

Single Number (easy)

We'll cover the following ^

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Problem Statement

In a non-empty array of integers, every number appears twice except for one, find that single number.

Example 1:


```
Input: 1, 4, 2, 1, 3, 2, 3
Output: 4
```


Example 2:


```
Input: 7, 9, 7
Output: 9
```


Try it yourself

Try solving this question here:

 Java

 Python3

 JS


 C++

```
1 def find_single_number(arr):
2     # TODO: Write your code here
3     return -1
4
5 def main():
6     arr = [1, 4, 2, 1, 3, 2, 3]
7     print(find_single_number(arr))
8
9 main()
```

Run

Save

Reset



Solution

One straight forward solution can be to use a **HashMap** kind of data structure and iterate through the input:

- If number is already present in **HashMap**, remove it.
- If number is not present in **HashMap**, add it.
- In the end, only number left in the **HashMap** is our required single number.

Time and space complexity Time Complexity of the above solution will be $O(n)$ and space complexity will also be $O(n)$.

Can we do better than this using the **XOR Pattern**?

Solution with XOR

Recall the following two properties of XOR:

- It returns zero if we take XOR of two same numbers.
- It returns the same number if we XOR with zero.

So we can XOR all the numbers in the input; duplicate numbers will zero out each other and we will be left with the single number.

Code

Here is what our algorithm will look like:

Java Python3 C++ JS

```
1 def find_single_number(arr):
2     num = 0
3     for i in arr:
4         num ^= i
5     return num
6
7 def main():
8     arr = [1, 4, 2, 1, 3, 2, 3]
9     print(find_single_number(arr))
10
11 main()
```

Run Save Reset

Time Complexity: Time complexity of this solution is $O(n)$ as we iterate through all numbers of the input once.

Space Complexity: The algorithm runs in constant space $O(1)$.

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Introduction

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Two Single Numbers (medium)

✓ Completed

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