CSE 2321 Foundations I Spring, 2024 Dr. Estill

Topic Guide for Midterm II

- Asymptotic analysis *(check CLRS chapter 2 for the basic idea and chapter 3 for the asymptotic sets)*
  - Know the basic definitions of the asymptotic growth sets,
    - how to use these definitions and inequalities to show that a given function is in an asymptotic growth set of a given comparison function, and
    - how to use limits to prove the same thing;
  - how to analyze algorithms and find their approximate run-times, specifically
    - `FOR` loops *(Appendix A of CLRS for sums)*
    - and `WHILE` loops.
    - You should be able to turn nested `WHILE` and `FOR` loops into sums,
    - and how to find their asymptotic behavior (i.e., Θ, O, and Ω) from the sums.
    - You should know how to apply the geometric series theorem.
    - You should know the integral comparison theorem.
- Recursive Relations
  - You should be able to create a recursive relation from a pseudocode algorithm that uses recursion.
  - You should be able to use one of our methods (expansion into a series or the recursion tree) to make an estimation of what the asymptotic growth of a recursive relation is.
  - You should be able to use the substitution method to prove that a recursive relation is in a given Θ set.
  - You should be able to apply the Master Theorem to some recursive relations.
  - You should have the basic idea of what an unbalanced recursion is,

NOTE: Make sure you know the difference between "expansion into a series" (making the guess) and "the substitution method" (proof by induction).