(B, C and D), and now each series has 6 possibilities for first digit(from left) of the registration number(0,1,2,3,4,5), 5 possibilities for second digit(0,1,2,3,4), 4 possibilities for third digit(0,1,2,3) and 5 possibilities for the last digit(0,1,2,3,4). So overall the maximum number of distinct vehicle registration number possible are: 4*3*3*6*5*4*5 = 21600.

Sample Input 2 :

1

2

A B C D

2 3 2 3

Sample Output 2 :

1152

Explanation For Sample Input 2 :

There are 2 possibilities for district numbers(10, and 11) and each district has 2 possibilities for first alphabet of series(A, and B) and 2 possibilities for second alphabet of series(C and D), and now each series has 3 possibilities for first digit(from left) of the registration number(0,1,2), 4 possibilities for second digit(0,1,2,3), 3 possibilities for third digit(0,1,2) and 4 possibilities for the last digit(0,1,2,3). So overall the maximum number of distinct vehicle registration number possible are: 2*2*2*3*4*3*4 = 1152.

Constraints :

1 <= T <= 10^4

1 <= Number of districts < 10^2

A <= Range of alphabets <= Z

0 <= Range of digits <= 9

ALPHA1 <= ALPHA2 and ALPHA3 <= ALPHA4

3. Money In Bank

Problem statement : Harshit wants to save money for his first car. So, he puts money in the bank every day.

He starts by putting in '1' rupee on Monday, the first day. Every day from Tuesday to Sunday, he will put in '1' rupee more than the day before. On every subsequent Monday, he will put in '1' rupee more than the previous Monday.

You are given an integer 'N', your task is to return the total amount of money he will have in the bank at the end of the 'N'th day.

For example :

Given 'N' = 2

On Day 1 = 1

On Day 2 = 2

Total Amount = 1 + 2 = 3.

Therefore the answer is 3.

Sample Input 1 :

2

2

7

Sample Output 1 :

3

28

Explanation Of Sample Input 1 :

For first test case :

On Day 1 = 1

On Day 2 = 2

Total Amount = 1 + 2 = 3.

Therefore the answer is 3.

For Second Test case :

On Day 1 = 1

On Day 2 = 2

On Day 3 = 3

On Day 4 = 4

On Day 5 = 5

On Day 6 = 6

On Day 7 = 7

Total Amount = 1 + 2 + 3 + 4 + 5 + 6 + 7= 28.

Therefore the answer is 28.

Sample Input 2 :

2

8

9

Sample Output 2 :

30

33

4. Amicable Pair

Problem statement : You are given two integers ‘X’ and ‘Y’. Your task is to find if the given integers are an amicable pair.

A pair of numbers are called Amicable if the sum of the proper divisor of each number is equal to the other number. Print ‘True’ if the numbers form amicable pair otherwise print ‘False’

A positive proper divisor is a positive divisor of a number, excluding itself. For example, 1, 2, and 3 are positive proper divisors of 6, but 6 itself is not.

For **example:**

Let 'X' = 220 and 'Y' = 284 form an amicable pair as the sum of the proper divisor of one is equal to the other.

Sample Input 1:

2

4 8

220 284

Sample Output 1:

False

True

Explanation For Sample Input 1:

In test case 1:

Proper divisors of 4 are 1 and 2 with sum 3!=8.

Proper divisors of 8 are 1, 2, and 4 with sum 7!=4

Thus they are not amicable pairs.

In test case 2:

Proper divisors of X=220 are 1, 2, 4, 5, 10, 11, 20, 22, 44, 55 and 110.

The sum of these is 284 = Y.

Proper divisors of Y=284 are 1, 2, 4, 71, and 142.

The sum of these is 220 = X.

Thus they are amicable pairs.

Sample Input 2:

3

67095 71145

253 487

280 81

Sample Output 2:

True

False

False

Explanation For Sample Input 2:

67095 & 71145 are amicable pairs while 253 & 487 and 280 and 81 are not amicable numbers.

