Proof-Based Math Readings Session: Algorithms*

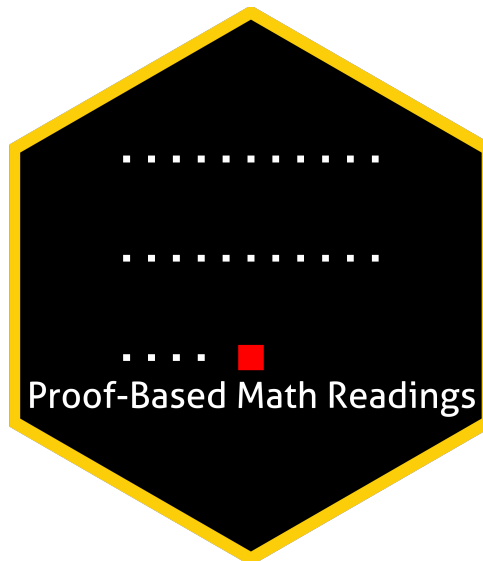**Zeki Akyol**

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Version: 24 June 2025, 08:26 PM

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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 *Algorithms*.

1 Prerequisites

- Supplementary Python and one of the Algorithms resources below.
- 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 and Main Book's Playlist

Introduction to Algorithms - T. Cormen, C. Leiserson, R. Rivest, C. Stein (4th Edition, 2022) is our main book for this session because it is well-written and well-structured.

- 📖 Introduction to Algorithms - T. Cormen, C. Leiserson, R. Rivest, C. Stein (4th Edition, 2022)
- ▶️ Introduction to Algorithms - T. Cormen, C. Leiserson, R. Rivest, C. Stein (4th Edition, 2022, Playlist)
- 📖 Introduction to Algorithms - T. Cormen, C. Leiserson, R. Rivest, C. Stein (4th Edition, 2022, Errata)
- 📖 Introduction to Algorithms - T. Cormen, C. Leiserson, R. Rivest, C. Stein (4th Edition, 2022, Selected Solutions)
- 📖 Introduction to Algorithms - T. Cormen, C. Leiserson, R. Rivest, C. Stein (3rd Edition, 2009, Solutions by M. Bodnar, A. Lohr)

3.2 Supplementary

3.2.1 Python

- ▶️ Introduction to CS and Programming using Python - Ana Bell (2022)

3.2.2 Algorithms

- 📖 Grokking Algorithms - Aditya Bhargava (2nd Edition, 2024)   → Easier to read
- 📖 Grokking Algorithms - Aditya Bhargava (2nd Edition, 2024, Errata)
- 📖 Data Structures and Algorithms in Python - M. T. Goodrich, R. Tamassia, M. H. Goldwasser (2013)
- 📖 Problem Solving with Algorithms and Data Structures using Python - B. Miller, D. Ranum, R. Yasinovskyy (3rd Edition, 2023)
- ▶️ Problem Solving with Algorithms and Data Structures using Python - B. Miller, D. Ranum, R. Yasinovskyy (3rd Edition, 2023, Playlist by Gerry Jenkins)
- 🖱️ leetcode.com

3.2.3 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

- **CLRS** is the abbreviation of **Introduction to Algorithms - T. Cormen, C. Leiserson, R. Rivest, C. Stein (4th Edition, 2022)**.

📘 CLRS   **Week 01 📅**

Appendix A: Summations
Appendix B: Sets, Etc.
Appendix C: Counting and Probability
Appendix D: Matrices

📘 CLRS   **Week 02-03 📅**

Chapter 1: The Role of Algorithms in Computing
Chapter 2: Getting Started
Chapter 3: Characterizing Running Times

📘 CLRS   **Week 04-05 📅**

Chapter 4: Divide-and-Conquer
Chapter 5: Probabilistic Analysis and Randomized Algorithms

📘 CLRS   **Week 06-07 📅**

Chapter 6: Heapsort
Chapter 7: Quicksort
Chapter 8: Sorting in Linear Time
Chapter 9: Medians and Order Statistics

📘 CLRS   **Week 08-09-10 📅**

Chapter 10: Elementary Data Structures
Chapter 11: Hash Tables
Chapter 12: Binary Search Trees
Chapter 13: Red-Black Trees

📘 CLRS   **Week 11-12 📅**

Chapter 14: Dynamic Programming
Chapter 15: Greedy Algorithms