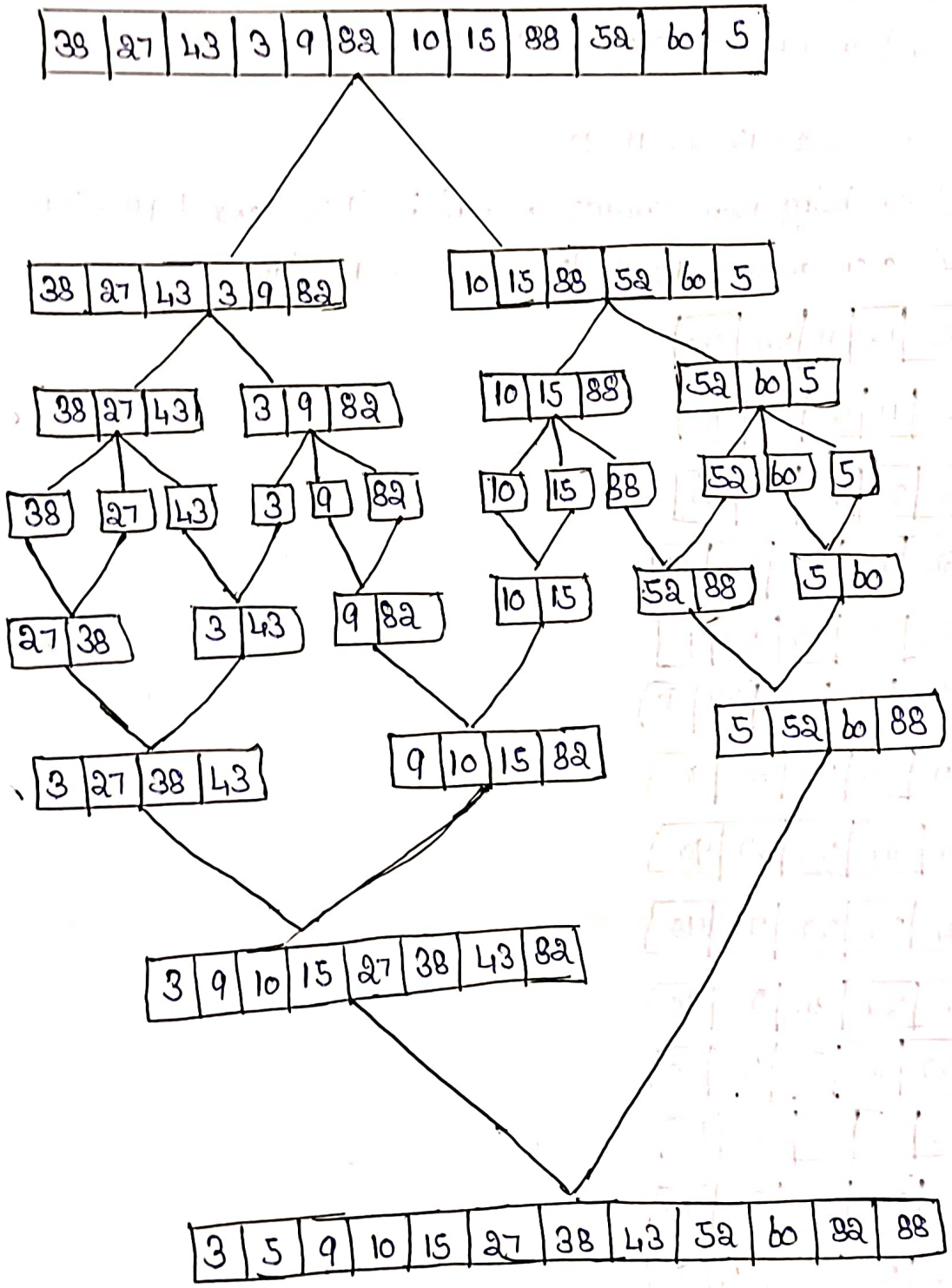
16) Sort the following elements using merge sort divide and conquer stage by [38, 27, 43, 3, 9, 82, 10, 15, 88, 52, 60, 5] using and analyze time complexity of the algorithm?

Sol: Given array :- merge sort.



∴ Sorted list = (3, 5, 9, 10, 15, 27, 38, 43, 52, 60, 82, 88)

Time complexity :-

The time Complexity of merge sort is $o(n \log n)$ where n is the num of elements in the list this is because the list is split into halves $\log n$ times and n.

merging is all the elements at each level takes $o(n)$ time.

17) sort the array 64, 34, 25, 12, 22, 11, 90 using bubble sort what is the time Complexity of selection sort in the best, worst and average case.

Sol: Given array = 64 34 25 12 22 11 90

In bubble sort we bring from smallest element in there correct position continue this until each element Reach there correct position.

64	34	25	12	11	22	90
64	34	25	11	12	22	90
64	34	11	25	12	22	90
64	11	34	25	12	22	90
11	64	34	25	12	22	90
11	64	34	12	25	22	90
11	64	12	34	25	22	90
11	12	64	34	25	22	90
11	12	64	34	22	25	90
11	12	64	22	34	25	90
11	12	22	64	34	25	90
11	12	22	64	25	34	90
11	12	22	25	64	34	90
11	12	22	25	34	64	90

18) Sort the array 64, 25, 12, 22, 11 using selection sort. what is the time complexity of selection sort in the best, worst and average cases?

Sol:-

64	25	12	22	11

In the selection we will fix that from the diag largest element in there correct position first so.

25	64	12	22	11

25	12	64	22	11

25	12	22	64	11

25	12	22	11	64

12	25	22	11	64

12	22	25	11	64

12	22	11	25	64

12	11	22	25	64

11	12	22	25	64

the sorted list is 11, 12, 22, 25, 64.