Constraints:

1 <= T <= 20

0 <= X,Y <=10^5

5. Nim Game

Problem Statement : You are playing the following Nim Game with your friend:
Initially, there is a heap of stones on the table.
You and your friend will alternate taking turns, and you go first.
On each turn, the person whose turn it is will remove 1 to 3 stones from the heap.
The one who removes the last stone is the winner.
Given n, the number of stones in the heap, return true if you can win the game assuming both you and your friend play optimally, otherwise return false.

Example 1:
Input: n = 4
Output: false
Explanation: These are the possible outcomes:
1. You remove 1 stone. Your friend removes 3 stones, including the last stone. Your friend wins.
2. You remove 2 stones. Your friend removes 2 stones, including the last stone. Your friend wins.
3. You remove 3 stones. Your friend removes the last stone. Your friend wins.
In all outcomes, your friend wins.

Example 2:
Input: n = 1
Output: true

Constraints:
1 <= n <= 2^31 – 1

6. Euler's Totient Function

Problem Statement : You are given an integer 'N'. Your task is to count the number of integers between 1 and 'N' both inclusive which are coprime to 'N'.
Note:
Two numbers are coprime if their greatest common divisor(GCD) is 1.
Here, 1 is considered to be coprime to any number.

For Example:

If the given integer is 9, then the answer would be 6 Because there are six numbers between 1 and 9 both inclusive which are coprime to 9 i.e 1, 2, 4, 5, 7, and 8.

Sample Input 1:

2

1

4

Sample Output 1:

1

2

Explanation for Sample 1:

For the first test case, there is only one number which is coprime to 1 i.e 1 itself. For the second test case, there are only two numbers between 1 and 4(both inclusive) which are coprime to 4 i.e 1 and 3.

Sample Input 2:

2

12

21

Sample Output 2:

4

12

Constraints:

1 <= T <= 100

1 <= N <= 10 ^ 9

7. Closest Number

Problem Statement : Given two integers N and M. The problem is to find the number closest to N and divisible by M. If there are more than one such number, then output the one having maximum absolute value.

Example 1:

Input:

N = 13 , M = 4

Output:

12

Explanation:

12 is the Closest Number to 13 which is divisible by 4.

Example 2:

Input:

N = -15 , M = 6

Output:

-18

Explanation:

-12 and -18 are both similarly close to -15 and divisible by 6. but -18 has the maximum absolute value. So, Output is -18

Constraints:

-10^5 <= N <= 10^5

8. Count Distinct Numbers on Board

Problem Statement : You are given a positive integer n, that is initially placed on a board. Every day, for 109 days, you perform the following procedure:

- For each number x present on the board, find all numbers 1 <= i <= n such that x % i == 1.
- Then, place those numbers on the board.

Return the number of distinct integers present on the board after 109 days have elapsed.

Note:

- Once a number is placed on the board, it will remain on it until the end.
- % stands for the modulo operation. For example, 14 % 3 is 2.

Example 1:

Input: n = 5

Output: 4

Explanation: Initially, 5 is present on the board.

The next day, 2 and 4 will be added since 5 % 2 == 1 and 5 % 4 == 1.

After that day, 3 will be added to the board because 4 % 3 == 1.

At the end of a billion days, the distinct numbers on the board will be 2, 3, 4, and 5.

Example 2:

Input: n = 3

Output: 2

Explanation:

Since 3 % 2 == 1, 2 will be added to the board.

After a billion days, the only two distinct numbers on the board are 2 and 3.

Constraints:

- 1 <= n <= 100

9. Sum of even & odd

Problem statement : Write a program to input an integer ***'n'*** and print the sum of all its even digits and the sum of all its odd digits separately.

Digits mean numbers, not places! That is, if the given integer is "132456", even digits are 2, 4, and 6, and odd digits are 1, 3, and 5.

