

# Proof-Based Math Readings

## Session: Statistics

### 2024 Summer

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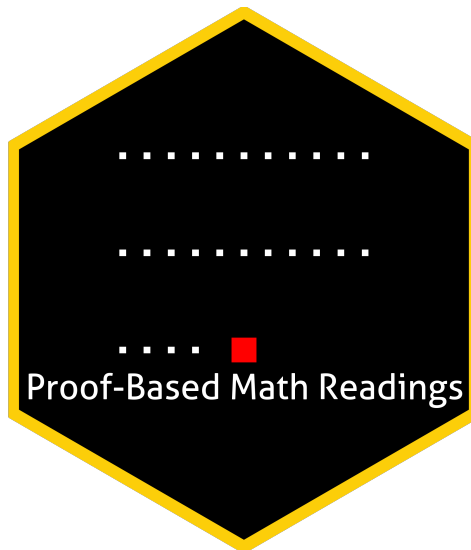
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## 0 Motivation

- *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 \(2nd Edition, 2008, Solutions & Errata\)](#)
- Please use the [📄 Application Form](#) to join our reading group anytime.
- Applicants are informed about their application results within a week via email.

## 2 Format

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

## 3 Resources

### 3.1 Main Book and Main Book's Playlist

**Statistical Inference (2nd Edition, 2001 or 2024)** by George Casella and Roger Berger is our main book because it is well-written and well-structured. The 2024 version of the book is just errata-free reprint of the 2001 version.

- 📖 [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 \(2nd Edition, 2001 or 2024, Playlist for Chapter 1-5\)](#)
- 📺 [Statistical Inference - George Casella, Roger Berger \(2nd Edition, 2001 or 2024, Playlist for Chapter 5-9\)](#)

### 3.2 Supplementary

#### 3.2.1 Statistics

- 📺 [Introduction to Mathematical Statistics - Jingyi Jessica Li \(2022\)](#)
- 📺 [Mathematical Statistics - Jem N. Corcoran \(2024\)](#)
- 📖 [The Book of Statistical Proofs - Joram Soch \(2024\)](#)

#### 3.2.2 Proof

- 📖 [Book of Proof - Richard Hammack \(3.3 Edition, 2022\)](#)
- 📺 [Book of Proof - Richard Hammack \(3.3 Edition, 2022, Playlist by Jeremy Teitelbaum\)](#)
- 📺 [Book of Proof - Richard Hammack \(3.3 Edition, 2022, Playlist by Michael Penn\)](#)

#### 3.2.3 Real Analysis

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

## 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 Basics of 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 6: Principles of Data Reduction

Week 09-10 

6.1 Introduction  
6.2 The Sufficiency Principle  
6.3 The Likelihood Principle

### SI, Chapter 7: Point Estimation

Week 11-12 

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