

# Two Sum Problem - Python Solutions

Problem: Given an array of integers `nums` and an integer `target`, determine if there are two numbers such that they add up to `target`.

## 1. HashMap / Set Approach

```
class Solution:
    def twoSum(self, arr, target):
        seen = set()
        for num in arr:
            if target - num in seen:
                return True
            seen.add(num)
        return False
```

✓ Time Complexity:  $O(n)$

✓ Space Complexity:  $O(n)$

## 2. Two-Pointer Approach (After Sorting)

```
class Solution:
    def twoSum(self, arr, target):
        n = len(arr)
        arr.sort()
        i, j = 0, n - 1
        while i < j:
            if arr[i] + arr[j] > target:
                j -= 1
            elif arr[i] + arr[j] < target:
                i += 1
            else:
                return True
        return False
```

✓ Time Complexity:  $O(n \log n)$  (due to sorting)

✓ Space Complexity:  $O(1)$