Sample Input 1:

132456

Sample Output 1:

12 9

Explanation of sample input 1 :

The sum of even digits = 2 + 4 + 6 = 12

The sum of odd digits = 1 + 3 + 5 = 9

Sample Input 2:

552245

Sample Output 2:

8 15

Constraints

0<= 'n' <=10000

10. Find Quadrant of the coordinate point

Problem statement : Write a program to accept a coordinate point in an XY coordinate system and determine in which quadrant the coordinate point lies.
Print
"1st Quadrant": if +x,+y
"2nd Quadrant": if -x,+y
"3rd Quadrant": if -x,-y
"4th Quadrant": if +x,-y
"x axis": if x,0
"y axis": if 0,y
"Origin": if 0,0

Sample Input 1 :
5 100
Sample Output 1 :
1st Quadrant
Explanation of Sample Input 1:
Both x and y are positive so the point lies in 1st Quadrant.
Sample Input 2 :
0 -80
Sample Output 2 :
y axis
Explanation of Sample Input 2:
Since x is 0 the point lies in y-axis.
Sample Input 3 :
-2 40
Sample Output 3 :
2nd Quadrant
Explanation of Sample Input 3:
Since x is negative and y is positive the point lies in 2nd Quadrant.

11. Character pattern

Problem statement : You are required to print a character pattern with alphabets as shown below. Given an integer N, where N represents the number of rows in the pattern, print the pattern with characters aligned accordingly.

Pattern for N = 4

A
BC
CDE
DEFG

Sample Input 1:
5
Sample Output 1:
A
BC
CDE
DEFG
EFGHI
Sample Input 2:
6
Sample Output 2:
A
BC
CDE
DEFG
EFGHI
FGHIJK

Constraints

0<= N <= 13

12. Count characters

Problem statement : Write a program to count and print the total number of characters (lowercase english alphabets only), digits (0 to 9) and white spaces (single space, tab i.e. '\t' and newline i.e. '\n') entered till '$'.
That is, input will be a stream of characters and you need to consider all the characters which are entered till '$'.
Print count of characters, count of digits and count of white spaces respectively (separated by space).

Sample Input :
abc def4 5$

Sample Output :

6 2 2

Sample Output Explanation :

Number of characters : 6 (a, b, c, d, e, f)

Number of digits : 2 (4, 5)

Number of white spaces : 2 (one space after abc and one newline after 4)

13. Total Salary

Problem statement : Ram just got an offer letter from a reputable company. The company sent him an offer letter along with the salary bifurcation.
In that bifurcation, Total Salary was not mentioned but instead a 'basicSalary' and an upper case character representing grade was mentioned, depending on which the Total Salary is calculated.
Help Ram in calculating his total salary, where total salary is defined as:
'totalSalary' = 'basic' + 'hra' + 'da' + 'allowance' - 'pf'
The above terms are as follows:
'hra' = 20% of 'basic'
'da' = 50% of 'basic'
'allowance' = 1700 if grade = 'A'
'allowance' = 1500 if grade = 'B'
'allowance' = 1300 if grade = 'C' or any other character
'pf' = 11% of 'basic'.
Note :
Round off the 'totalSalary' and then print the integral part only.
'x.5' type values will always be round up, for example, 1.5, 2.5 will be round off to 2, 3 respectively.

Sample Input 1 :

2

10000 A

4567 B

Sample Output 1 :

17600

8762

Explanation for Sample Input 1:

Test Case 1:

We have been given the basic salary as Rs. 10000. We need to calculate the hra, da and pf.
Now when we calculate each of the, it turns out to be:
hra = 20% of Rs. 10000 = Rs. 2000
da = 50% od Rs. 10000 = Rs. 5000
pf = 11% of Rs. 10000 = Rs. 1100

Since, the grade is 'A', we take an allowance of Rs. 1700.
On substituting these values to the formula of totalSalary, we get Rs. 17600 and now rounding it off will result in Rs. 17600 and hence the Answer.

Test Case 2:

We have been given the basic salary as Rs. 4567. We need to calculate the hra, da and pf.
Now when we calculate each of the, it turns out to be:
hra = 20% of Rs. 4567 = Rs. 913.4
da = 50% od Rs. 4567 = Rs. 2283.5
pf = 11% of Rs. 4567 = Rs. 502.37
Since, the grade is 'B', we take an allowance of Rs. 1500.
On substituting these values to the formula of totalSalary, we get Rs. 8761.53 and now rounding it off will result in Rs. 8762 and hence the Answer.

