Proof-Based Math Readings
Session: Algorithms*

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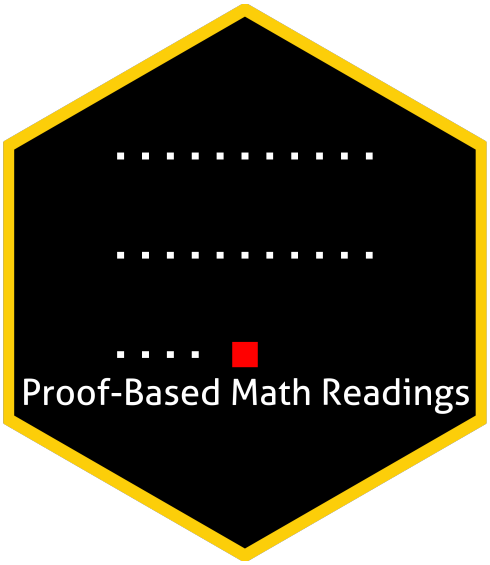

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0 Motivation

- *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