

Find Missing and Repeating Number

We are given an array of size n containing numbers from 1 to n . In the array, one number is missing and one number is repeated. We need to find both of them. **Mathematical Approach:** 1. The expected sum of first n natural numbers = $n(n+1)/2$. 2. The expected sum of squares of first n natural numbers = $n(n+1)(2n+1)/6$. 3. Calculate the actual sum and sum of squares from the array. 4. Let: - $val1 = (\text{sum of array}) - (\text{expected sum}) = \text{Repeating} - \text{Missing}$ - $val2 = (\text{sum of squares of array}) - (\text{expected sum of squares}) = \text{Repeating}^2 - \text{Missing}^2$ Since $val2 = (\text{Repeating} - \text{Missing})(\text{Repeating} + \text{Missing})$, we can divide $val2 / val1$ to get $(\text{Repeating} + \text{Missing})$. 5. Using these two equations, solve for Repeating and Missing. **Time Complexity:** $O(n)$ **Space Complexity:** $O(1)$

Python Code:

```
class Solution:
    def findTwoElement(self, arr):
        n = len(arr)
        sn = (n * (n + 1)) // 2
        s2n = (n * (n + 1) * (2 * n + 1)) // 6
        s = 0
        s2 = 0

        for i in range(n):
            s += arr[i]
            s2 += arr[i] * arr[i]

        val1 = s - sn
        val2 = s2 - s2n
        val2 = val2 // val1

        repeating = (val1 + val2) // 2
        missing = repeating - val1

        return [repeating, missing]
```