Jaypee University of Engineering and Technology

18B11CI311– Data Structures
B.Tech -3rd Semester
Tutorial – 5 (Sorting Algorithms)

Consider the following arrays (Contains 8 elements to be sorted in ascending order) -

Array W - 4, 5, 7, 1, 6, 10, 17, 13
Array X - 20, 15, 13, 11, 4, 3, 2, 1
Array Y - 32, 4, 6, 9, 12, 3, 11, 10
Array Z - 5, 8, 12, 17, 19, 23, 41, 50

1. Give the number of swaps in 4th pass of bubble sort for array W.
2. What is the time complexity of selection sort for array X and give the output of 4th pass.
3. With reference to insertion sort, which of above arrays (W, X, Y, Z) will be worst, average and best case. Justify your answer with algorithmic statements.
4. Array Z is the worst case input instance of quick sort. Justify the statement.
5. Compare quick and merge sort. Use the above arrays (W, X, Y, Z) to give specific time complexity case.
6. What is the worst case time complexity of insertion sort where position of the data to be inserted is calculated using binary search?
7. Consider the array A[]= {6,4,8,1,3} apply the insertion sort to sort the array . Consider the cost associated with each shift is 5 rupees, what is the total cost of the insertion sort when element 1 reaches the first position of the array?
8. Let t1 and t2 be the number of comparisons made by P for the inputs {1, 2, 3, 4, 5} and {4, 1, 5, 3, 2} respectively. Mention the relation between t1 and t2 for the following cases:
    a. Quick sort using the first element as pivot.
    b. Bubble sort
    c. Insertion sort
    d. Selection sort
9. Give the practical situations where each of the following sorting algorithms should be preferred over other. Also mention which one is stable and in-place along with their time complexity (best, average and worst case).
    a. Quick sort
    b. Bubble sort
    c. Insertion sort
    d. Selection sort
    e. Merge sort
10. Apply bubble sort, selection sort, insertion sort, quick sort, and merge sort on following array. Show all the steps.
    15, 6, 2, 5, 9, 10, 45, 32, 9, 3