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Qn.1 Justify best case, Worst case, average case time complexity of quick sort algorithm is $O(n \log n)$, $O(n^2)$, $O(n \log n)$

Ans Worst Case :-
When an array is sorted or reverse sorted, the partition algorithm divided the array in 2 subarrays with 0 and n-1.

$T(n) = T(0) + T(n-1) + Cn$
Solving this we get
$T(n) = O(n^2)$

Best Case and Average Case :-
On an average, the partitions algorithm divides the array in two sub arrays with equal size

$T(n) = 2T(n/2) + CN$
Solving this we get
$T(n) = O(n \log n)$

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Quick sort algorithm

Step 1: Start
Step 2: Chose the highest Index value as pivot.
Step 3: Take two variable to point left and right of the list excluding pivot.
Step 4: left point to the lower index
Step 5: right point to the high.
Step 6: While value at left is less than the pivot move right.
Step 7: While value at right is greater than the pivot move left.
Step 8: If both step 5 and 6 not match Swap left and right.
Step 9: If left ≥ right, the point they met is new pivot.

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