

Midterm #2 Topics

Spring 2004

Here are the topics we have covered since the first midterm. See the first midterm sheet for topics covered previously, although the second midterm will emphasize the material covered since the first one, it will include some questions on the earlier material, consult the review sheet for the first midterm. A “(HW)” indicates a problem appearing only on the homeworks.

You are responsible for Chapters 7, 9, 15, and sections 5.1, 5.2, 6.3, 8.3, 25.1, 25.2, 28.2, and appendix C.1 through C.3. The more difficult questions will be drawn directly from class examples, homeworks, and the book.

1. Counting and probability, indicator functions.
2. Divide and Conquer algorithms
 - Merge Sort
 - initializing a heap
 - Strassen’s matrix multiplication
 - multiplication of n -bit numbers (HW)
 - majority element (HW)
 - Quicksort
 - Divide and conquer on keys: Bucket Sort, Radix Sort
 - Median of Medians algorithm
 - When a recurrence is likely to be linear
3. Backtracking
 - N-queens
 - subset sum
 - graph coloring
4. Branch and Bound
 - Knapsack problem
 - Graph coloring minimizing use of one color.

5. Dynamic Programming

- best path in a DAG
- Knights-move telephone numbers
- number of binary search trees (HW)
- Matrix Chain multiplication order
- Longest common subsequence
- Knapsack
- Optimal binary search trees
- Canoe Rental (HW)
- Change with few coins (HW)
- Floyd-Warshall