Exam 1 Review

1. Runtime Analysis
   (a) Definition of $O, \Omega, \Theta$, know how to prove $f = O(h)$.
   (b) Know how to analyze the time complexity of an algorithm.

2. Basic Data Structures
   (a) Understand these basic data structures: array, dynamic array, linked list, stack, queue, set, map
   (b) Know how to insert, delete, search in a Linked List
   (c) Stack (LIFO), Queue (FIFO)

3. Hashing
   (a) Hash function
   (b) Collision: separate chaining, linear probing, quadratic probing
   (c) $O(1)$ for insertion, deletion, and search

4. Sorting
   (a) Know how to sort. You should know the details about each sorting algorithm
   (b) Know the best, average, worst case time complexity of each sorting algorithm
   (c) Mergesort: you should know divide and conquer, how to merge two sorted array
   (d) Quicksort: divide and conquer, pick pivot, partition function
   (e) Heapsort: What is a max heap, what is heapify procedure, how to build a heap, heap operations: extract max, increase value, maximum

5. Binary search

6. Tree
   (a) Tree data structure
   (b) Breadth First Search (BFS)
   (c) Depth First Search (DFS): preorder, inorder, postorder

7. Binary Search Tree
   (a) What is a binary search tree
   (b) Sorting keys by inorder traversal
   (c) Know the basic operations: insertion, search, predecessor, successor, deletion, minimum, maximum