

Proof-Based Math Readings

Session: Statistics*

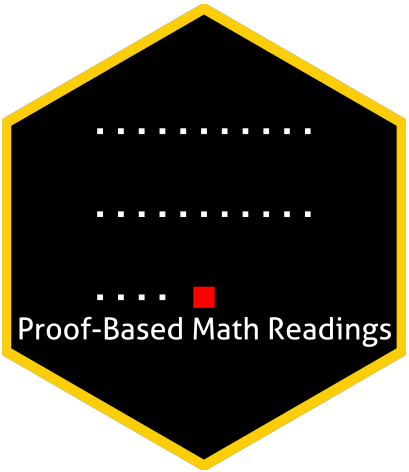
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Version: 01 February 2026, 08:20 PM

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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 and Format

- 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.
- 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 .

2 Resources

2.1 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)

2.2 Supplementary

2.2.1 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)

2.2.2 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)

3 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