

University of Nevada, Las Vegas Computer Science 477/677 Spring 2021

Additional Topics for Final Examination

In addition to topics covered on the practice final, any of these topics could be on the final examination of May 13.

1. Complexity questions.
 - (a) O , Ω , and Θ .
 - (b) Recurrences.
 - (c) Analyzing code fragments and functions.
2. Computational paradigms.
 - (a) Divide and conquer.
 - (b) Dynamic programming.
 - (c) Memoization.
3. Graphs and directed graphs.
 - (a) Connectivity and strong connectivity.
 - (b) Components and strong components.
 - (c) Topological order.
 - (d) Planar graphs.
 - (e) Kruskal's algorithm and union/find.
4. Sorting
 - (a) Theoretical lower bound on sorting.
 - (b) Insertion sort.
 - (c) Selection sort.
 - (d) Treesort.
 - (e) Heapsort.
 - (f) Quicksort.
 - (g) Mergesort.
 - (h) Polyphase mergesort.
 - (i) Bucket sort.
5. Data Structures
 - (a) Priority queues.
 - i. Unfulfilled obligations.
 - ii. Stacks.
 - iii. Queues.

- iv. Heaps.
 - (b) Search structures.
 - i. Binary search trees.
 - ii. AVL trees.
 - iii. Treaps.
 - iv. Hashing.
 - A. Open and closed hashing, separate chaining and open addressing.
 - B. Collisions and collision resolution.
 - C. Cuckoo hashing.
 - (c) Arrays, sparse arrays, compressed storage.
 - (d) Range queries.
6. Shortest path problems.
- (a) Bellman-Ford algorithm.
 - (b) Dijkstra's algorithm.
 - (c) Floyd-Warshall algorithm.
 - (d) A* algorithm.
7. Other
- (a) Infix to postfix algorithm using a stack.
 - (b) Finding medians.
 - (c) Levenshtein distance.
 - (d) Longest common subsequence (LCS).
 - (e) Sorting networks.
8. \mathcal{NP} -completeness.
- (a) $\mathcal{P} = \mathcal{NP}$ problem. Unsolved!
 - (b) Traveling Salesman.
 - (c) Knapsack.