

Programiz Python Online Compiler

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main.py

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```
1 arr = [2, 4, 6, 8, 10, 12, 14, 18]
2 min_val = arr[0]
3 max_val = arr[-1]
4 print(f"Min = {min_val}, Max = {max_val}")
5
```

Output

Clear

```
Min = 2, Max = 18
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```

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```
1 def merge_sort(arr):
2     if len(arr) > 1:
3         mid = len(arr) // 2
4         L = arr[:mid]
5         R = arr[mid:]
6         merge_sort(L)
7         merge_sort(R)
8         i = j = k = 0
9         while i < len(L) and j < len(R):
10             if L[i] < R[j]:
11                 arr[k] = L[i]
12                 i += 1
13             else:
14                 arr[k] = R[j]
15                 j += 1
16             k += 1
17         while i < len(L):
18             arr[k] = L[i]
19             i += 1
20             k += 1
21         while j < len(R):
22             arr[k] = R[j]
23             j += 1
24             k += 1
25     return arr
26 arr1 = [31, 23, 35, 27, 11, 21, 15, 28]
27 arr2 = [22, 34, 25, 36, 43, 67, 52, 13, 65, 17]
28 print("Sorted Array 1:", merge_sort(arr1))
29 print("Sorted Array 2:", merge_sort(arr2))
30
```

Sorted Array 1: [11, 15, 21, 23, 27, 28, 31, 35]
Sorted Array 2: [13, 17, 22, 25, 34, 36, 43, 52, 65, 67]

=== Code Execution Successful ===

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```
1 def partition(arr, low, high):
2     pivot = arr[low]
3     i = low + 1
4     j = high
5     while True:
6         while i <= j and arr[i] <= pivot:
7             i += 1
8         while i <= j and arr[j] > pivot:
9             j -= 1
10        if i <= j:
11            arr[i], arr[j] = arr[j], arr[i]
12        else:
13            break
14    arr[low], arr[j] = arr[j], arr[low]
15    return j
16 def quick_sort(arr, low, high):
17     if low < high:
18         pi = partition(arr, low, high)
19         quick_sort(arr, low, pi - 1)
20         quick_sort(arr, pi + 1, high)
21 arr = [10, 16, 8, 12, 15, 6, 3, 9, 5]
22 n = len(arr)
23 quick_sort(arr, 0, n - 1)
```

Sorted Array: [3, 5, 6, 8, 9, 10, 12, 15, 16]

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```
1 def quick_sort(arr):
2     if len(arr) <= 1:
3         return arr
4     pivot = arr[len(arr) // 2]
5     left = [x for x in arr if x < pivot]
6     middle = [x for x in arr if x == pivot]
7     right = [x for x in arr if x > pivot]
8     return quick_sort(left) + middle + quick_sort(right)
9 arr = [19, 72, 35, 46, 58, 91, 22, 31]
10 sorted_array = quick_sort(arr)
11 print("Sorted Array:", sorted_array)
12
```

Sorted Array: [19, 22, 31, 35, 46, 58, 72, 91]

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```
1 def binary_search(arr, x):
2     low = 0
3     high = len(arr) - 1
4     mid = 0
5     count = 0
6     while low <= high:
7         mid = (high + low) // 2
8         count += 1
9         if arr[mid] < x:
10             low = mid + 1
11         elif arr[mid] > x:
12             high = mid - 1
13         else:
14             return mid, count
15     return -1, count
16 arr = [5, 10, 15, 20, 25, 30, 35, 40, 45]
17 x = 20
18 result, comparisons = binary_search(arr, x)
19 print("Element found at index:", result)
20 print("Number of comparisons made:", comparisons)
21
```

