015. 3Sum

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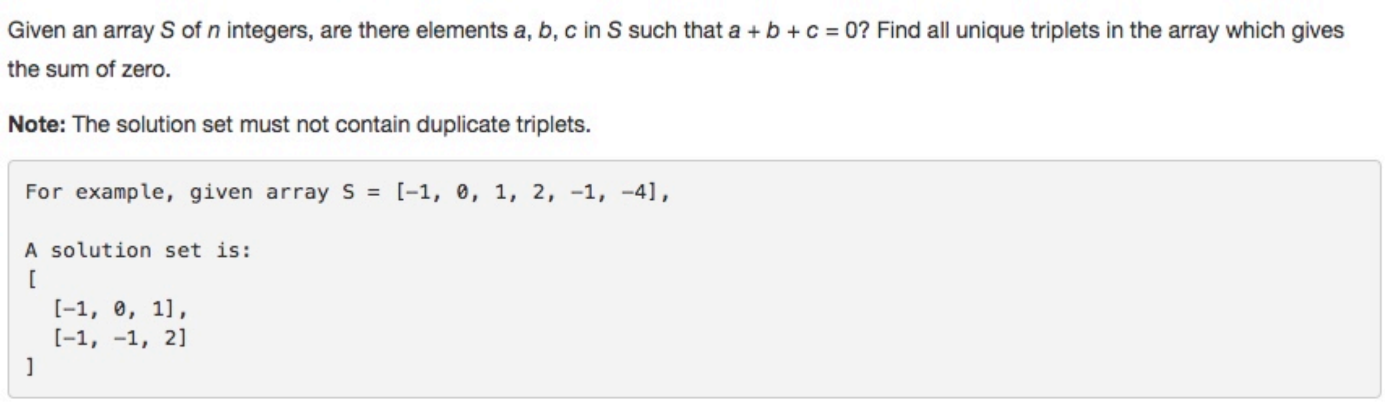
- **Two Pointers**

Description



Given an array *S* of *n* integers, are there elements *a*, *b*, *c* in *S* such that *a* + *b* + *c* = 0? Find all unique triplets in the array which gives the sum of zero.

Note: The solution set must not contain duplicate triplets.

```
For example, given array S = [-1, 0, 1, 2, -1, -4],

A solution set is:
[
  [-1, 0, 1],
  [-1, -1, 2]
]
```

Two Pointers with optimization

```
class Solution {
public:
    vector<vector<int>> threeSum(vector<int>& nums) {
        vector<vector<int>> result;
        if (nums.size()<3) return result;

        int N = nums.size();
        sort(nums.begin(),nums.end());

        for (int i=0; i<=N-3; ++i){
            if (i>0 && nums[i]==nums[i-1]) continue;
            if (nums[i]+nums[N-1]+nums[N-2]<0) continue;
            if (nums[i]+nums[i+1]+nums[i+2]>0) break;

            int front = i+1, tail = N-1;
            while (front<tail){
                if (nums[i] + nums[front] + nums[tail] == 0) {
                    result.push_back({nums[i], nums[front], nums[tail]});
                    while (front+1 < tail && nums[front] == nums[front+1])
                      ++front;
                    while (tail-1 >front && nums[tail] == nums[tail-1])
                      --tail;
                    ++front, --tail;
                }else if(nums[i] + nums[front] + nums[tail] < 0) ++front;
                else --tail;
            }
        }
        return result;
    }
};
```