

Proof-Based Math Readings

Session: Matrix Algebra*

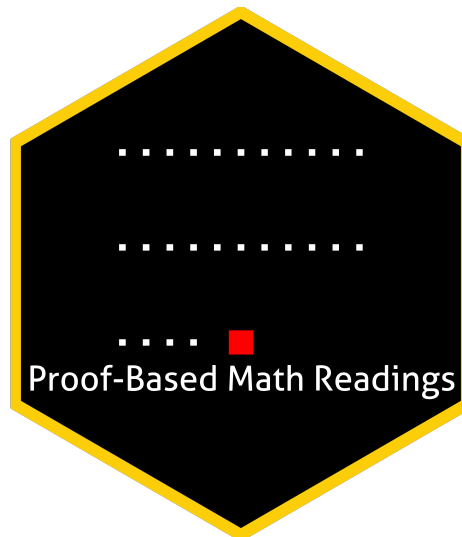
Zeki Akyol

Department of Economics
Istanbul Technical University
[Click here for the most recent version](#)

Version: 27 May 2025, 07:36 PM

Table of contents

0	Motivation	2
1	Prerequisites	2
2	Format	2
3	Resources	2
3.1	Main Book	2
3.2	Supplementary	2
3.2.1	Matrix Algebra	2
3.2.2	Proof Techniques	2
4	Reading Schedule	3
5	Further Readings (Optional)	3



*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 *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)