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Sub: Algorithm Analysis and Design

Practical 1

(1) There are 2 chefs, namely chef 1 and chef 2 in the MasterChef competition. The judge is going to judge on the basis of 3 categories: presentation, taste and hygiene to prepare the dishes. The marking is scaling from 1 to 100. The rating for chef 1 challenge is the triplet a = (a[0], a[1], a[2]), and the rating for Chef 2 challenge is the triplet b = (b[0], b[1], b[2]), where 0 index is presentation, 1 index is taste and 2 index is hygiene.
The task is to find their comparison points by comparing a[0] with b[0], a[1] with b[1], and a[2] with b[2].

- If a[i] > b[i], then Chef 1 is awarded 1 point.
- If a[i] < b[i], then Chef 2 is awarded 1 point.
- If a[i] = b[i], then neither person receives a point.

Comparison points are the total points a person earned.
Given a and b, determine their respective comparison points.
Design the algorithm for the same and implement using the programming language of your choice. Make comparative analysis for various use cases & input size.

Sample Input 1

27 48 70
89 26 7

Sample Output 1

2 1

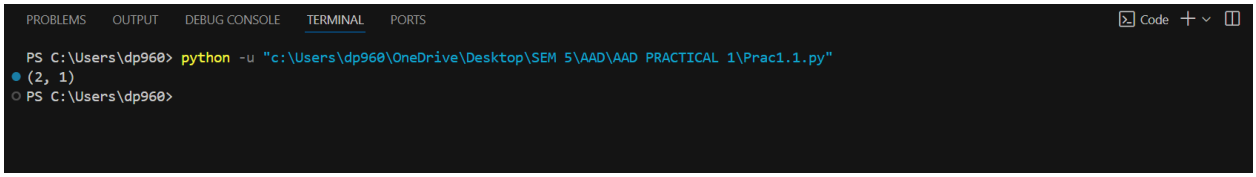
Explanation 1

Comparing the 0th elements, 27<89 so Chef 2 receives a point.
Comparing the 1st and 2nd elements, 48>26 and 70>7 so Chef 1 receives two points.
The return array is [2,1].
Input:

```
def compare_chefs(a, b):
    chef1_points = 0
    chef2_points = 0

    for i in range(3):
        if a[i] > b[i]:
            chef1_points += 1
        elif a[i] < b[i]:
            chef2_points += 1
```

```
    return chef1_points, chef2_points


a = [27, 48, 70]
b = [89, 26, 7]

result = compare_chefs(a, b)
print(result)
```

Output:



(2) Let us suppose that you are having an array containing both positive and negative numbers. Given the numbers you are supposed to find 2 such elements such that the sum of those numbers is closest to zero.

Sample Input 1
15, 5, -20, 30, -45

Sample Output 1
15, -20

Explanation 1
In all the comparison, the sum of 15 and -20 is smallest amount among all other comparison.

Sample Input 2
15, 5, -20, 30, 25

Sample Output 2
15, -20 & -20, 25

Explanation 2
In all the comparison, the sum of 15,-20 & -20, 25 is smallest amount among all other comparison.

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Input:def find_closest_to_zero(arr):

```
    arr.sort()
    n = len(arr)
    left = 0
    right = n - 1
    closest_sum = float('inf')
    closest_pair = (arr[left], arr[right])

    while left < right:
        current_sum = arr[left] + arr[right]


        if abs(current_sum) < abs(closest_sum):
            closest_sum = current_sum
            closest_pair = (arr[left], arr[right])

        if current_sum < 0:
            left += 1
        else:
            right -= 1

    return closest_pair

arr1 = [15, 5, -20, 30, -45]
arr2 = [15, 5, -20, 30, 25]

print(find_closest_to_zero(arr1))
print(find_closest_to_zero(arr2))
```

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Output: