Discrete Structures for CS Exam #2 Study Guide

Review homework 5-7. Try similar odd-numbered problems at the end of each section; their solutions are at the end of the book. When in doubt of a problem or solution, ask.

Expect questions of the following type:
- Given a statement involving sets in propositional logic, express it in English (and vice versa)
- Given one or more sets, find
    - union
    - intersection
    - complementation
    - difference
    - cardinality
    - cartesian product
    - power set
- Draw a Venn Diagram for some sets
    - use it to show relationship between sets (if one is a subset of another or they are equal)
- Know important sets (Z, N, R)
- Know what it means for an integer to be positive (> 0) vs. non-negative (≥ 0).
- Given a sequence, use forward or backward substitution to conjecture a closed formula which describes the nth term of that sequence
- Given a recurrence formula or closed formula, find the first n terms of the sequence it describes
- Given one or more functions
    - find the result of that function at some value (for example, find $f(5)$)
    - provide the domain and range
    - determine if it is surjective/injective/bijective
    - if it exists, find its inverse
    - find the composition of the functions
    - find the nth term for a recursively defined function
- Find the value of a function which uses ceiling, floor, modulus, or factorial
- Find the summation over some small sequence
- Define a function or set recursively
- Proof techniques
    - **Mathematical induction**
    - Structural induction (understand example on slides and from the homework)
    - Prove two sets are equal using
        - membership table
        - containment proof (left is a subset of the right and right is a subset of left)
        - set builder notation and propositional logic