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

• Cheat sheet allowed: handwritten, double sided 8.5 by 11 inch

• Lots of true/false questions, a few problems
Thanks!