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!