

# Proof-Based Math Readings

## Session: Matrix Algebra

### 2023 Fall

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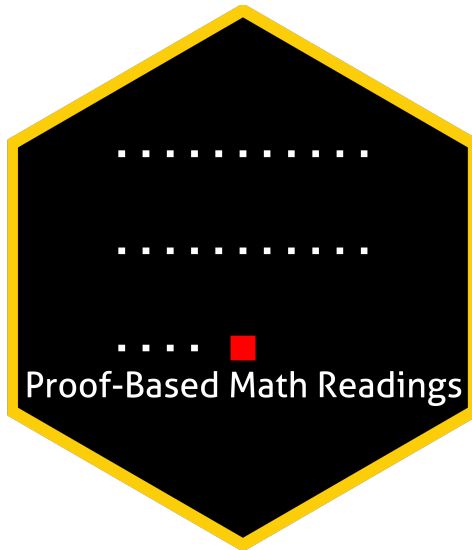
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[Click here for the most recent versions of the syllabuses](#)

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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 anytime.
- 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](https://matrixcalculus.org)

#### 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).

|   |   |
|---|---|
|  MA  | Week 01          |
| Appendix A: Some mathematical tools<br>Appendix B: Notation<br>Chapter 1: Vectors<br>Chapter 2: Matrices  |   |
|  MA  | Week 02          |
| Chapter 3: Vector spaces<br>Chapter 4: Rank, inverse, and determinant   |   |
|  MA  | Week 03-04       |
| Chapter 5: Partitioned matrices<br>Chapter 6: Systems of equations  |   |
|  MA  | Week 05-06       |
| Chapter 7: Eigenvalues, eigenvectors, and factorizations<br>Chapter 8: Positive (semi)definite and idempotent matrices<br>Chapter 9: Matrix functions |   |
|  MA  | Week 07-08-09  |
| Chapter 10: Kronecker product, vec-operator, and Moore-Penrose inverse<br>Chapter 11: Patterned matrices: commutation- and duplication matrix         |   |
|  MA  | Week 10-11-12  |
| Chapter 12: Matrix inequalities<br>Chapter 13: Matrix calculus  |   |

## 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)