

Proof-Based Math Readings

Session: Matrix Algebra

2023 Fall

Zeki Akyol*

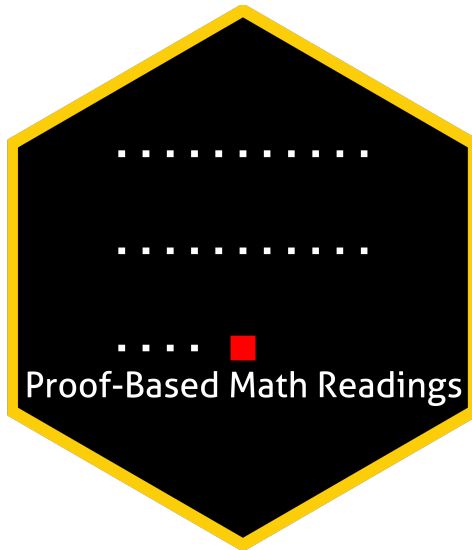
Department of Economics
Istanbul Technical University

[Click here for the most recent versions of the syllabuses](#)

Version: 07 October 2024, 10:36 AM

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	2
4	Reading Schedule	3
5	Further Readings (Optional)	3





*zekiakyol.com


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 the 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

 [A Gentle Introduction to Matrix Calculus - Jan R. Magnus \(2024\)](#)

 [The Matrix Cookbook - Kaare Brandt Petersen, Michael Syskind Pedersen \(2012\)](#)

 matrixcalculus.org

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

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)

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