

Proof-Based Math Readings

Session: Statistics

2024 Winter

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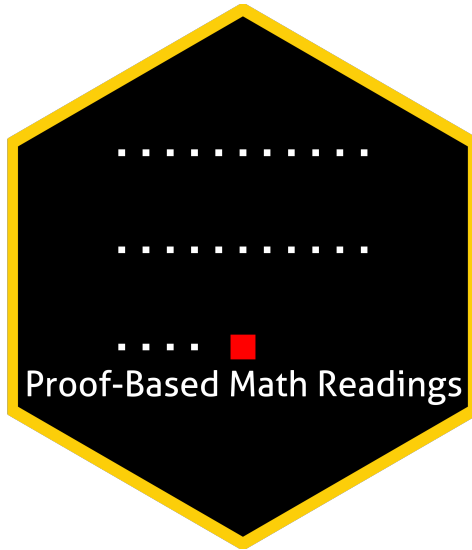
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0 Motivation

- *Proof-Based Math Readings* is a free and independent online reading group where we study mathematics required in economics master's/PhD programs using an intuitive approach.
- This session of the reading group is on *Statistics*.

1 Prerequisites

- CGPA: 3.00/4.00
- [Introduction to Probability](#) - Dimitri P. Bertsekas, John N. Tsitsiklis (2nd Edition, 2008, Summary Material)
- [Introduction to Probability](#) - Dimitri P. Bertsekas, John N. Tsitsiklis (2nd Edition, 2008, Playlist)
- [Introduction to Probability](#) - Dimitri P. Bertsekas, John N. Tsitsiklis (2nd Edition, 2008, Solutions and Errata)
- Please use our [📄 Application Form](#) to join our reading group anytime.
- Applicants will be informed about their application results within a week via email.

2 Format

- This session will last 12 weeks.
- We will discuss the topics/exercises that we struggle with at [🗨️ Proof-Based Math Readings \[Discord\]](#).
- We will not have face-to-face/online meetings due to the size of the group.
- Members are expected to read the chapters from the book's playlist.

3 Resources

3.1 Main Book and Main Book's Playlist

Statistical Inference by George Casella and Roger Berger is our main book because it is a well-written and well-structured.

- 📖 [Statistical Inference](#) - George Casella, Roger Berger (2nd Edition, 2001)
- 📖 [Statistical Inference](#) - George Casella, Roger Berger (2nd Edition, 2001, Errata)
- 📖 [Statistical Inference](#) - George Casella, Roger Berger (2nd Edition, 2001, Solutions)
- 📺 [Statistical Inference](#) - George Casella, Roger Berger (2nd Edition, 2001, Playlist by for Chapter 1-5)
- 📺 [Statistical Inference](#) - George Casella, Roger Berger (2nd Edition, 2001, Playlist for Chapter 5-9)

3.2 Supplementary

3.2.1 Proof

- 📖 [Book of Proof](#) - Richard Hammack (3.3 Edition, 2022)
- 📺 [Book of Proof](#) - Richard Hammack (3.3 Edition, 2022, Companion playlist by Jeremy Teitelbaum)
- 📺 [Book of Proof](#) - Richard Hammack (3.3 Edition, 2022, Companion playlist by Michael Penn)
- 📖 [Book of Proof](#) - Richard Hammack (3.3 Edition, 2022, Companion workbook by Justin Wright)

3.2.2 Real Analysis

- 📖 [Basic Analysis I: Introduction to Real Analysis \[Volume I\]](#) - Jiri Lebl (Version 6.0, 2023)
- 📺 [Real Analysis](#) - Casey Rodriguez (2020, Companion playlist to Basic Analysis I)
- 📺 [Introduction To Metric Spaces](#) - Paige Bright (2023)

4 Reading Schedule

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

SI, Chapter 1: Probability Theory

Week 01

- 1 Set Theory, 2 Basics of Probability Theory, 3 Conditional Probability and Independence,
- 4 Random Variables, 5 Distribution Functions, 6 Density and Mass Functions

SI, Chapter 2: Transformations and Expectations

Week 02

- 1 Distributions of a Random Variable
- 2 Expected Values
- 3 Moments and Moment Generating Functions

SI, Chapter 3: Common Families of Distributions

Week 03-04

- 1 Introduction
- 2 Discrete Distributions
- 3 Continuous Distributions
- 4 Exponential Families
- 5 Location and Scale Families
- 6 Inequality and Identities

SI, Chapter 4: Multiple Random Variables

Week 05-06

- 1 Joint and Marginal Distributions
- 2 Conditional Distributions and Independence
- 3 Bivariate Transformations
- 4 Hierarchical Models and Mixture Distributions
- 5 Covariance and Correlation
- 6 Multivariate Distributions
- 7 Inequalities

SI, Chapter 5: Properties of a Random Sample

Week 07-08

- 1 Basic Concepts of Random Samples
- 2 Sums of Random Variables from a Random Sample
- 3 Sampling from the Normal Distribution
- 4 Order Statistics
- 5 Convergence Concepts
- 6 Generating a Random Sample

SI, Chapter 6: Principles of Data Reduction

Week 09-10

- 1 Introduction
- 2 The Sufficiency Principle
- 3 The Likelihood Principle

SI, Chapter 7: Point Estimation

Week 11-12

- 1 Introduction
- 2 Methods of Finding Estimators
- 3 Methods of Evaluating Estimators