

Proof-Based Math Readings

Session: Linear Algebra*

Zeki Akyol

Department of Economics

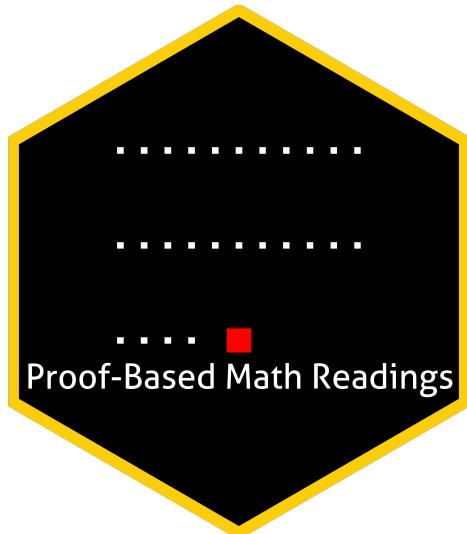
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*zekiakyol.com

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 *Linear Algebra*.
- This session is dedicated to Sheldon Axler's lovely cat, Moon, who passed away in August 2023.

1 Prerequisites

- Proof Techniques resources below and [Linear Algebra - Gilbert Strang \(2005\)](#).
- 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

Linear Algebra Done Right - Sheldon Axler (4th Edition, 2025, Errata-free version) is our main book for this session because it is well-written, well-structured, and open-access.

Robert Won's playlist is our main playlist because his narrative is great.

- [Linear Algebra Done Right - Sheldon Axler \(4th Edition, 2025, Errata-free version\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(4th Edition, 2025, Playlist by Robert Won\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(4th Edition, 2025, Playlist by Sheldon Axler\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(4th Edition, 2025, Notes by Robert Won\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(4th Edition, 2025, Solutions by MathwithoutCommentary\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(4th Edition, 2025, Solutions by Oliver Li\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(4th Edition, 2025, Solutions by nehc0\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(3rd Edition, 2015, Solutions by linearalgebras\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(3rd Edition, 2015, Solutions by jubnoske08\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(3rd Edition, 2015, Solutions by Solverer\)](#)

3.2 Supplementary

3.2.1 Linear Algebra

- [Essence of Linear Algebra - 3Blue1Brown \(2023\)](#)
- [Linear Algebra Done Right - Sheldon Axler \(3rd Edition, 2015, Playlist by Jason Morton\)](#)
- [Down with Determinants! - Sheldon Axler \(1994\)](#)

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 \(3.4 Edition, 2025, Playlist by Michael Penn\)](#)

4 Reading Schedule

- LADR is the abbreviation of Linear Algebra Done Right - Sheldon Axler (4th Edition, 2025).

LADR, Chapter 1: Vector Spaces	Week 01
1A \mathbf{R}^n and \mathbf{C}^n 1B Definition of Vector Space 1C Subspaces	
LADR, Chapter 2: Finite-Dimensional Vector Spaces	Week 02-03
2A Span and Linear Independence 2B Bases 2C Dimension	
LADR, Chapter 3: Linear Maps	Week 04-05-06
3A Vector Space of Linear Maps 3B Null Spaces and Ranges 3C Matrices 3D Invertibility and Isomorphisms	
LADR, Chapter 5: Eigenvalues and Eigenvectors	Week 07-08
5A Invariant Subspaces 5B The Minimal Polynomial 5C Upper-Triangular Matrices 5D Diagonalizable Operators	
LADR, Chapter 6: Inner Product Spaces	Week 09-10
6A Inner Products and Norms 6B Orthonormal Bases 6C Orthogonal Complements and Minimization Problems	
LADR, Chapter 7: Operators on Inner Product Spaces	Week 11-12
7A Self-Adjoint and Normal Operators 7B Spectral Theorem 7C Positive Operators 7D Isometries, Unitary Operators, and Matrix Factorization 7E Singular Value Decomposition	

5 Further Readings (Optional)

Matrix Analysis - Roger A. Horn, Charles R. Johnson (2nd Edition, 2013)