

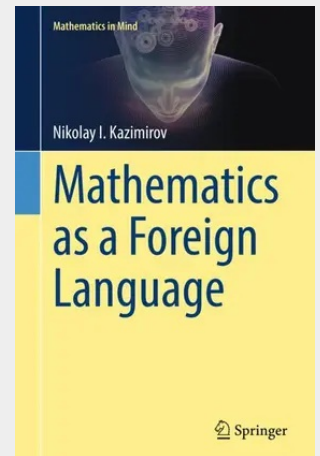
Mathematics as a Foreign Language

This text, structured in two parts, presents a distinctive pedagogical approach to the foundations of mathematics by treating the subject as a formal language to be learned. Its central thesis is that mastery of modern mathematics, logic, and computer science requires fluency in a precise and structured mode of thinking—an “architecture of thought” grounded in a rigorous and expressive language. The book develops a method for learning mathematical language in a way aligned with contemporary foreign language pedagogy, enabling readers to interpret mathematical texts with clarity and precision while gaining insight into their underlying patterns, structures, capabilities, and limitations. In doing so, it bridges the gap between intuitive understanding and formal rigor, complementing standard courses in logic, set theory, algebra, and philosophy.

The text includes approximately 190 exercises of varying difficulty, each accompanied by detailed solutions to support independent study and self-assessment. It also explicitly connects the formal language of mathematics with the operational logic of artificial intelligence. Undergraduate students in mathematics, computer science, philosophy, and linguistics—as well as graduate students seeking a clear and structured review of foundational concepts—will find the book a valuable contribution to their understanding of mathematical formalism. Those interested in the logical principles underlying computer science and AI will likewise find it an engaging resource for deepening their grasp of formal structures.

Part I, The Ascent, serves as a conceptual and intuitive guide, using the metaphor of language acquisition levels (A1 to C1) to develop understanding from the basic syntax of mathematical expressions (the “Matryoshka principle”) to advanced ideas in formal logic and set theory, enriched by analogies, historical context, and philosophical motivation. Part II, Proof-Theoretical Basis, provides the rigorous definitions and proofs underpinning these concepts, completing the transition from intuition to formal precision.

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