Proof-Based Math Readings Session: Measure Theory *

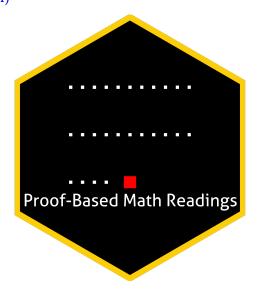
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0 Motivation

- 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)
- lacktriangle Measure, Integration & Real Analysis Sheldon Axler (202X) \rightarrow 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 6.1, 2024)
- Basic Analysis I: Introduction to Real Analysis Jiri Lebl (Version 6.1, 2024, Playlist by Casey Rodriguez)
- ► Introduction To Metric Spaces Paige Bright (2023)

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 R
- **2B** Measurable Spaces and Functions
- **2C** Measures and Their Properties
- **2D** Lebesgue Measure
- ${\bf 2E}$ 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 **R**ⁿ

Further Readings (Optional) 5

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