

AGENDA

- Basics - Bitwise AND, OR, XOR, NOT, Left/Right Shift
- How to set / unset / toggle the n-th bit in a number?
- Check if a number is a power of 2.
- Count set bits in a number.
- Count set bits in all numbers from 1 to N.
- Single Number
- Single Number: follow-up

Check if a number is a Power of 2

Given a non-negative integer **n**. You have to check if it is a power of **2** or not.

Examples

Input: $n = 8$

Output: true

Explanation: 8 is equal to 2 raised to 3 ($2^3 = 8$).

Input: $n = 98$

Output: false

Explanation: 98 cannot be obtained by any power of 2.

Input: $n = 1$

Output: true

Explanation: ($2^0 = 1$).

Constraints:

$$0 \leq n < 10^9$$

Count Set Bits in a Number

Given a positive integer **n**. Your task is to return the **count** of set bits.

Examples:

Input: $n = 6$

Output: 2

Explanation: Binary representation is '110', so the count of the set bit is 2.

Input: $n = 8$

Output: 1

Explanation: Binary representation is '1000', so the count of the set bit is 1.

Input: $n = 3$

Output: 2

Constraints:

$$1 \leq n \leq 10^9$$

Count set bits in all numbers from 1 to N

You are given a number **n**. Find the total count of set bits for all numbers from 1 to n (both inclusive).

Examples :

Input: n = 4

Output: 5

Explanation: For numbers from 1 to 4. for 1: 0 0 1 => 1 set bit, for 2: 0 1 0 => 1 set bit, for 3: 0 1 1 => 2 set bits, for 4: 1 0 0 => 1 set bit. Therefore, the total set bits are 5.

Input: n = 17

Output: 35

Explanation: From numbers 1 to 17(both inclusive), the total number of set bits are 35.

Constraints:

$$1 \leq n \leq 10^8$$

Single Number

Given a **unsorted** array **arr[]** of positive integers having all the numbers occurring exactly **twice**, except for one number which will occur only **once**. Find the number occurring only once.

Examples :

Input: arr[] = [1, 2, 1, 5, 5]

Output: 2

Explanation: Since 2 occurs once, while other numbers occur twice, 2 is the answer.

Input: arr[] = [2, 30, 2, 15, 20, 30, 15]

Output: 20

Explanation: Since 20 occurs once, while other numbers occur twice, 20 is the answer.

Constraints

$1 \leq \text{arr.size()} \leq 10^6$

$0 \leq \text{arr}[i] \leq 10^9$

Single Number - Follow-up

Given an array of integers **arr[]** where, every element **appears thrice** except for one which **occurs once**.

Find that element which **occurs once**.

Examples:

Input: arr[] = [1, 10, 1, 1]

Output: 10

Explanation: 10 occurs once in the array while the other element 1 occurs thrice.

Input: arr[] = [3, 2, 1, 34, 34, 1, 2, 34, 2, 1]

Output: 3

Explanation: All elements except 3 occurs thrice in the array.

Constraints:

$$1 \leq \text{arr.size()} \leq 10^5$$

$$\text{arr.size()} \% 3 = 1$$

$$-10^9 \leq \text{arr}[i] \leq 10^9$$