BULLETIN OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 83, Number 2, March 1977

An algebraic introduction to mathematical logic, by Donald W. Barnes and John M. Mack, Graduate Texts in Mathematics, no. 22, Springer-Verlag, New York, Heidelberg, Berlin, 1975, viii + 121 pp., $10.80.

An outline of mathematical logic, by Andrzej Grzegorczyk, Synthese Library, vol. 70, D. Reidel Publishing Co., Dordrecht, Holland and Boston, 1974, x + 596 pp., $45.00 (cloth), $24.00 (paper).

Completeness, compactness, and undecidability, by Alfred B. Manaster, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1975, vi + 154 pp.

Mathematical logic, by Daniel Ponasse, Gordon and Breach Science Publishers, New York, 1973, x + 126 pp., $12.50.

Choosing a new textbook is like buying a house. There is no hope of getting just what you want unless you create it yourself. It is usually impossible to find a book that covers exactly the material you want in the way you want it covered. What the instructor has to settle for is, at best, a book with a solid foundation on which he can build his kind of course, a book covering the basic material in what he considers a reasonable way but with enough flexibility to be expanded and remodelled here and there without disaster. The purpose of this review is to help someone choosing a new text for a first course in mathematical logic decide whether any of the above books provide a foundation for his kind of course.

What must be covered in a first course in mathematical logic? Let us presuppose a one semester course at the advanced undergraduate or beginning graduate level, a course aimed at future users of mathematics, not just future logicians. After such a course the student should be aware of the basic notions and results, both those with applications to other branches of mathematics, but also those which have something important to say about the nature of mathematics. First and foremost, the student should leave the course with a working knowledge of what mathematical concepts and notions are expressible in first-order logic, either directly or indirectly (within, say, axiomatic set theory). Without this, the rest of the course is pointless. He should learn what the Gödel Completeness Theorem has to say about the mathematicians informal notions of "proof" and "provable". The Completeness and Löwenheim-Skolem Theorems are essential for grasping the strengths and weaknesses of first-order logic, and for applications. Finally, the student should understand the Gödel Incompleteness Theorems and what they say about the nature of mathematics. This is the hard core of any reasonable first course in mathematical logic. It provides a minimal knowledge for anyone working in modern pure mathematics. Let us see how the four books listed above cover this basic hard core.

1. The Barnes and Mack book. This is a short, straightforward book which assumes a fair amount of algebraic sophistication from the student. It would not be appropriate for an undergraduate course but could be used with well-