

Proof-Based Math Readings

Session: Matrix Algebra

2023 Fall

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0 Motivation

- *Proof-Based Math Readings* is a free and independent online reading group where we study mathematics required in economics master's/PhD programs using an intuitive approach.
- This session of the reading group is on *Matrix Algebra*.

1 Prerequisites

- CGPA: 3.00/4.00.
- Proof resources below and  [Linear Algebra - Gilbert Strang \(2005\)](#) are the prerequisites for this session.
- Please use the  [Application Form](#) to join our reading group.
- Applicants are informed about their application results within a week via email.


2 Format

- This session takes 12 weeks.
- We discuss the topics/exercises that we struggle with at  [Proof-Based Math Readings \[Discord\]](#).
- We do not have face-to-face/online meetings due to the size of the group.
- Members are expected to read the chapters from the book.

3 Resources

3.1 Main Book


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

 [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

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

 [Econometric Theory - William H. Greene \(**Appendix A**, 8th Edition, 2020\)](#)

 matrixcalculus.org

3.2.2 Proof













 [Book of Proof - Richard Hammack \(3.3 Edition, 2022\)](#)

 [Book of Proof - Richard Hammack \(3.3 Edition, 2022, Playlist by Jeremy Teitelbaum\)](#)

 [Book of Proof - Richard Hammack \(3.3 Edition, 2022, Playlist by Michael Penn\)](#)

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)

You can check out our Linear Algebra syllabus at  github.com/zekiakyol/proof-based-math-readings