

A Study Guide: Exam 1

Exam Date: Oct. 10th (Thr.) 9:00 – 10:45 AM, 2019.

Topics: Chapters 1 – 5 (and 6 – TBD), Handouts 1 – 5, HWs 1 - 3

I. Algorithm Design and its Analysis.

- 1) Design of a short algorithm to solve a problem.
- 2) Counting the number of operations in the algorithm and their total.
- 3) Asymptotic bound of total number of operations in big-Oh, big-Omega, big-Theta.
- 4) Proof of big-Oh, big-Omega or big-Theta by its definition.
- 5) Representation of the Running Time of Recursive algorithm in Recurrence Equation.
- 6) Solving a simple recurrence equation by iterative substitution.

II. Data Structures and Algorithms

- 1) Stack, Queue, List, (Binary) Tree,
- 2) Binary Search Tree, AVL Tree, Red-Black Tree,
- 3) Priority Queue, Heap
- 4) Hash Table
- 5) The Algorithms in the above Data Structures and their Running Time.
- 6) Definition, Terminology and Property of Data Structures.
- 7) Proof of the property of data structure. – See the Theorems & their proofs in the slides/text book.

III. The Various Algorithms: Sorting Algorithms, Operations in Data Structures, + α

- The sorting algorithms; you should be write their codes.
 - Insertion sort, Selection sort, Bucket sort, Heap sort.
- The operational algorithms in the Data Structures:
 - E.g.) Heap constructions/insertion/deletion, Down/Up Heap to restore the heap property, search/insertion/deletion in BST, AVL-Tree, RB-Tree, Priority Queue, Stack Queue, Hash Table, etc.

IV. Review all of the problems of the HWs, exercises of the textbook, the lecture slides and the handouts.

Good Luck!