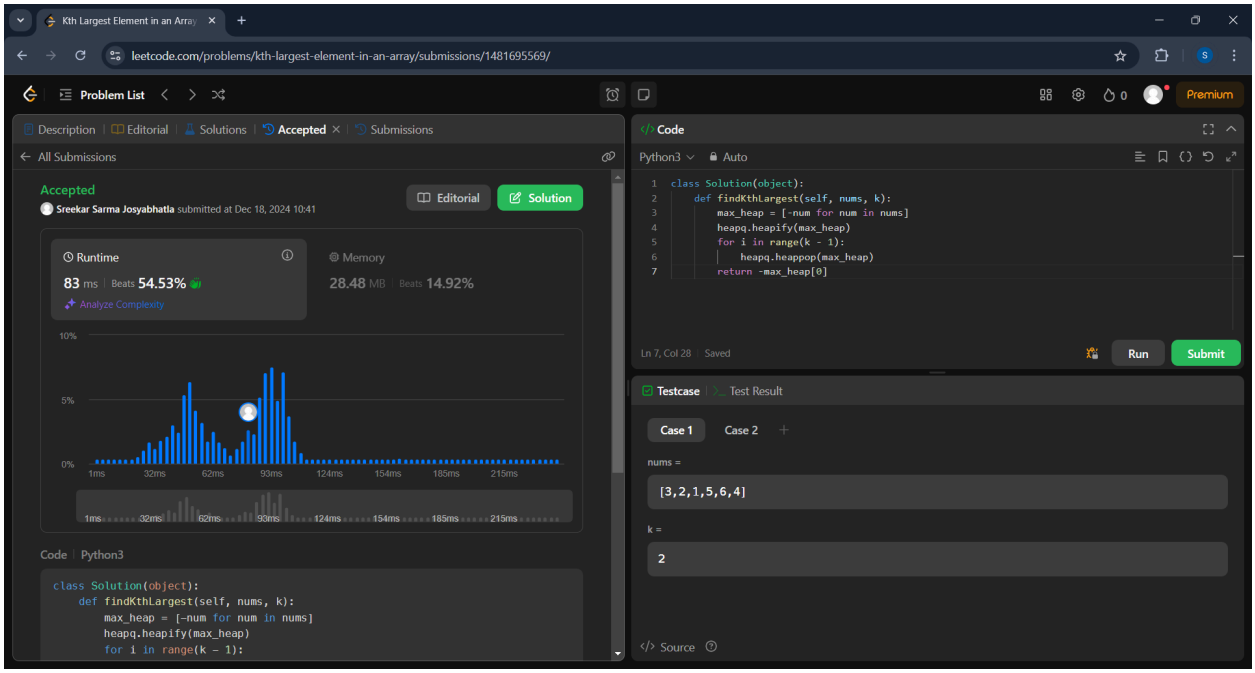
Task-3

T.Bhagath
VU21CSEN0300254

1. **Kth Largest Element in an Array**

```
class Solution(object):
    def findKthLargest(self, nums, k):
        max_heap = [-num for num in nums]
        heapq.heapify(max_heap)
        for i in range(k - 1):
            heapq.heappop(max_heap)
        return -max_heap[0]
```

OUTPUT



2. **Merge k Sorted Lists**

```
class Solution:
    def mergeKLists(self, lists: List[ListNode]) -> ListNode:
        if not lists:
            return None
        if len(lists) == 1:
            return lists[0]

        mid = len(lists) // 2
        left = self.mergeKLists(lists[:mid])
        right = self.mergeKLists(lists[mid:])

        return self.merge(left, right)
```

