

COM Design and Analysis of Algorithms Assignment-3

Due: Mar 11, Friday

1. A sorting algorithm is stable, if numbers with the same value appear in the output array as they do in the input array. i.e., Order of appearance is preserved between input and output. Which of the following algorithms are stable; bubble, insertion, merge, quick, heap. Present a counter example and algorithm trace if algorithm is not stable.
2. What modification would you do to quick sort so that it runs in $\theta(n \log n)$ in worst case. Justify your answer with analysis.
3. What is a lower bound for multiplying two $n \times n$ matrices. Justify your answer.
4. In how many different ways can you multiply matrix chain A_1, \dots, A_n . Present a recurrence relation and a lower bound with analysis.
 - Is the above count same as the number of different binary trees on n-nodes.
 - What about the number of different binary search trees on n-nodes.
5. Recall the case study 'Assembly line scheduling'. What modification would you bring to assembly line scheduling graph so that Dijkstra shortest path can be applied to find optimum schedule. Justify if it can not be modified. If modification exists, take suitable example and show the modified graph using your construction.