Sample Input 2 :

2
1500 B
5000 C

Sample Output 2 :

3885
9250

Constraints :

0 <= 'basicSalary' <= 7 * (10 ^ 5)

14. Terms Of AP

Problem statement : Ayush is given a number 'X'. He has been told that he has to find the first 'X' terms of the series 3 * 'N' + 2, which are not multiples of 4. Help Ayush to find it as he has not been able to answer.

Example: Given an 'X' = 4. The output array/list which must be passed to Ayush will be [5, 11, 14, 17].

Sample Input 1:

2

2

5

Sample Output 1:

5 11

5 11 14 17 23

Explanation For Sample Input 1:

In the first test case, the first number is 5, while the second number cannot be 8 as it is divisible by 4, and so, the next number is directly 11 as it is not divisible by 4.

In the second test case, the first two numbers are 5 and 11. While following three numbers are 14, 17 and 23 for 'N' = 4, 5 and 7 respectively. 20 is divisible by 4, and thus, 20 cannot be included in the list.

Sample Input 2:

2

7

8

Sample Output 2:

5 11 14 17 23 26 29

5 11 14 17 23 26 29 35

Explanation For Sample Input 2:

In the first test case, the first five numbers are 5, 11, 14, 17 and 23. While the following two numbers are 26 and 29 for N = 8 and 9 respectively.

In the second test case, the seven numbers are explained in the above test case and for N = 10, we get the number 32, which is divisible by 4 and thus, we reject it. For N = 11, the number is 35 and is not divisible by 4.

Constraints:

1 <= T <= 10^2

1<= X <= 10^5

15. Distribute N candies among K people

Problem statement : Sanyam has 'N' candies, he wants to distribute that into 'K' of his friends. He made his 'K' friends stand in line, in increasing order of his likeness. Not being so smart he gives 1 candy to the first friend, 2 to the second

person, and so on till the kth person. In the next turn, the first person gets 'K + 1' candies, the second person gets 'K + 2' candies, and so on.

While distributing the candies, if at a turn, the number of candies to be given to a friend is less than the required candies, then that friend gets all the remaining candies and Sanyam stops the distribution.

Your task is to find the total number of candies every person has at the end.

Sample Input 1:

2

7 4

4 1

Sample Output 1:

1 2 3 1

4

Explanation For Sample Input1:

Test case 1:

Sanyam has 7 candies and 4 friends.

In the first turn, the first friend gets 1 candy, the second friend gets 2 candies and the third friend gets 3 candies. Now he has used up 6 candies and 1 candy is left. As per the condition, the fourth friend has to be given 4 candies, but there is only 1 left, hence he takes one only.

Test case 2:

As there is only one friend he will get the first candy, then the next two, and then the last one making the count 4.

Sample Input 2:

2

10 3

3 2

Sample Output 2:

5 2 3

1 2

Constraints:

1 <= T <= 50

1 <= N <= 10^9

16. Sort Integers by The Number of 1 Bits

Problem Statement: You are given an integer array arr. Sort the integers in the array in ascending order by the number of 1's in their binary representation and in case of two or more integers have the same number of 1's you have to sort them in ascending order. Return the array after sorting it.

Example 1:

Input: arr = [0,1,2,3,4,5,6,7,8]

Output: [0,1,2,4,8,3,5,6,7]

Explanation: [0] is the only integer with 0 bits.

[1,2,4,8] all have 1 bit.

[3,5,6] have 2 bits.

[7] has 3 bits.

The sorted array by bits is [0,1,2,4,8,3,5,6,7]

Example 2:

Input: arr = [1024,512,256,128,64,32,16,8,4,2,1]

Output: [1,2,4,8,16,32,64,128,256,512,1024]

Explanation: All integers have 1 bit in the binary representation, you should just sort them in ascending order.

Constraints:

- 1 <= arr.length <= 500
- 0 <= arr[i] <= 10^4

17. Complement of Base 10 Integer

Problem Statement: The **complement** of an integer is the integer you get when you flip all the 0's to 1's and all the 1's to 0's in its binary representation. Given an integer n, return its complement.

Example 1:

Input: n = 5

Output: 2

Explanation: 5 is "101" in binary, with complement "010" in binary, which is 2 in base-10.

Example 2:

Input: n = 7

Output: 0

Explanation: 7 is "111" in binary, with complement "000" in binary, which is 0 in base-10.

