

Logic in Elementary Mathematics. Robert M. Exner and Myron F. Rosskopf, New York, (McGraw-Hill Book Co.: 1959) cloth, vi + 274 pp., \$6.75.

The authors state that their purpose is threefold: to present portions of symbolic logic useful in elementary mathematics, to use logic in discussing formal aspects of mathematics, and to present the material in a manner accessible to students with elementary mathematics but not logic as a background. Chapter I is an informal introduction on the nature of mathematics and logic. Chapter II considers the statement (or sentential) calculus. Chapter III is devoted to a discussion of proofs and demonstrations with emphasis on indirect proofs, proof by elimination and by cases, and converses and inverses of theorems. Chapter IV deals with abstract mathematical systems. Special consideration is given to an axiomatic treatment of a "miniature" geometry with exactly ten points and ten lines. A purely symbolic development of this geometry is provided in an appendix.

Chapter V treats the restricted predicate calculus. A set of rules for quantifier inferences with restrictions to avoid invalid arguments is the focus of the chapter. The set of rules yields yet another system of natural deduction to be added to the many already published. (The large number of variant systems in the literature indicates that a fully satisfactory system has still to be found.) Chapter VI sets forth a number of applications of logic in mathematics centered around an explicit consideration of proofs in the elementary theory of groups and fields.

The authors are to be commended for the painstaking care with which the book has been written. I liked particularly the third chapter on proofs, the system of miniature geometry in the fourth chapter and the explicit treatment of numerous algebraic questions in the final chapter.

A few minor criticisms may be mentioned. The discussion of logical validity is sketchy and occasionally misleading in Chapter I and elsewhere. In particular, the criteria of soundness and completeness for a set of rules of inference are not adequately mentioned. The chapter on applications of logic in mathematics could well have included an intuitive sketch of the notions of computability and decision procedures without entering into technical details, for it is in this direction that many serious mathematical applications of logic have been made in recent decades. A section or chapter on the theory of definition would not have been amiss, but this opinion perhaps reflects the personal taste of the reviewer.—Patrick Suppes, *Stanford University, Stanford, California.*