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.
Lecture 1

• Proof by induction
  - E.g., for sequences

• Running time of insertion sort
  - Worst-case, best-case
• Asymptotic notations
  - Big-O, small-o ... and their definitions
  - Comparisons
• Rates of function growth
• Merge sort
  - Analysis
Lecture 3

- Substitution method (for proofs)
  - Guess
  - Induction
- Recursion tree method (for guess)
- Master method
  - When applicable?
  - Three cases
Lecture 4

• 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
Lecture 6

- Quicksort
  - How it works
- Randomized quicksort
- Analysis
  - Worst-case and average-case
Lecture 7

- **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