Proof-Based Math Readings Session: Matrix Algebra

2023 Fall

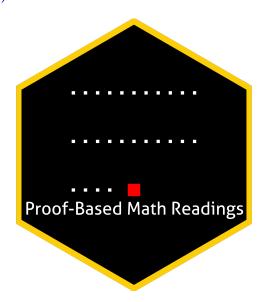
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0 Motivation

- 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 **O** 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 10 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.

- Adadir, 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**

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 **= 23** October - 05 November MA, Appendix B: Notation MA, Chapter 1: Vectors MA, Chapter 2: Matrices MA, Chapter 4: Rank, inverse, and determinant Week 03-04 **= 06** November - 19 November MA, Chapter 5: Partitioned matrices MA, Chapter 6: Systems of equations Week 05-06 ## 20 November - 03 December MA, Chapter 7: Eigenvalues, eigenvectors, and factorizations MA, Chapter 8: Positive (semi)definite and idempotent matrices Week 07-08-09 **≡** 04 December - 24 December MA, Chapter 10: Kronecker product, vec-operator, and Moore-Penrose inverse MA, Chapter 11: Patterned matrices: commutation- and duplication matrix Week 10-11-12 **25** December - 14 January MA, Chapter 12: Matrix inequalities MA, Chapter 13: Matrix calculus MA, Chapter 3: Vector spaces (Optional)

5 Further Readings (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, 2024)
Linear Algebra Done Right - Sheldon Axler (4th Edition, 2024, Companion playlist to the book)
We also have a session on Linear Algebra at github.com/zekiakyol/proof-based-math-readings