

# Proof-Based Math Readings

## Session: Matrix Algebra\*

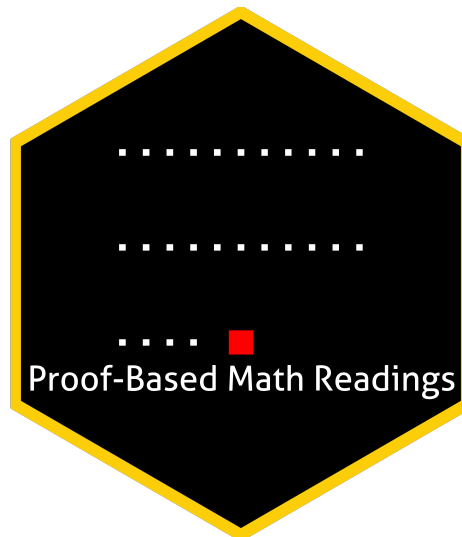
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\*[zekiakyol.com](http://zekiakyol.com)

## 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)