Exam 1 Review

Spring 2022

Here are the topics you'll want to know for the exam:

- Induction (Chapter 2)
  - Induction and Strong Induction
  - How to structure an inductive proof
  - How to recognize when induction might be useful
- Pigeonhole Principle (Chapter 1)
  - Pigeonhole Principle
  - Generalized Pigeonhole Principle
  - Use in packing problems
  - Recognizing other applications
- Basic Counting Techniques (Chapter 3)
  - Addition Rule
  - (Generalized) Multiplication Rule
  - Exponent Rule
  - (Falling) Factorials
  - Multinomial/Binomial Coefficients
  - Using rules in combination to solve counting problems
- Balls in Bins Problems (Chapter 5)
  - Distinguishability
  - (Weak) Compositions
  - Stars and Bars
  - Set Partitions
  - Sterling Numbers of the Second Kind
  - Bell Numbers
  - Integer Partitions
  - Ferrers Diagrams
  - Conjugate Partitions
  - Self-Conjugate Partitions and Partitions into distinct odd parts
  - Partitions into odd parts and partitions into distinct parts
- Permutations and Cycle Structure (Chapter 6)
  - Cycles

  - Cycle notation for permutations
  - Canonical Cycle Notation
  - Counting permutations with a given cycle structure
  - Sterling numbers of the first kind
  - EVEN, ODD
- Inclusion-Exclusion (Chapter 7)
  - Generalized Addition Rule
  - Inclusion-Exclusion Principle
  - How to recognize applications of Inclusion-Exclusion
  - Derangements