Element found at index: 3
Number of comparisons made: 4

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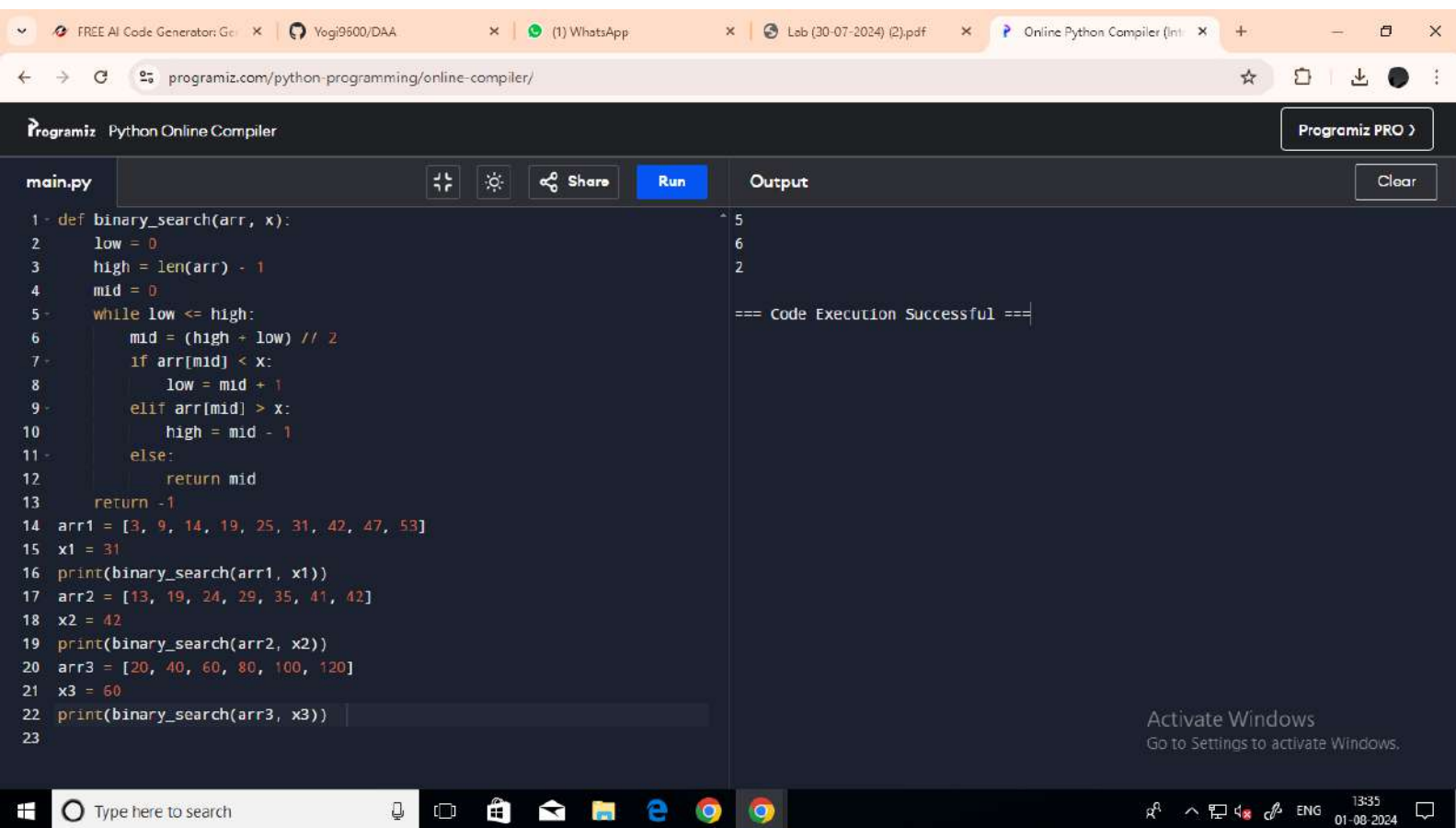
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```
1 from collections import Counter
2 def fourSumCount(A, B, C, D):
3     AB_sum = Counter(a + b for a in A for b in B)
4     count = 0
5     for c in C:
6         for d in D:
7             count += AB_sum[-c - d]
8     return count
9 A1 = [1, 2]
10 B1 = [-2, -1]
11 C1 = [-1, 2]
12 D1 = [0, 2]
13 print(f"Output for Test Case 1: {fourSumCount(A1, B1, C1, D1)}")
14 A2 = [0]
15 B2 = [0]
16 C2 = [0]
17 D2 = [0]
18 print(f"Output for Test Case 2: {fourSumCount(A2, B2, C2, D2)}")
19
```

Output for Test Case 1: 2
Output for Test Case 2: 1

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```
1 def merge_sort(arr):
2     comparisons = 0
3     if len(arr) <= 1:
4         return arr, comparisons
5     mid = len(arr) // 2
6     left_half = arr[:mid]
7     right_half = arr[mid:]
8     left_sorted, left_comparisons = merge_sort(left_half)
9     right_sorted, right_comparisons = merge_sort(right_half)
10    merged, merge_comparisons = merge(left_sorted, right_sorted)
11    comparisons = left_comparisons + right_comparisons + merge_comparisons
12    return merged, comparisons
13 def merge(left, right):
14     merged = []
15     left_index = 0
16     right_index = 0
17     comparisons = 0
18     while left_index < len(left) and right_index < len(right):
19         comparisons += 1
20         if left[left_index] <= right[right_index]:
21             merged.append(left[left_index])
22             left_index += 1
23         else:
24             merged.append(right[right_index])
25             right_index += 1
26     merged.extend(left[left_index:])
27     merged.extend(right[right_index:])
28     return merged, comparisons
29 arr = [12, 4, 78, 23, 45, 67, 89, 1]
30 sorted_arr, comparisons = merge_sort(arr)
31 print("Sorted array:", sorted_arr)
```

Sorted array: [1, 4, 12, 23, 45, 67, 78, 89]
Comparisons: 16

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