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DSA Assignment #2

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V1
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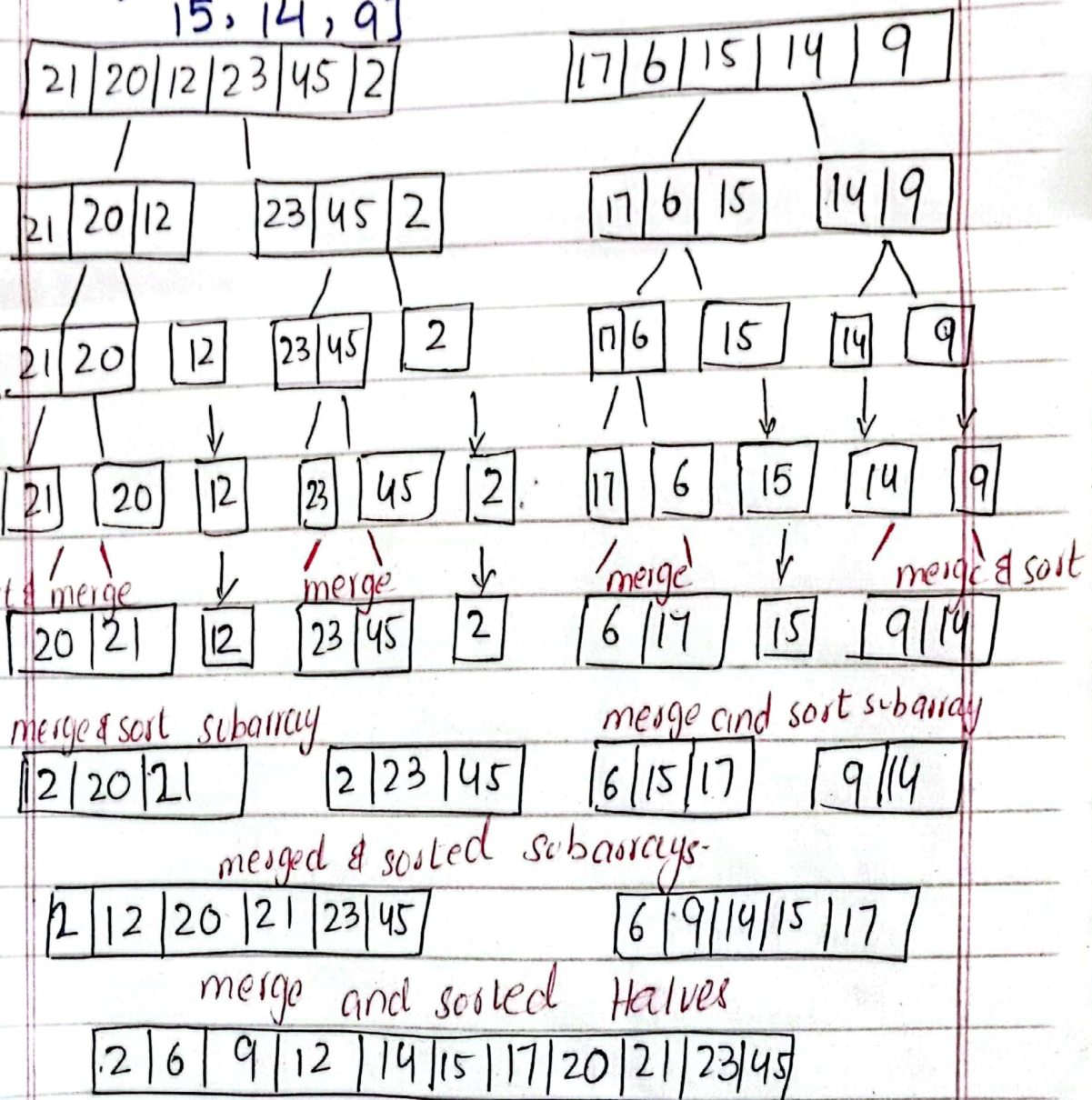
Q#01

Merge sort = {21, 20, 12, 23, 45, 2, 17, 6, 15, 14, 9}



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The given array is= [21,20,12,23,45,2,17,6,15,14,9]

Divide:

Split the array into two Halves

1st Half= [21, 20, 12, 23, 45, 2]

2nd Half = [17, 6, 15, 14, 9]

This pair is 6 | 5, 6 on 1st half and 5 on 2nd half.

Divide the 1st Half (3 by 3):

Subarray 1= [21, 20, 12]

subarray 2= [23, 45, 2]

This pair is 3 by 3 on 1st half of right and left subarray.

Divide the 2nd Half (3 by 2):

Subarray 3 = [17, 6, 15]

Subarray 4 = [14, 9]

Divide subarray 1, 2 (2, 1):

subarray 5= [21, 20], [12]

subarray 6 = [23, 45], [2]

Divide subarray 3 (2, 1):

subarray 7 = [17, 6], [15]

Then **sort & merge subarray 4**

[9, 14]

sort & merge subarray 5, 6, 7

[12, 20, 21], [2, 23, 45] | [6, 15, 17]

[2, 12, 20, 21, 23, 45]

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[6, 9, 14, 15, 17]

merge the sorted Halves:-

[2, 6, 9, 12, 14, 15, 17, 20, 21, 23, 45]

This step by step procedure demonstrate how to modified merge sort algorithm divides the array into specific subarray and sort & merges them accordingly. Note that the key idea behind merge sort is same - Recursively divide the array into halves, sort each half and merge the sorted Halves. The specific division & merging details may vary based on chosen approach.

Q# 02

Quick sort:-

Array: [12, 15, 14, 5, 56, 85, 10, 57, 36, 21, 45]

chose firstly the Pivot element (45)

partition of Array = [12, 15, 14, 5, 56, 85, 10, 57, 36, 21, 45] → given array

Partition Array:

[12, 15, 14, 5, 10, 36, 21, 45, 56, 85, 57]

↑ index

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- Element less than the pivot (45) are on left
- Element greater than the pivot (45) are on the right

Then pivot on 21 of left subarray
[12, 15, 14, 5, 10, 21, 36]
And pivot on 57 of right subarray
[56, 57, 85]

This method will apply and also show the another method will apply recursively sort left or right subarrays.
Then no additional combining is needed in Quick sort. The sorting is acheived during the partition process.

[5, 10, 12, 14, 15, 21, 36, 45, 56, 57, 85]

when we partitioned array 45 is at 7 index and after the final sorted array is also at 45 at 7 index. The final sorted array is ascending order