

# MATHS FOR ECONOMISTS

## A COMPREHENSIVE HANDBOOK

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# Maths for Economists: A Comprehensive Handbook

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## Preface

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This book is written as a handbook for economists rather than a note for courses like Econ Math, where materials are selected from various sources including course handouts from SUFE, lecture notes from open sources and many great books. To make it a comprehensive one, I'll try to cover almost all maths needed for studying economics, including logic, algebra, analysis, topology, probability theory and the theory of optimization. And I'll add something more, basically based on the syllabus of the course I've taken. In this way can those (especially from SUFE) who're taking courses like Mathematical analysis refer to it.

Though served as a handbook, the book will be written as intuitive as possible so that all techniques and definitions are expressed in a natural way and readers can better understand them.

The book may be updated in a monthly basis.



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## Acknowledgement

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First Author & Second Author



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# **Part I**

# **Preliminaries**



Introduce statements...



# **Chapter 1**

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## **Set, Relation and Operation**

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definition and simple operations of sets.

## 1.1 Relation and Operation

### 1.1.1 Relation

#### 1.1.1.1 Equivalence

#### 1.1.1.2 Order

#### 1.1.1.3 Mapping

### 1.1.2 Operation

## **1.2 The Operation of Sets**

**1.2.1 The Power Set**

**1.2.2 Cartesian Product**

**1.2.3 Family of Sets**

## 1.3 Countability

### 1.3.1 Cardinal

### 1.3.2 Countable Set

## **Chapter 2**

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### **Group, Ring and Field**

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## **Part II**

# **Vector Space and Linear ALgebra**



## **Part III**

# **Metric Space and Convergence**



## **Part IV**

# **Topology Space and Functions**



## **Part V**

# **Differentiation in One Variable**



## **Part VI**

# **More in Convergence: Uniform Convergence**



## **Appendix A**

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### **Notation**

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## **Appendix B**

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### **Supplementary Scripts**

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## Bibliography

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- Amann, H. and Escher, J. (2005). *Analysis I*. Birkhäuser Basel.
- Amann, H. and Escher, J. (2006). *Analysis II*. Birkhäuser Basel.
- Armstrong, M. A. (1983). *Basic Topology*. Springer New York.
- Axler, S. (2024). *Linear Algebra Done Right*. Springer International Publishing.
- Mei, J. (2020). *Mathematical Analysis*. Higher Education Press.
- Qiao, L. (2024). Mathematical economics. Lecture Note of Mathematical Economics.
- Stein, E. M. and Shakarchi, R. (2009). *Real Analysis: Measure Theory, Integration, and Hilbert Spaces*. Princeton University Press.
- Wang, Y. (2025). A concise course in mathematical analysis. Lecture Note of Mathematical Analysis I and II.
- Xie, Q. (2022). *Advanced Algebra*. Fudan University Press.
- Zhang, H. (2025). Probability and statistics. Class Handout of Probability Theory and Mathematical Statistics.