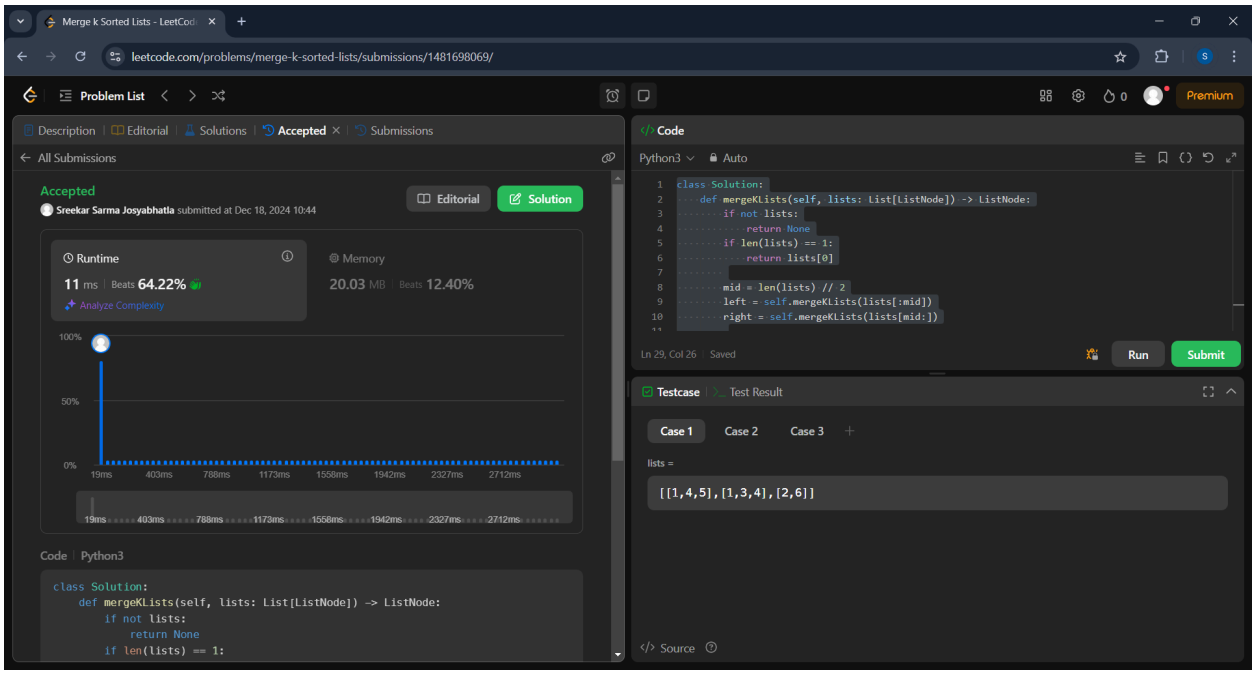
```
def merge(self, l1, l2):
    dummy = ListNode(0)
    curr = dummy

    while l1 and l2:
        if l1.val < l2.val:
            curr.next = l1
            l1 = l1.next
        else:
            curr.next = l2
            l2 = l2.next
        curr = curr.next

    curr.next = l1 or l2

    return dummy.next
```

OUTPUT



3. **Design Circular Deque**

```
class MyCircularDeque:
    def __init__(self, k: int):
        self.d = [0] * k
        self.f = 0
        self.r = 0
        self.sz = 0
```

```
        self.cap = k
    def insertFront(self, v: int) -> bool:
        if self.isFull(): return False
        self.f = (self.f - 1 + self.cap) % self.cap
        self.d[self.f] = v
        self.sz += 1
        return True
    def insertLast(self, v: int) -> bool:
        if self.isFull(): return False
        self.d[self.r] = v
        self.r = (self.r + 1) % self.cap
        self.sz += 1
        return True
    def deleteFront(self) -> bool:
        if self.isEmpty(): return False
        self.f = (self.f + 1) % self.cap
        self.sz -= 1
        return True
    def deleteLast(self) -> bool:
        if self.isEmpty(): return False
        self.r = (self.r - 1 + self.cap) % self.cap
        self.sz -= 1
        return True
    def getFront(self) -> int:
        return -1 if self.isEmpty() else self.d[self.f]
    def getRear(self) -> int:
        return -1 if self.isEmpty() else self.d[(self.r - 1 + self.cap) % self.cap]
    def isEmpty(self) -> bool:
        return self.sz == 0
    def isFull(self) -> bool:
        return self.sz == self.cap
```

OUTPUT