

Proof-Based Math Readings

Session: Proof Techniques*

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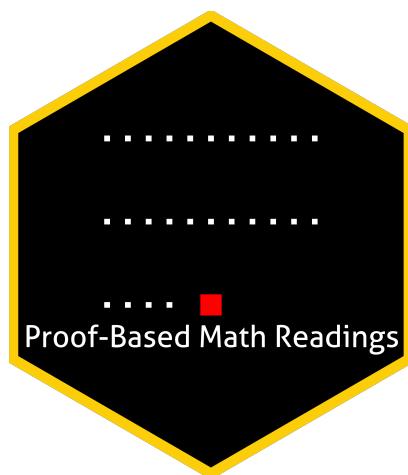
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0 Motivation

- *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 *Proof Techniques*.

1 Prerequisites and Format

- Calculus resources below.
- Please use the [🔗 Application Form](#) to join our reading group; you will receive a response within a week.
- 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 [🔗](#).

2 Resources [All are open-access]

2.1 Main Book and Main Book's Playlist

Book of Proof - Richard Hammack (3.4 Edition, 2025) is our main book because it is a well-written and well-structured pedagogical masterpiece. It is also open-access and provides detailed solutions for odd-numbered exercises at the end of the book.

Jeremy Teitelbaum's playlist on Book of Proof is our main playlist because his narrative is great.

- ❑ 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)

2.2 Supplementary

2.2.1 Proof Techniques

Because our main playlist does not cover Chapters 13-14, we cover these chapters from Michael Penn's playlist.

- ▶ Book of Proof - Richard Hammack (3.4 Edition, 2025, Playlist by Michael Penn, Chapters 1-14)
- ▶ Book of Proof - Richard Hammack (3.4 Edition, 2025, Playlist by Valerie Hower, Chapters 1-12)
- ❑ Book of Proof - Richard Hammack (3.4 Edition, 2025, Workbook by Justin Wright)
- ❑ Appendix A: Elements of Style for Proofs - Dana C. Ernst (2025)

2.2.2 Calculus

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

3 Reading Schedule

- 1) Read the chapter and watch the matching playlist.
- 2) Solve the odd-numbered exercises and check their solutions at the end of the book.
- 3) Solve the even-numbered exercises and check their solutions using our unofficial solutions manual.
- 4) If stuck, ask questions in Discord.

Book of Proof	Week 01
Chapter 1: Sets Chapter 2: Logic Chapter 3: Counting	
Book of Proof	Week 02-03
Chapter 4: Direct Proof Chapter 5: Contrapositive Proof Chapter 6: Proof by Contradiction	
Book of Proof	Week 04-05
Chapter 7: Proving Non-Conditional Statements Chapter 8: Proofs Involving Sets Chapter 9: Disproof	
Book of Proof	Week 06
Chapter 10: Mathematical Induction	
Book of Proof	Week 07-08
Chapter 11: Relations Chapter 12: Functions	
Book of Proof	Week 09-10
Chapter 14: Cardinality of Sets	(This chapter requires a solid understanding of Chapter 12)
Book of Proof	Week 11-12
Chapter 13: Proofs in Calculus	(This chapter is denser than the previous ones)

4 Further Readings (Optional)

 Mathematical Proofs - G. Chartrand, A. Polimeni, P. Zhang (**Chapter 0-14**, 4th Edition, 2018) 