

**Problem 6:** Given an array of numbers, you need to return the count of reverse pairs. **Reverse Pairs** are those pairs where  $i < j$  and  $arr[i] > 2 * arr[j]$ .

What is an inversion of an array? Definition: for all  $i \& j < \text{size of array}$ , if  $i < j$  then you have to find pair  $(A[i], A[j])$  such that  $A[j] < A[i]$ .

```
def mergeSortAndCount(arr, start, end):  
    if start == end:  
        return 0  
  
    mid = (start + end) // 2  
    countLeft = mergeSortAndCount(arr, start, mid)  
    countRight = mergeSortAndCount(arr, mid + 1, end)  
  
    countPairs = 0  
    i = start  
    j = mid + 1  
  
    while i <= mid and j <= end:  
        if arr[i] > 2 * arr[j]:  
            countPairs += (mid - i + 1)  
            j += 1  
        else:  
            i += 1  
  
    merged = []  
    i = start  
    j = mid + 1  
  
    while i <= mid and j <= end:  
        if arr[i] <= arr[j]:
```

```

        merged.append(arr[i])
        i += 1
    else:
        merged.append(arr[j])
        j += 1

while i <= mid:
    merged.append(arr[i])
    i += 1

while j <= end:
    merged.append(arr[j])
    j += 1

arr[start:end + 1] = merged

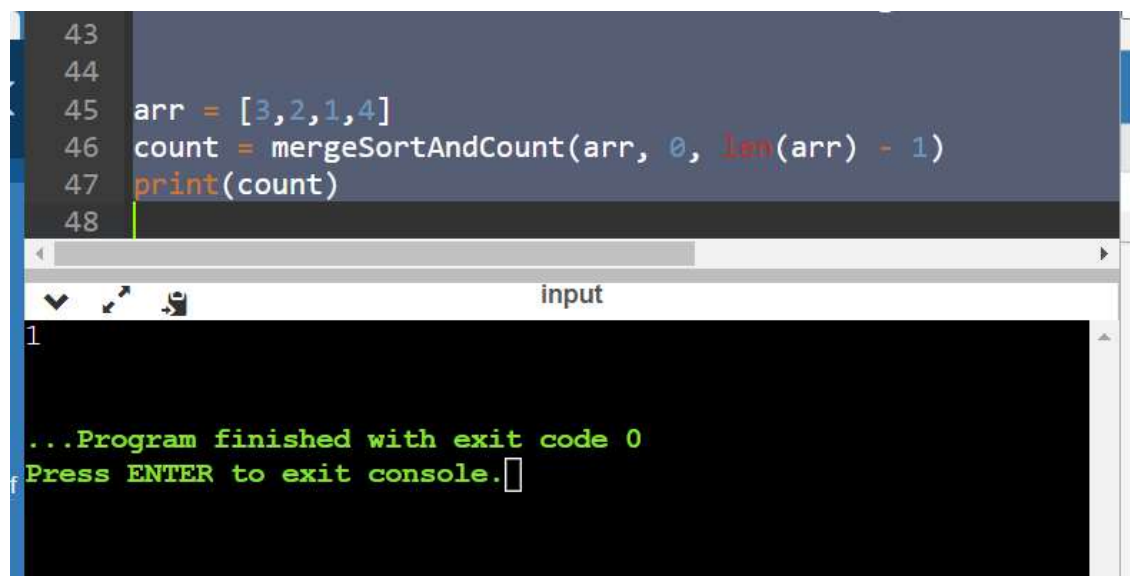
return countPairs + countLeft + countRight

```

```

arr = [3,2,1,4]
count = mergeSortAndCount(arr, 0, len(arr) - 1)
print(count)

```



The screenshot shows a code editor with the following Python code:

```

43
44
45 arr = [3,2,1,4]
46 count = mergeSortAndCount(arr, 0, len(arr) - 1)
47 print(count)
48

```

Below the code editor is a console window titled "input". The console output shows the number "1" on the first line, followed by a blank line, and then the message "...Program finished with exit code 0" and "Press ENTER to exit console." on the next line.