

Stat 4105 Syllabus

(Chapter References are from Terrell(1999) **Mathematical Statistics**: Springer)

Chapter 3: Combinatorial Probability

2. Probability with Equally Likely Outcomes
 - 2.1 What is Probability?
 - 2.2 Probabilities by Counting
3. Combinatorics
 - 3.1 Basic Rules for Counting
 - 3.2 Counting Lists
 - 3.3 Combinations
 - 3.4 Multinomial Counting
4. Some Probability Calculations
 - 4.1 Complicated Counts
 - 4.2 The Birthday Problem
 - 4.3 General Principles about Probability
5. Approximations to Coincidence Probabilities
 - 5.1 An Upper Bound
 - 5.2 A Lower Bound
 - 5.3 A Useful Approximation
6. Sampling

Chapter 4: Other Probability Models

2. Geometric Probability
 - 2.1 Uniform Geometric Probability
 - 2.2 General Properties
3. Algebra of Events
 - 3.1 What is An Event?
 - 3.2 Rules for Combining Events
4. Probability
 - 4.1 In General
 - 4.2 Axioms of Probability
 - 4.3 Consequences of the Axioms
5. Discrete Probability
 - 5.1 Definition
 - 5.2 Examples

- 6. Partitions and Bayes' Theorem
 - 6.1 Partitions
 - 6.2 Division into Cases
 - 6.3 Bayes' Theorem
 - 6.4 Applied to Partitions
- 7. Independence
 - 7.1 Irrelevant Conditions
 - 7.2 Symmetry of Independence
 - 7.3 Near-Independence
- 8. More General Geometric Probabilities
 - 8.1 Probability Density
 - 8.2 Sigma Algebras and Borel Algebras*
 - 8.3 Kolmogorov's Axiom*

Chapter 5: Discrete Random Variables I: The Hypergeometric Process

- 2. Random Variables
 - 2.1 Some Simple Examples
 - 2.2 Discrete Random Variables
 - 2.3 The Negative Hypergeometric Family
 - 2.4 Symmetry
- 3. Hypergeometric Variables
 - 3.1 The Hypergeometric Family
 - 3.2 More Symmetries
 - 3.3 Fisher's Test for Independence
 - 3.4 Hypothesis Testing
 - 3.5 The Sign Test
- 4. The Cumulative Distribution Function
 - 4.1 Some Properties
 - 4.2 Continuous Variables
 - 4.3 Symmetry and Duality
- 5. Expectations
 - 5.1 Average Values
 - 5.2 Discrete Random Variables
 - 5.3 The Method of Indicators
- 6. Estimation and Confidence Bounds
 - 6.1 Estimation

6.2 Compatibility with the Data

6.3 Lower Confidence Bounds

Chapter 6: Discrete Random Variables II: The Bernoulli Process

2. The Geometric and Negative Binomial Families

2.1 The Geometric Approximation

2.2 The Geometric Family

2.3 Negative Binomial Approximations

2.4 Negative Binomial Variables

2.5 Convergence in Distribution

3. The Binomial Family and the Bernoulli Process

3.1 Binomial Approximations

3.2 Binomial Random Variables

3.3 Bernoulli Processes

4. The Poisson Family

4.1 Poisson Approximation to Binomial Probabilities

4.2 Approximation to the Negative Binomial

4.3 Poisson Random Variables

5. More About Expectation

6. Mean Squared Error and Variance

6.1 Expectations of Functions

6.2 Variance

6.3 Variances of Some Families

7. Bernoulli Parameter Estimation

7.1 Estimating Binomial p .

7.2 Confidence Bounds for Binomial p .

7.3 Confidence Intervals

7.4 Two-sided Hypothesis Tests