Constraints:

0 <= n < 10^9

18. Swap two nibbles in a byte

Problem Statement : Given a number N, swap the two nibbles in it and find the resulting number.

Example 1:

Input:

N = 100

Output:

70

Explanation:

100 in binary is 01100100, two nibbles are (0110) and (0100)

If we swap the two nibbles, we get 01000110 which is 70 in decimal.

Example 2:

Input:

N = 129

Output:

24

Explanation:

129 in binary is 10000001, two nibbles are (1000) and (0001)

If we swap the two nibbles, we get 00011000 which is 24 in decimal.

Constraints:

0 ≤ N ≤ 255

19. Number of Steps to Reduce a Number to Zero

Problem Statement: Given an integer num, return *the number of steps to reduce it to zero*. In one step, if the current number is even, you have to divide it by 2, otherwise, you have to subtract 1 from it.

Example 1:

Input: num = 14

Output: 6

Explanation:

Step 1) 14 is even; divide by 2 and obtain 7.

Step 2) 7 is odd; subtract 1 and obtain 6.

Step 3) 6 is even; divide by 2 and obtain 3.

Step 4) 3 is odd; subtract 1 and obtain 2.

Step 5) 2 is even; divide by 2 and obtain 1.

Step 6) 1 is odd; subtract 1 and obtain 0.

Example 2:

Input: num = 8

Output: 4

Constraints:

0 <= num <= 10^6

20. Sum of Values at Indices with K Set Bits

Problem statement: You are given a 0-indexed integer array nums and an integer k. Return an integer that denotes the sum of elements in nums whose corresponding indices have exactly k set bits in their binary representation. The set bits in an integer are the 1's present when it is written in binary.

Example 1:

Input: nums = [5,10,1,5,2], k = 1

Output: 13

Explanation: The binary representation of the indices are:

0 = 0002

1 = 0012

2 = 0102

3 = 0112

4 = 1002

Indices 1, 2, and 4 have k = 1 set bits in their binary representation.
Hence, the answer is nums [1] + nums[2] + nums[4] = 13.

Example 2:
Input: nums = [4,3,2,1], k = 2
Output: 1

Constraints:

- 1 <= nums.length <= 1000
- 1 <= nums[i] <= 10^5
- 0 <= k <= 10

21. Change all even bits in a number to 0

Problem Statement: Given a number N, change all bits at even positions to 0.

Example 1:
Input: N = 30
Output: 10
Explanation: Binary representation of 11110. Bits at Even positions are highlighted. After making all of them 0, we get 01010. Hence the answer is 10.

Example 2:
Input: N = 10
Output: 10
Explanation: Binary representation of 1010. Bits at Even positions are highlighted. After making all of them 0, we get 1010. Hence the answer is 10.

Constraints:

- 1<= N <=(32-bit number)

22. Copy Set Bits in Range

Problem Statement : Given two numbers X and Y, and a range [L, R] where 1 <= L <= R <= 32. You have to copy the set bits of 'Y' in the range L to R in 'X'. Return this modified X.

Example 1:

Input:

X = 44, Y = 3

L = 1, R = 5

Output:

47

Explanation:

Binary representation of 44 and 3 is 101100 and 000011. So in the range 1 to 5 there are two set bits of 3 (1st & 2nd position). If those are set in 44 it will become 101111 which is 47.

Example 2:

Input:

X = 16, Y = 2

L = 1, R = 3

Output: 18

Explanation: Binary representation of 16 and 2 is 10000 and 10. If the mentioned conditions are applied then 16 will become 10010 which is 18.

Constraints:

$1 \leq X, Y \leq 10^9$

$1 \leq L \leq R \leq 32$

23. Check set bits

Problem Statement: Given a number N. You have to check whether every bit in the binary representation of the given number is set or not.

Example 1:

Input:

N = 7

Output:

1

Explanation:

Binary for 7 is 111 all the bits are set so output is 1

Example 2:

Input:

N = 8

Output:

0

Explanation:

Binary for 8 is 1000 all the bits are not set so output is 0.

Constraints:

0<=N<=100000

24. Sum of two numbers without using arithmetic operators

Problem Statement: Given two integers a and b. Find the sum of two numbers without using arithmetic operators.

