

# Design and Analysis of Algorithms Problem Set

November 18, 2024

1. Problem 3-2 from CLRS (page 58)
2. Problem 3-3 from CLRS (page 58)
3. Problem 7-3 from CLRS (pages 161-162)
4. Problem 8.3-4 from CLRS (Your algorithm should use  $O(n)$  space.)
5. Which of the following sorting algorithms are stable? Justify your answer. Algorithms: insertion sort, merge sort, heap sort, quick sort, counting sort.
6. **For practice:** Problems 9-15 from Jeff Erickson's book
7. **Dynamic programming:** Problems 3, 25, 32 from Jeff Erickson's book, Problems 6.2, 6.3, 6.10, 6.14 from Dasgupta et. al
8. Problems 3,4,5, 22 from Chapter 4 of Jeff Erickson's book (Note that all of them may not have a greedy algorithm. You need to figure out where a greedy strategy would apply.)
9. Problem 5.19 from DPV
10. Problems 5,7 from Chapter 5, and problems 1,3,4,5,6,10 from Jeff Erickson's book
11. **Shortest paths and Minimum spanning trees** CLRS: Problems 21.1-6, 21.1-11, 21.1, 21.4, 22.2, 22.3, 22.6  
DPV: 5.8,5.9, 4.9, 4.11
12. **Network flows:** From Jeff Erickson's book: Chapter 10, Problems 0,1 only for practice, not for submission.  
Problems for submission ([JE] Chapter 10): 2,3,4,5,6, 12,13,14,15,16
13. **NP-completeness:** From [CLRS]: 34-3  
From [JE]: Chapter 12: 8,9,10, 17,26