

Proof-Based Math Readings

Session: Matrix Algebra*

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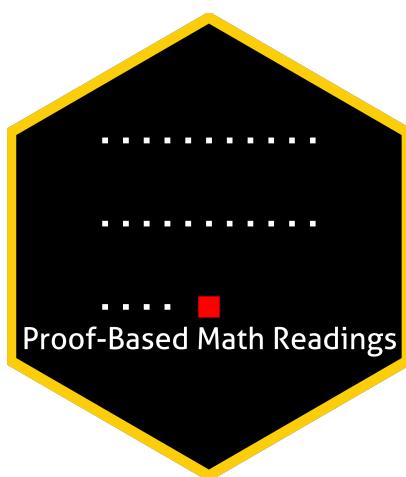
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0 Motivation

- *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 *Matrix Algebra*.

1 Prerequisites and Format

- 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.
- 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

2.1 Main Book

Matrix Algebra - Karim M. Abadir, Jan R. Magnus (2005) is our main book because it is well-written and well-structured. It also provides detailed solutions for the exercises.

- Matrix Algebra - Karim M. Abadir, Jan R. Magnus (2005)
- Matrix Algebra - Karim M. Abadir, Jan R. Magnus (2005, Errata)

2.2 Supplementary

2.2.1 Matrix Algebra

- A Gentle Introduction to Matrix Calculus - Jan R. Magnus (2024)
- The Matrix Cookbook - Kaare Brandt Petersen, Michael Syskind Pedersen (2012)
- Econometric Theory - William H. Greene (Appendix A, 8th Edition, 2020)
- matrixcalculus.org

2.2.2 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 Reading Schedule

- MA is the abbreviation of Matrix Algebra - Karim M. Abadir, Jan R. Magnus (2005).

 MA	Week 01 
Appendix A: Some mathematical tools Appendix B: Notation Chapter 1: Vectors Chapter 2: Matrices	
 MA	Week 02 
Chapter 3: Vector spaces Chapter 4: Rank, inverse, and determinant	
 MA	Week 03-04 
Chapter 5: Partitioned matrices Chapter 6: Systems of equations	
 MA	Week 05-06 
Chapter 7: Eigenvalues, eigenvectors, and factorizations Chapter 8: Positive (semi)definite and idempotent matrices Chapter 9: Matrix functions	
 MA	Week 07-08-09 
Chapter 10: Kronecker product, vec-operator, and Moore-Penrose inverse Chapter 11: Patterned matrices: commutation- and duplication matrix	
 MA	Week 10-11-12 
Chapter 12: Matrix inequalities Chapter 13: Matrix calculus	

4 Further Readings (Optional)

-  Matrix Differential Calculus with Applications in Statistics and Econometrics - Jan R. Magnus, Heinz Neudecker (3rd Edition, 2019)