

Summary of Class Topics

Asymptotics

- Relationship between polynomial, exponential, logarithmic time
- Big-Oh notation

Graphs

- Relationship between degree and number of edges
- Cycles, trees
- Graph Search
- Algorithms for coloring
- Negative Edge Weights in Directed graphs

Greedy Algorithms

- Interval Scheduling
- Approximation algorithms for Vertex Cover, Set Cover
- Minimum Spanning Tree Algorithms, and Cycle and Cut properties
- Union Find-Data Structure

Divide and Conquer Algorithms

- Recurrences (Master Theorem)
- Algorithms for merge sort, finding closest pair, multiplication, finding closest pairs, matrix multiplication, computing the median
- Fast Fourier transform

Dynamic Programming

- Design the recurrence using subproblems, then write the program. Many types of recurrences.
- Algorithms for sequencing related problems, edit distance, knapsack, weighted interval scheduling, algorithms on trees.

Network Flows

- Algorithms for max-flow, min-cut
- Applications to Image segmentation, project selection, edge-disjoint paths, maximum matchings in bipartite graphs, Marriage theorem.

Linear Programming

- Writing linear programs
- Min-max theorem
- Weak and strong duality
- Simplex and ellipsoid algorithms

NP

- Concept of NP-completeness
- NP-complete problems: 3SAT, 3Coloring, Independent set, Hamiltonian cycle

I hope

- You learnt a lot
- You are a better at communicating ideas
- The high level principles stay with you

Final

- 12 true/false questions, 3 problems
- Remember: grades are curved!
- Review homework, take the practice final.

Thanks!