Example 1:

Input:

a = 5, b = 3

Output: 8

Explanation:

5 + 3 = 8

Example 2:

Input:

a = 10, b = 30

Output: 40

Explanation:

10 + 30 = 40

Constraints:

1<=a, b<=10^8

25. Minimum number of swaps required to sort an array

Problem statement : You have been given an array 'ARR' of 'N' distinct elements.

Your task is to find the minimum no. of swaps required to sort the array.

For **example:**

For the given input array [4, 3, 2, 1], the minimum no. of swaps required to sort the array is 2, i.e. swap index 0 with 3 and 1 with 2 to form the sorted array [1, 2, 3, 4].

Sample Input 1:

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

Sample Output 1:

2
2

Explanation of Sample Input 1:

For the first test case, swap index 0 with 3 i.e. 4 -> 1 and 1 with 2 i.e. 3 -> 2 to form the sorted array {1, 2, 3, 4}.
For the second test case, swap index 1 with 4 i.e. 5 -> 2 and 2 with 3 i.e. 4 -> 3 to form the sorted array {1, 2, 3, 4, 5}.

Sample Input 2:

2
4
1 2 3 4
6
3 5 2 4 6 8

Sample Output 2:

0
3

Constraints:

1 <= T <= 100
1 <= N <= 1000
0 <= ARR[i] <= 10 ^ 9

Where 'ARR[i]' is the value of the input array elements.

26. Find Closest Number to Zero

Problem statement : Given an integer array nums of size n, return the number with the value closest to 0 in nums. If there are multiple answers, return the number with the largest value.

Example 1:
Input: nums = [-4,-2,1,4,8]
Output: 1
Explanation:
The distance from -4 to 0 is |-4| = 4.
The distance from -2 to 0 is |-2| = 2.
The distance from 1 to 0 is |1| = 1.
The distance from 4 to 0 is |4| = 4.
The distance from 8 to 0 is |8| = 8.
Thus, the closest number to 0 in the array is 1.

Example 2:
Input: nums = [2,-1,1]
Output: 1
Explanation: 1 and -1 are both the closest numbers to 0, so 1 being larger is returned.

27. Running Sum of 1d Array

Problem Statement : Given an array nums. We define a running sum of an array as runningSum[i] = sum(nums[0]…nums[i]).
Return the running sum of nums.

Example 1:
Input: nums = [1,2,3,4]
Output: [1,3,6,10]
Explanation: Running sum is obtained as follows: [1, 1+2, 1+2+3, 1+2+3+4].

Example 2:
Input: nums = [1,1,1,1,1]
Output: [1,2,3,4,5]

Explanation: Running sum is obtained as follows: [1, 1+1, 1+1+1, 1+1+1+1, 1+1+1+1+1].

Constraints:

1 <= nums.length <= 1000
-10^6 <= nums[i] <= 10^6

28. Shuffle the Array

Problem Statement : Given the array nums consisting of 2n elements in the form [x1,x2,...,xn,y1,y2,...,yn].
Return the array in the form [x1,y1,x2,y2,...,xn,yn]

Example 1:
Input: nums = [2,5,1,3,4,7], n = 3
Output: [2,3,5,4,1,7]
Explanation: Since x1=2, x2=5, x3=1, y1=3, y2=4, y3=7 then the answer is [2,3,5,4,1,7].

Example 2:
Input: nums = [1,2,3,4,4,3,2,1], n = 4
Output: [1,4,2,3,3,2,4,1]
Example 3:
Input: nums = [1,1,2,2], n = 2
Output: [1,2,1,2]

Constraints:

- 1 <= n <= 500
- nums.length == 2n
- 1 <= nums[i] <= 10^3

29. Search In Infinite Sorted 0-1 Array

Problem statement : You are given an infinite array consisting of only ones and zeroes, in sorted order. You have to find the index of the first occurrence of 1.

Example:

If the array is 0 0 0 0 1 1 1 1… then, the first occurrence of 1 will be at index 4 therefore the answer here is 4.

Note:

As the array size is infinite, the actual array won't be given to you. Instead, you will be able to access the array elements by calling a method named 'get'.

get(i) : returns the value present at index I.

