205) Given an unsorted array 10,16,8,12,15,6,3,9,5 Write a program to perform Quick Sort. Choose the first element as the pivot and partition the array accordingly. Show the array after this partition. Recursively apply Quick Sort on the sub-arrays formed. Display the array after each recursive call until the entire array is sorted.

Input : N= 9, a[]= {10,16,8,12,15,6,3,9,5}
Output : 3,5,6,8,9,10,12,15,16
Test Cases :
Input : N= 8, a[] = {12,4,78,23,45,67,89,1}
Output : 1,4,12,23,45,67,78,89
Test Cases :
Input : N= 7, a[] = {38,27,43,3,9,82,10}
Output : 3,9,10,27,38,43,82,

AIM: Show the array after this partition. Recursively apply Quick Sort on the sub-arrays formed. Display the array after each recursive call until the entire array is sorted.

PROGRAM:

```
def quick_sort(arr):
    if len(arr) <= 1:
        return arr
    else:
        pivot = arr[0]
        less_than_pivot = [x for x in arr[1:] if x <= pivot]
        greater_than_pivot = [x for x in arr[1:] if x > pivot]

        print(f"Pivot: {pivot}")
        print(f"Less: {less_than_pivot}")
        print(f"Greater: {greater_than_pivot}")

        sorted_less = quick_sort(less_than_pivot)
        sorted_greater = quick_sort(greater_than_pivot)

        combined_result = sorted_less + [pivot] + sorted_greater
        print(f"Combined: {combined_result}")
        return combined_result

N1 = 9
a1 = [10, 16, 8, 12, 15, 6, 3, 9, 5]
print("Sorting array:", a1)
sorted_a1 = quick_sort(a1)
print("Sorted array:", sorted_a1)
print("\n")
```

INPUT:

```
Sorting array: [10, 16, 8, 12, 15, 6, 3, 9, 5]
```

OUTPUT:

```
Pivot: 10
Less: [8, 6, 3, 9, 5]
Greater: [16, 12, 15]
```

TIME COMPLEXITY: O(N LOGN)