
ECS 122A

Algorithm Design and Analysis

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Agenda

- Strongly connected component
 - Definitions
 - How to find SCC
- Minimum spanning tree
 - Definitions
 - *Two algorithms*

Course updates

- Midterm on 8/25
- Closed book & closed notes
- Hw2 is due today
 - Later submission will not be considered

Fundamentals

- Know how algorithm works
 - All algorithms mentioned in the lecture.

Lecture1

- Proof by induction
 - E.g., for sequences
- Running time of insertion sort
 - Worst-case, best-case

Lecture2

- Asymptotic notations
 - Big-O, small-o ... and their definitions
 - Comparisons
- Rates of function growth
- Merge sort
 - Analysis

Lecture3

- Substitution method (for proofs)
 - Guess
 - Induction
- Recursion tree method (for guess)
- Master method
 - When applicable?
 - Three cases

Lecture4

- Strassen algorithm for MM
 - Basic idea
 - Why asymptotically fast?
- Heapsort
 - Concepts: height, parent...

Lecture5

- Heapsort
 - Major procedures: analysis and complexity
- Priority queue
 - Major procedures: complexity

Lecture6

- Quicksort
 - How it works
- Randomized quicksort
- Analysis
 - Worst-case and average-case

Lecture7

- Graph representations
 - List vs. matrix
 - Benefits?
- BFS
 - Basic idea
 - With a source node!
- DFS
 - Basic idea
 - Will search all nodes!
 - Terminology: white node, black node, ..., back edge, cross edge...
- Topological sort
 - Definitions, complexly

The End
