Proof-Based Math Readings
Session: Statistics*

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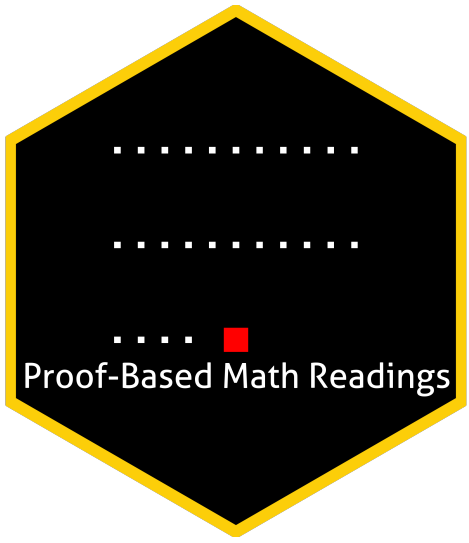

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0 Motivation

- *Proof-Based Math Readings* is a free, independent online reading group where we study the mathematics required for economics master's and PhD programs through an intuitive approach. Active since May 2023.
- This session of the reading group is on *Statistics*.

1 Prerequisites

- Introduction to Probability - Dimitri Bertsekas, John Tsitsiklis (2nd Edition, 2008, Summary Material)
- Introduction to Probability - Dimitri Bertsekas, John Tsitsiklis (2nd Edition, 2008, Playlist)
- Introduction to Probability - Dimitri Bertsekas, John Tsitsiklis (2nd Edition, 2008, Solutions & Errata)
- Please use the Application Form to join our reading group; you will receive a response within a week.

2 Format

- This session takes 12 weeks. We do not have face-to-face/online meetings due to the size of the group.
- Members read the main book and discuss the topics/exercises in the Proof-Based Math Readings Discord .

3 Resources

3.1 Main Book and Main Book's Playlist

Statistical Inference - George Casella, Roger Berger (2nd Edition, 2001 or 2024) is our main book because it is well-written and well-structured.

- Statistical Inference - George Casella, Roger Berger (2nd Edition, 2001 or 2024)
- Statistical Inference - George Casella, Roger Berger (2nd Edition, 2001, Errata)
- Statistical Inference - George Casella, Roger Berger (2nd Edition, 2001 or 2024, Solutions)
- Statistical Inference - George Casella, Roger Berger (2nd Edition, 2001 or 2024, Playlist for Chapter 1-5 by Stephen Carden)
- Statistical Inference - George Casella, Roger Berger (2nd Edition, 2001 or 2024, Playlist for Chapter 5-9 by Somesh Kumar)

3.2 Supplementary

3.2.1 Probability and Statistics

- Introduction to Probability - Joseph K. Blitzstein, Jessiza Hwang (2nd Edition, 2019)
- Introduction to Probability - Joseph K. Blitzstein, Jessiza Hwang (2nd Edition, 2019, Selected Solutions)
- Introduction to Probability - Joseph K. Blitzstein, Jessiza Hwang (2nd Edition, 2019, Playlist)
- Introduction to Mathematical Statistics - Jingyi Jessica Li (2022)
- Mathematical Statistics - Jem N. Corcoran (2024)
- The Book of Statistical Proofs - Joram Soch (2024)
- Statistical Ideas that Changed the World - Robert Tibshirani (2024, Interview Series)
- The Epic Story of Maximum Likelihood Stephen - M. Stigler (2008)

3.2.2 Proof Techniques

- Book of Proof - Richard Hammack (3.4 Edition, 2025)
- Book of Proof - Richard Hammack (3.4 Edition, 2025, Playlist by Jeremy Teitelbaum)
- Book of Proof - Richard Hammack (3.4 Edition, 2025, Playlist by Michael Penn)

4 Reading Schedule

SI is the abbreviation of Statistical Inference - George Casella, Roger Berger (2nd Edition, 2001 or 2024).

SI, Chapter 1: Probability Theory — **Week 01**

1.1 Set Theory, **1.2** Probability Theory, **1.3** Conditional Probability and Independence,
1.4 Random Variables, **1.5** Distribution Functions, **1.6** Density and Mass Functions

SI, Chapter 2: Transformations and Expectations — **Week 02**

2.1 Distributions of a Random Variable
2.2 Expected Values
2.3 Moments and Moment Generating Functions

SI, Chapter 3: Common Families of Distributions — **Week 03-04**

3.1 Introduction
3.2 Discrete Distributions
3.3 Continuous Distributions
3.4 Exponential Families
3.5 Location and Scale Families
3.6 Inequality and Identities

SI, Chapter 4: Multiple Random Variables — **Week 05-06**

4.1 Joint and Marginal Distributions
4.2 Conditional Distributions and Independence
4.3 Bivariate Transformations
4.4 Hierarchical Models and Mixture Distributions
4.5 Covariance and Correlation
4.6 Multivariate Distributions
4.7 Inequalities

SI, Chapter 5: Properties of a Random Sample — **Week 07-08**

5.1 Basic Concepts of Random Samples
5.2 Sums of Random Variables from a Random Sample
5.3 Sampling from the Normal Distribution
5.4 Order Statistics
5.5 Convergence Concepts
5.6 Generating a Random Sample

SI, Chapter 7: Point Estimation — **Week 09-10**

7.1 Introduction
7.2 Methods of Finding Estimators
7.3 Methods of Evaluating Estimators

SI, Chapter 8: Hypothesis Testing — **Week 11-12**

8.1 Introduction
8.2 Methods of Finding Tests
8.3 Methods of Evaluating Tests