

Proof-Based Math Readings

Session: Matrix Algebra

2023 Fall

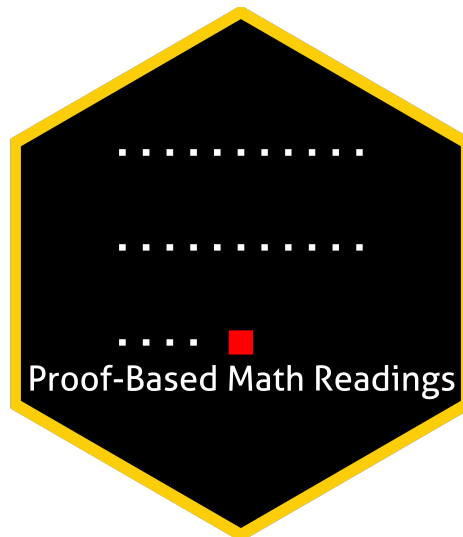
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0 Motivation

- *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

- 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





3.1 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 \(2005, Errata\)](#)

3.2 Supplementary

3.2.1 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

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

- 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	

5 Further Readings (Optional)

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