# Proof-Based Math Readings Session: Matrix Algebra

2023 Fall

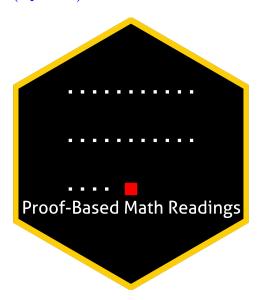
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### Table of contents

0	Motivation	
1	Prerequisites	:
2	Format	:
3	Resources [All are open-access]     3.1 Main Book      3.2 Supplementary      3.2.1 Matrix Algebra      3.2.2 Proof	
4	Reading Schedule	
5	Further Readings & Playlists (Optional)	



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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), Linear Algebra Gilbert Strang (2005)
- Please apply by uploading your CV and transcript to this **Google Form** until 23:59, 18 October 2023. Please upload your CV and transcript as **NameSurname.pdf**, not **CV.pdf**. Students who applied will be informed about their application results via email at 10:00, 20 October 2023.

#### 2 Format

- This session will last 10 weeks from 30 October 2023 to 14 January 2024.
- 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 size of the group.
- Members are expected to read the chapters from the book.

### 3 Resources [All are open-access]

#### 3.1 Main Book

Matrix Algebra - Karim M. Abadir, Jan R. Magnus (2005) is our main book because it is a 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)

#### **3.2.2** Proof

In case we need to review a proof topic we can use following book and its playlists.

- 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 abrevviation of Matrix Algebra - Karim M. Abadir, Jan R. Magnus (2005) in the previous page.

## Week 01-02 **= 30 October - 12 November** MA, Appendix B: Notation MA, Chapter 1: Vectors MA, Chapter 2: Matrices MA, Chapter 3: Vector spaces MA, Chapter 4: Rank, inverse, and determinant Week 03-04 苗 13 November - 26 November MA, Chapter 5: Partitioned matrices MA, Chapter 6: Systems of equations Week 05-06 ## 27 November - 10 December MA, Chapter 7: Eigenvalues, eigenvectors, and factorizations MA, Chapter 8: Positive (semi)definite and idempotent matrices Week 07-08 苗 11 December - 31 December MA, Chapter 10: Kronecker product, vec-operator, and Moore-Penrose inverse MA, Chapter 11: Patterned matrices: commutation- and duplication matrix Week 09-10 苗 01 January - 14 January MA, Chapter 12: Matrix inequalities MA, Chapter 13: Matrix calculus

# 5 Further Readings & Playlists (Optional)

If we want to read a more abstract book, the following book and its playlist are great.

■ Linear Algebra Done Right - Sheldon Axler (4th Edition, 2023, Forthcoming)
■ Linear Algebra Done Right - Sheldon Axler (3rd Edition, 2015, Companion playlist to the book)
We will also have a session on this book. Please see our syllabus at Linear Algebra