Proof-Based Math Readings
Session: Measure Theory*

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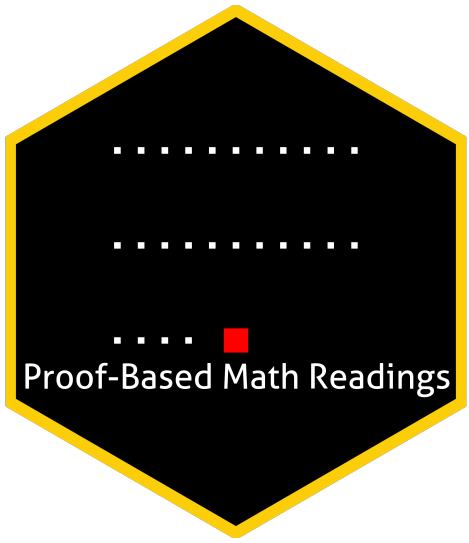

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0 Motivation

- *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 *Measure Theory*.

1 Prerequisites

- Proof Techniques, Real Analysis, and Topology resources below.
- 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

Measure, Integration & Real Analysis - Sheldon Axler (2025, Errata-free version) is our main book for this session because it is well-written, well-structured, and open-access.

- Measure, Integration & Real Analysis - Sheldon Axler (2025, Errata-free version)
- Measure, Integration & Real Analysis - Sheldon Axler (202X, Playlist) → will be added after the 2nd edition.

3.2 Supplementary

3.2.1 Measure Theory

- Measure Theory - The Bright Side of Mathematics (2025)
- Measure Theory - Indrava Roy (2020)
- A horizontal integral?! Introduction to Lebesgue Integration - vcubingx (2020)
- The Lebesgue Integral - BBC (1975)

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)

3.2.3 Real Analysis

- Measure, Integration & Real Analysis - Sheldon Axler (2025, Supplement)
- Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.2, 2025)
- Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.2, 2025, Playlist by Casey Rodriguez)
- Introduction To Metric Spaces - Paige Bright (2023)

4 Reading Schedule

- **MIRA** is the abbreviation of **Measure, Integration & Real Analysis - Sheldon Axler (2025)**.

MIRA, Chapter 1: Riemann Integration — **Week 01**

1A Review: Riemann Integral
1B Riemann Integral Is Not Good Enough

MIRA, Chapter 2: Measures — **Week 02-03-04-05**

2A Outer Measure on $\mathbf{R}$
2B Measurable Spaces and Functions
2C Measures and Their Properties
2D Lebesgue Measure
2E Convergence of Measurable Functions

MIRA, Chapter 3: Integration — **Week 06-07-08**

3A Integration with Respect to a Measure
3B Limits of Integrals & Integrals of Limits

MIRA, Chapter 4: Differentiation — **Week 09**

4A Hardy–Littlewood Maximal Function
4B Derivatives of Integrals

MIRA, Chapter 5: Product Measures — **Week 10-11-12**

5A Products of Measure Spaces
5B Iterated Integrals
5C Lebesgue Integration on $\mathbf{R}^n$

5 Further Readings (Optional)

Our Measure Theoretic Probability syllabus at github.com/zekiakyol/proof-based-math-readings