

# 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
-  [Book of Proof - Richard Hammack \(3.3 Edition, 2022\)](#)
-  [Linear Algebra - Gilbert Strang \(2005\)](#)
- Please use our  [Application Form](#) to join our reading group anytime.
- Applicants will be informed about their application results within a week via email.



## 2 Format

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

-  [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 \(\*\*Appendix A\*\*, 8th Edition, 2020\)](#)

#### 3.2.2 Proof

-  [Book of Proof - Richard Hammack \(3.3 Edition, 2022\)](#)
-  [Book of Proof - Richard Hammack \(3.3 Edition, 2022, Companion playlist by Jeremy Teitelbaum\)](#)
-  [Book of Proof - Richard Hammack \(3.3 Edition, 2022, Companion playlist by Michael Penn\)](#)

## 4 Reading Schedule

- **MA** is the abbreviation of **Matrix Algebra - Karim M. Abadir, Jan R. Magnus (2005)**.

### 📅 Week 01-02

- 📖 **MA**, Appendix A: Some mathematical tools
- 📖 **MA**, Appendix B: Notation
- 📖 **MA**, Chapter 1: Vectors
- 📖 **MA**, Chapter 2: Matrices
- 📖 **MA**, Chapter 4: Rank, inverse, and determinant

### 📅 Week 03-04

- 📖 **MA**, Chapter 5: Partitioned matrices
- 📖 **MA**, Chapter 6: Systems of equations

### 📅 Week 05-06

- 📖 **MA**, Chapter 7: Eigenvalues, eigenvectors, and factorizations
- 📖 **MA**, Chapter 8: Positive (semi)definite and idempotent matrices

### 📅 Week 07-08-09

- 📖 **MA**, Chapter 10: Kronecker product, vec-operator, and Moore-Penrose inverse
- 📖 **MA**, Chapter 11: Patterned matrices: commutation- and duplication matrix

### 📅 Week 10-11-12

- 📖 **MA**, Chapter 12: Matrix inequalities
- 📖 **MA**, Chapter 13: Matrix calculus
- 📖 **MA**, Chapter 3: Vector spaces (Optional)

## 5 Further Readings (Optional)

You can check out our Linear Algebra syllabus at [🔗 github.com/zekiakyol/proof-based-math-readings](https://github.com/zekiakyol/proof-based-math-readings)