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# Grokking the Coding Interview: Patterns for Coding Questions

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Solution Review: Problem

## Triplet Sum to Zero (medium)

We'll cover the following ^

- Problem Statement
- Try it yourself
- Solution
  - Code
  - Time complexity
  - Space complexity

### Problem Statement #

Given an array of unsorted numbers, find all **unique triplets in it that add up to zero**.

#### Example 1:

Input: [-3, 0, 1, 2, -1, 1, -2]

Output: [-3, 1, 2], [-2, 0, 2], [-2, 1, 1], [-1, 0, 1]

Explanation: There are four unique triplets whose sum is equal to zero.

#### Example 2:

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Solution Review: Problem

Input: [-5, 2, -1, -2, 3]

Output: [[-5, 2, 3], [-2, -1, 3]]

Explanation: There are two unique triplets whose sum is equal to zero.



## Try it yourself #

Try solving this question here:

Java

Python3

JS

C++

```
5 while(left < right){
6     int sum = arr[left] + arr[right];
7     if(sum == target){
8         triplets.add(Arrays.asList(-target, arr[left], arr[right]));
9         left++;
10        right--;
11        while(left < right && arr[left] == arr[left-1]){
12            left++;
13        }
14        while(left < right && arr[right] == arr[right+1]){
15            right--;
16        }
17    }
18    else if(sum > target){
19        right--;
20    }
21    else{
22        left++;
23    }
24 }
25 }
26 public static List<List<Integer>> searchTriplets(
27     List<List<Integer>> triplets = new ArrayList<>()
28     Arrays.sort(arr);
29     for(int i=0; i<arr.length-2; i++){
30         if(i>0 && arr[i-1] == arr[i]){
31             continue;
32         }
33         searchPair(arr, triplets, -arr[i], i+1);
```



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Solution Review: Problem

```
34     }
35     // TODO: Write your code here
```

Test

Save \*

Reset



Show Results

Show Console



2 of 2 Tests Passed

Result	Input	Expected Output	Actual Output	Reason
✓	searchTriplets([-3, 0, 1, 2, -1, 1, -2])	[[-3, 1, 2], [-2, 1, 1], [-2, 0, 2], [-1 ...	[[-3, 1, 2], [-2, 0, 2], [-2, 1, 1], [-1 ...	Succeeded
✓	searchTriplets([-5, 2, -1, -2, 3])	[[-2, -1, 3], [-5, 2, 3]]	[[-5, 2, 3], [-2, -1, 3]]	Succeeded

10.960s

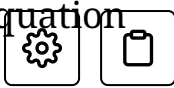
## Solution #

This problem follows the **Two Pointers** pattern and shares similarities with Pair with Target Sum

(<https://www.educative.io/collection/page/5668639101419520/5671464854355968/6618310940557312/>). A couple of differences are that the input array is not sorted and instead of a pair we need to find triplets with a target sum of zero.

To follow a similar approach, first, we will sort the array and then iterate through it taking one number at a time. Let's say during our iteration we are at number 'X', so we need to find 'Y' and 'Z' such that  $X + Y + Z == 0$ . At this stage, our problem

translates into finding a pair whose sum is equal to “ $-X$ ” (as from the above equation  $Y + Z == -X$ ).



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Solution Review: Problem

Another difference from Pair with Target Sum

(<https://www.educative.io/collection/page/5668639101419520/5671464854355968/6618310940557312/>) is that we need to find all the unique triplets. To handle this, we have to skip any duplicate number. Since we will be sorting the array, so all the duplicate numbers will be next to each other and are easier to skip.

Code #

Here is what our algorithm will look like:

Java

Python3

C++

JS

```
1 import java.util.*;
2
3 class TripletSumToZero {
4
5     public static List<List<Integer>> searchTriplets(
6         Arrays.sort(arr);
7         List<List<Integer>> triplets = new ArrayList<>();
8         for (int i = 0; i < arr.length - 2; i++) {
9             if (i > 0 && arr[i] == arr[i - 1]) // skip s
10                continue;
11                searchPair(arr, -arr[i], i + 1, triplets);
12            }
13
14            return triplets;
15        }
16
17        private static void searchPair(int[] arr, int tar
18            int right = arr.length - 1;
19            while (left < right) {
20                int currentSum = arr[left] + arr[right];
21                if (currentSum == targetSum) { // found the t
22                    triplets.add(Arrays.asList(-targetSum, arr[
```



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Solution Review: Problem

```
22     triplets.add(Arrays.asList(targetSum, arr[
23         left++;
24         right--;
25         while (left < right && arr[left] == arr[le
26             left++; // skip same element to avoid dup
27             while (left < right && arr[right] == arr[ri
28                 right--; // skip same element to avoid du
29         } else if (targetSum > currentSum)
30             left++; // we need a pair with a bigger sum
31     } else
```

Run

Save

Reset



## Time complexity #

Sorting the array will take  $O(N * \log N)$ . The `searchPair()` function will take  $O(N)$ . As we are calling `searchPair()` for every number in the input array, this means that overall `searchTriplets()` will take  $O(N * \log N + N^2)$ , which is asymptotically equivalent to  $O(N^2)$ .

## Space complexity #

Ignoring the space required for the output array, the space complexity of the above algorithm will be  $O(N)$  which is required for sorting.

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Squaring a Sorted Array (easy)

Triplet Sum Close to Target (medium)

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Solution Review: Problem

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