Indexing is 0-based.

Instead of representing an infinite array in the input, we give the index of the first occurrence of 1 in the input itself. However, this input will be completely hidden from the user.

It is guaranteed that the answer will fit in a 64-bit integer.

Sample Input 1:

10

Sample Output 1:

10

Sample Input 2:

1

Sample Output 2:

1

Constraints:

0 <= ARR[i] <= 1

30. Max Consecutive Ones

Problem statement : Given a binary array nums, return the maximum number of consecutive 1's in the array.

Example 1:

Input: nums = [1,1,0,1,1,1]

Output: 3

Explanation: The first two digits or the last three digits are consecutive 1s. The maximum number of consecutive 1s is 3.

Example 2:

Input: nums = [1,0,1,1,0,1]
Output: 2

Constraints:

1 <= nums.length <= 10^5
nums[i] is either 0 or 1.

31. Count the Digits That Divide a Number

Problem statement: Given an integer num, return the number of digits in num that divide num. An integer val divides nums if nums % val == 0.

Example 1:
Input: num = 7
Output: 1

Example 2:
Input: num = 121
Output: 2

Example 3:
Input: num = 1248
Output: 4
Explanation: 1248 is divisible by all of its digits, hence the answer is 4.

Constraints:

- 1 <= num <= 10^9
- num does not contain 0 as one of its digits.

32. Price Pattern

Problem statement : Alex observed the prices of a certain stock for some days. He found a n interesting pattern in the prices of the stock. Let P(i) be the price of the stock on the 'ith' day. He observed that
P(i) = P(i-1) + P(i-2) + P(i-1) * P(i-2)

You are given the stock prices on the first day and the second day. Your task is to determine the price of the stock on the 'Nth' day if the prices followed the same pattern.

Sample Input 1 :

1

1 7 3

Sample Output 1 :

15

Explanation For Sample Input 1 :

In the given test case, the price on day 1 is 1, and the price on day 2 is 7. We can calculate the price on day 3 using these two values. Price on day 3 will be 1 + 7 + (1*7) = 15.

Sample Input 2 :

1

1 3 4

Sample Output 2 :

31

Explanation For Sample Input 2 :

In the given test case, the price on day 1 is 1, and the price on day 2 is 3. We can calculate the price on day 3 using these two values. Price on day 3 will be 1 + 3 + (1*3) = 7. Similarly, price on day 4 will be 3 + 7 + (3*7) = 31.

33. Replace character

Problem statement

Given an input string S and two characters c1 and c2, you need to replace every occurrence of character c1 with character c2 in the given string.

Sample Input :

abacd

a x

Sample Output :

Xbxcd

Constraints :

1 <= Length of String S <= 10^6

34. Repeat Triangle

Problem statement : Sara wants to build a triangle pattern for English alphabets for a given integer input.

Example, for 'N' = 4

Pattern:

ABCDDCBA
ABCCBA
ABBA
AA

Sample Input 1:

2
4
1

Sample Output 1:

ABCDDCBA
ABCCBA
ABBA
AA
AA

Explanation of Sample Input 1:

Test case 1:

In the first test case of sample input 1, we need to print a triangle-like pattern wherein each line, the number of alphabets will be decreasing from both sides till the last row.

Sample Input 2:

1
2

Sample Output 2:

BAAB
AA

Explanation of Sample Input 2:

Test case 1:

In this test case, as 'N' is equal to 2, we consider the first two alphabets and then make the triangle-like pattern

35. Number Complement

Problem Statement: The complement of an integer is the integer you get when you flip all the 0's to 1's and all the 1's to 0's in its binary representation. Given an integer num, return its complement.

Example 1:
Input: num = 5
Output: 2
Explanation: The binary representation of 5 is 101 (no leading zero bits), and its complement is 010. So you need to output 2.

Example 2:
Input: num = 1
Output: 0
Explanation: The binary representation of 1 is 1 (no leading zero bits), and its complement is 0. So you need to output 0.

