CS151 Spring 2017

Prep for Final: Birdseye View

Final Exam:

Comprehensive

Wednesday, 1-3pm, LC A1

UNIT-1: Logic

    Material:

        Chapter-3 of the MIT Reader

        Additional Resources:

            Chapters 12 and 14 of Stanford Text:

            http://i.stanford.edu/~ullman/focs.html

    Homeworks: 1 and 2

    Exam-1

    Some Key Concepts:

- Propositions and Propositional formulas
- Logical Equivalence
- Implication
- DeMorgan's Laws
- Tautologies ("valid" formulas)
- The Satisfiability Problem (remember Zebras?)
- Quantifiers
- Writing and understanding quantified propositional formulas.

UNIT-2: Sets, relations and functions

    Material:

        Chapter-4 and section 7.1 of MIT Reader

        Chapters 7 and 8 of Stanford Text

    Homeworks 3 and 4

    Exam-2

    Some Key Concepts:

- Finite vs. Infinite Sets
- Power Sets
- Subsets, membership, etc.
- Binary relations (and properties they may or may not have)
- Functions: one-to-one (injective); onto (surjective); bijections
- Countability

UNIT-3: Sequences, recursive definitions and Induction
     Material:
          Chapter 5 of MIT Reader
          Chapter 2 of Stanford Text
     Homework 5
     Exam-3
     Some Key Concepts:
       - Sigma notation
       - Nested Sigma Notation
       - Understanding Recursively Defined Functions
       - Induction:
            - Structure
            - Why it works!
            - Strong vs. weak
            - Pitfalls

UNIT-4:   Basics of Combinatorics ("Counting")

     (More like a half-unit)
     Material:
          Chapter 14 of MIT Text
          Chapter 4 of Stanford Text
     Homework-6
     Some Key Concepts:

       - Counting as a sequence of choices
            "Choice-trees"
       - Ordered Selection
            - Example: GOLD, SILVER, BRONZE medals
       - Unordered Selection
            - Examples:
                 - forming a committee
                 - Counting subsets of fixed size
       - Symmetry of n-choose-k
       - Relation to power-sets
       - Pascal's recurrence / triangle
       - Pitfalls/tricks:
            - OVERCOUNTING (and correcting it)
            - Turning a counting problem into a ***string counting*** problem (when possible). Example: distributing jelly beans to children
            - Indirect counting: e.g., compute the size of the complement of a set to determine the size of the set itself.

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General Advice:  Work Problems!

     Revisit Exams 1-3

     Revisit Discussion Section Exercises

     Revisit Homeworks

     Make up sample problems and share with your friends!

     Work Posted Sample Exam

     Comprehension  >>  Memorization
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