Proof-Based Math Readings
Session: Real Analysis*

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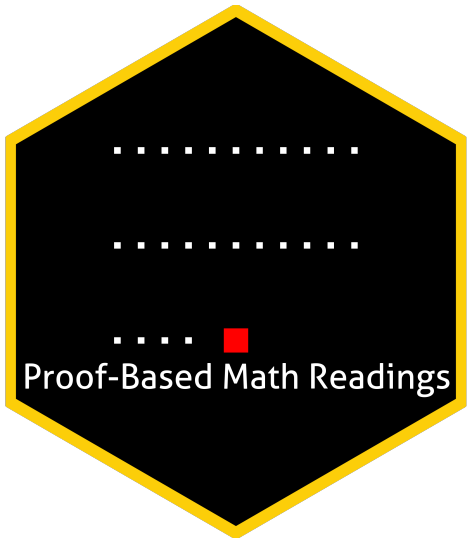

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0 Motivation

- *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 *Real Analysis*.

1 Prerequisites

- Proof Techniques 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 [All are open-access]

3.1 Main Book and Main Book's Playlist

Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.2, 2025) is our main book for this session because it is well-written, well-structured, and open-access.

Casey Rodriguez's playlist is our main playlist because his narrative is great.

- 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)
- Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.2, 2025, Notes by Casey Rodriguez)

3.2 Supplementary

3.2.1 Real Analysis

- Real Analysis - Wrath of Math (2025) → Start with this playlist if you find the main book challenging
- Real Analysis - Michael Penn (2021)
- Understanding Analysis - Stephen Abbott (2nd Edition, 2016, Playlist by Marc Renault)
- Understanding Analysis - Stephen Abbott (2nd Edition, 2016, Solutions by Ulisse Mini, Jesse Liby)

3.2.2 Calculus

- Essence of Calculus - 3Blue1Brown (2023)
- Single Variable Calculus - David Jerison (2006) and Multivariable Calculus - Denis Auroux (2007)
- Sequences and Series Calculator - Geogebra
- Function Graph - Geogebra

3.2.3 Proof Techniques

- Book of Proof - Richard Hammack (3.4 Edition, 2025)
- Book of Proof - Richard Hammack (3.4 Edition, 2025, Playlist by Jeremy Teitelbaum, Chapters 1-12)
- Book of Proof - Richard Hammack (3.4 Edition, 2025, Playlist by Michael Penn, Chapters 1-14)

4 Reading Schedule

- **BAI** is the abbreviation of Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.2, 2025).
- We use Understanding Analysis - Stephen Abbott (2nd Edition, 2016, Solutions by Ulisse Mini, Jesse Liby) for exercises.

BAI, Chapter 0: Introduction — **Week 01**

List of Notation (Page 309-312)
0.1 About this book
0.2 About analysis
0.3 Basic set theory

BAI, Chapter 1: Real Numbers — **Week 02**

1.1 Basic properties
1.2 The set of real numbers
1.3 Absolute value and bounded functions
1.4 Intervals and the size of $\mathbb{R}$

BAI, Chapter 2: Sequence and Series — **Week 03-04-05**

2.1 Sequences and limits
2.2 Facts about limits of sequences
2.3 Limit superior, limit inferior, and Bolzano-Weierstrass
2.4 Cauchy sequences
2.5 Series

BAI, Chapter 3: Continuous Functions — **Week 06-07-08**

3.1 Limits of functions
3.2 Continuous functions
3.3 Extreme and intermediate value theorems
3.4 Uniform continuity

BAI, Chapter 4: The Derivative — **Week 09-10**

4.1 The derivative
4.2 Mean value theorem
4.3 Taylor's theorem

BAI, Chapter 5: The Riemann Integral — **Week 11-12**

5.1 The Riemann integral
5.2 Properties of the integral
5.3 Fundamental theorem of calculus

5 Further Readings (Optional)

Introduction To Metric Spaces - Paige Bright (2023)