Constraints:

- 1 <= num < 2^31

36. Binary Gap

Problem Statement: Given a positive integer n, find and return the **longest distance** between any two **adjacent** 1's in the binary representation of n. If there are no two adjacent 1's, return 0.Two 1's are **adjacent** if there are only 0's separating them (possibly no 0's). The **distance** between two 1's is the absolute difference between their bit positions. For example, the two 1's in "1001" have a distance of 3.

Example 1:
Input: n = 22
Output: 2

Explanation: 22 in binary is "10110".
The first adjacent pair of 1's is "10110" with a distance of 2.
The second adjacent pair of 1's is "10110" with a distance of 1.
The answer is the largest of these two distances, which is 2.
Note that "10110" is not a valid pair since there is a 1 separating the two 1's underlined.

Example 2:
Input: n = 8
Output: 0
Explanation: 8 in binary is "1000".
There are not any adjacent pairs of 1's in the binary representation of 8, so we return 0.

Constraints:
1 <= n <= 10^9

37. Change all even bits in a number to 0

Problem Statement: Given a number N, change all bits at even positions to 0.

Example 1:
Input: N = 30
Output: 10
Explanation: Binary representation of 11110. Bits at Even positions are highlighted. After making all of them 0, we get 01010. Hence the answer is 10.

Example 2:
Input: N = 10
Output: 10
Explanation: Binary representation of 1010. Bits at Even positions are highlighted. After making all of them 0, we get 1010. Hence the answer is 10.

Constraints:
1<= N <=(32-bit number)

38. Monotonic Array

Problem statement : An array is monotonic if it is either monotone increasing or monotone decreasing. An array nums is monotone increasing if for all i <= j, nums[i] <= nums[j]. An array nums is monotone decreasing if for all i <= j, nums[i] >= nums[j].
Given an integer array nums, return true if the given array is monotonic, or false otherwise.

Example 1:
Input: nums = [1,2,2,3]
Output: true

Example 2:
Input: nums = [6,5,4,4]
Output: true

Constraints:

$1 <= nums.length <= 10^5$
$-10^5 <= nums[i] <= 10^5$

39. Find Numbers with Even Number of Digits

Problem statement : Given an array nums of integers, return how many of them contain an even number of digits.

Example 1:
Input: nums = [12,345,2,6,7896]
Output: 2
Explanation:
12 contains 2 digits (even number of digits).
345 contains 3 digits (odd number of digits).
2 contains 1 digit (odd number of digits).
6 contains 1 digit (odd number of digits).
7896 contains 4 digits (even number of digits).
Therefore only 12 and 7896 contain an even number of digits.

Example 2:

Input: nums = [555,901,482,1771]

Output: 1

Explanation: Only 1771 contains an even number of digits.

Constraints:

1 <= nums.length <= 500

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

40. Search insert position

Problem statement : You are given a sorted array ***'arr'*** of distinct values and a target value ***'m'***. You need to search for the index of the target value in the array.

Note:

If the value is present in the array, return its index.

If the value is absent, determine the index where it would be inserted in the array while maintaining the sorted order.

Example:

Input: arr = [1, 2, 4, 7], m = 6

Output: 3

Explanation: If the given array 'arr' is: [1, 2, 4, 7] and m = 6. We insert m = 6 in the array and get 'arr' as: [1, 2, 4, 6, 7]. The position of 6 is 3 (according to 0-based indexing)

Note:

1) The given array has distinct integers.

2) The given array may be empty.

Sample Input 1:

4 9

1 2 4 7

Sample Output 1:

4

Explanation of Input 1:

The given array 'arr' is: [1, 2, 4, 7] and m = 9. We insert m = 9 in the array and get 'arr' as: [1, 2, 4, 7, 9]. The position of 9 is 4 (according to 0-based indexing).

Sample Input 2:

3 1

2 5 7

Sample Output 2

0

Explanation of Input 2:

The given array 'arr' is: [2, 5, 7] and m = 1. We insert m = 1 in the array and get 'arr' as: [1, 2, 5, 7]. The position of 1 is 0 (according to 0-based indexing)

Constraints:

$0 \leq n \leq 10 \wedge 5$

$1 \leq m \leq 10 \wedge 9$

$1 \leq arr[i] \leq 10 \wedge 9$

Where 'arr[i]' is the array element at index 'i'.