Time Complexity :- Selection sort is an another simple comparision sorted algorithm.

Best case = $O(n^2)$

Average case = $O(n^2)$

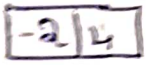
worst case = $O(n^2)$

19) Given an array of [4, -2, -5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 0, -6, -8, 11, -9] integers sort the following elements using insertion sort using Brute force algorithm

Strategy analyze time Complexity.

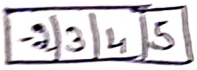
Sol Given array is 4, -2, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 0, -6, -8, 1

Insert 4, -2



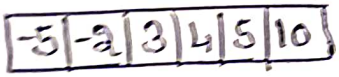
Insert 5

Insert 3

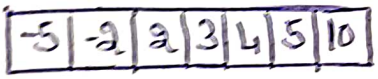


Insert 10

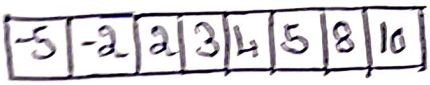
Insert -5



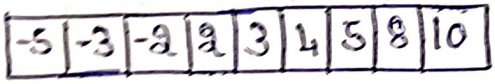
Insert 2



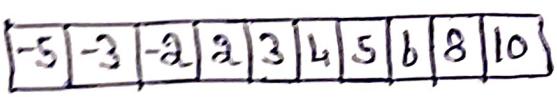
Insert 8



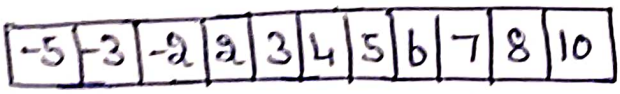
Insert -3



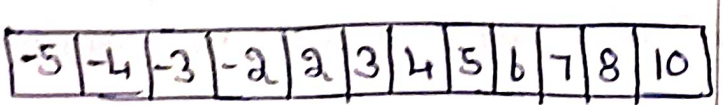
Insert 6



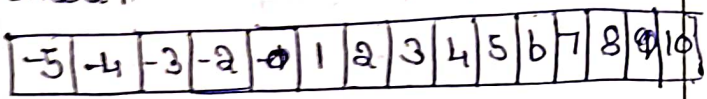
Insert 7



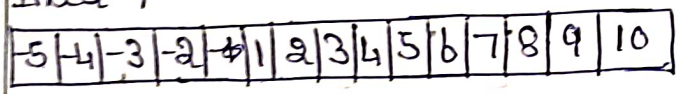
Insert -4



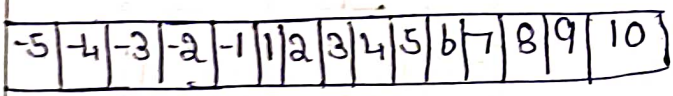
Insert 1



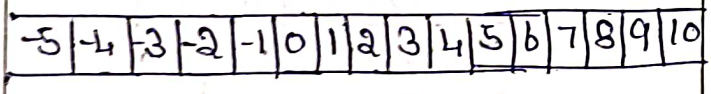
Insert 9



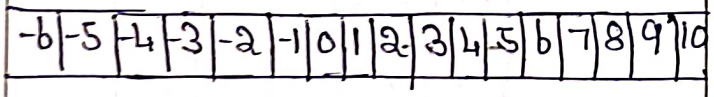
Insert -1



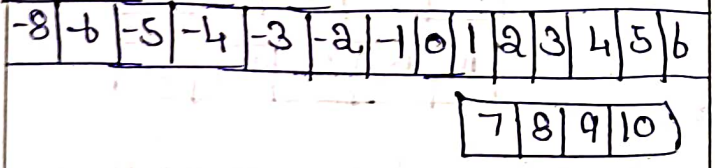
Insert 0



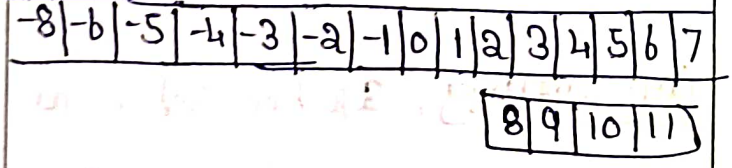
Insert -6



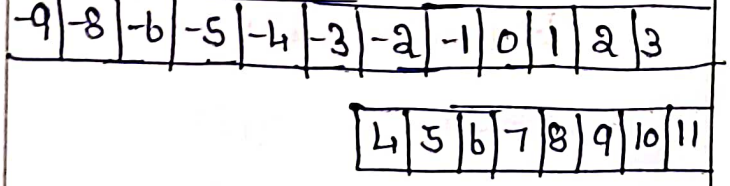
Insert -8



Insert 11



Insert -9



(9) Sort the following elements using insertion sort using Brute force approach [38, 27, 43, 3, 9, 82, 10, 15, 88, 52, 60, 5] and analyze complexity of the algorithm.

Soln: Insert 38, 27

27	38

Insert 43

27	38	43

Insert 3

3	27	38	43

Insert 9

3	9	27	38	43

Insert 82

3	9	27	38	43	82

Insert 10

3	9	10	27	38	43	82

Insert 15

3	9	10	15	27	38	43	82

Insert 88

3	9	10	15	27	38	43	82	88

Insert 52

3	9	10	15	27	38	43	52	82	88

Insert 60

3	9	10	15	27	38	43	52	60	82	88

Insert 5

3	5	9	10	15	27	38	43	52	60	82	88

Time complexity :-

Best case :- $O(n)$

Average case :- $O(n^2)$

Worst case :- $O(n^2)$