CS 2233 Discrete Mathematical Structures – Fall 08

Material relevant for midterm 2

- Homeworks 4,5,6
- **3.1-3.3 Algorithms and Complexity:**
  - O, Ω, Θ. (E.g., use definitions to show that $4n + 5 \in O(n^2)$.)
  - Code snippets
- **4.1-4.2 Induction**
  - Weak and strong induction
  - **NO** program correctness and loop invariants
- **4.3, 7.1 Recursive Definitions and Recurrence Relations**
  - Recursive functions, sequences, and algorithms
    Know how to develop a recursive solution (i.e., function, sequence, or algorithm) for a problem. (E.g., recursive function for 2^n, or a recursive definition for the sequence $1, 5, 9, 13, 17, \ldots$.)
  - Every recursive definition has a base case and a recursive case.
  - Understand all recursive examples (Fibonacci, $n!$, Towers of Hanoi)
  - Other recursive definitions (sets, arithmetic formulae)
- Recursive algorithms, and solving divide-and-conquer runtime recurrences (Handout from CLRS book, and parts of 7.3)
  - Divide and conquer examples: Mergesort, recursive squaring
  - **NOT:** Develop a divide and conquer algorithm
  - Extract runtime recurrence from a recursive algorithm
  - Solve the runtime recurrence:
    - Generate a guess using either the expansion method or the recursion tree method (knowing any one method is enough)
    - Big-Oh induction
    - Master Theorem (The theorem itself will be given on the test, so you don't need to memorize it.)

Midterm 2 is on Friday November 7 at the usual class time in the class room. It is closed-book and closed-notes, but you are allowed to bring one cheat sheet.