Model Theory and the Philosophy of Mathematical Practice

Formalization without Foundationalism

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Major shifts in the field of model theory in the twentieth century have seen the development of new tools, methods, and motivations for mathematicians and philosophers. In this book, John T. Baldwin places the revolution in its historical context from the ancient Greeks to the last century, argues for local rather than global foundations for mathematics, and provides philosophical viewpoints on the importance of modern model theory for both understanding and undertaking mathematical practice. The volume also addresses the impact of model theory on contemporary algebraic geometry, number theory, combinatorics, and differential equations. This comprehensive and detailed book will interest logicians and mathematicians as well as those working on the history and philosophy of mathematics.

Part I. Refining the Notion of Categoricity: 1. Formalization; 2. The context of formalization; 3. Categoricity; Part II. The Paradigm Shift: 4. What was model theory about?; 5. What is contemporary model theory about?; 6. Isolating tame mathematics; 7. Infinitary logic; 8. Model theory and set theory; Part III. Geometry: 9. Axiomatization of geometry; 10. π, area, and circumference of circles; 11. Complete: the word for all seasons; Part IV. Methodology: 12. Formalization and purity in geometry; 13. On the nature of definition: model theory; 14. Formalism-freeness; 15. Summation.