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SIMON J. BERNAU

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*Mathematical logic. An introduction to model theory*, by A. H. Lightstone, Mathematical Concepts and Methods in Science and Engineering, Vol. 9, Plenum Press, New York and London, 1978, xiii + 338 pp.,$22.50.

**1.** In the past twenty years or so mathematical logic has moved from being a subject often considered rather exotic (if indeed it was really mathematics) to being a subject about which most mathematicians ought to know at least a little. The reasons are not hard to find. First, mathematical logic essentially enshrines the idea of precision in mathematical language. Second, it treats of the logical processes of deduction and makes clearer the abstract structure of arguments. Third, the techniques involved lead to new developments in and of other parts of mathematics.

Precision of language was encouraged, even demanded, by the nineteenth century crises in analysis and, later, set theory. (How easy it is now to distinguish between convergence: $\forall\varepsilon > 0\ \forall x\ \exists\delta > 0 \ldots$ and uniform convergence $\forall\varepsilon > 0\ \exists\delta > 0\ \forall x \ldots$ How tricky for Cauchy.)

The analysis of deduction culminates in the provision of a neat (essentially finite) presentation of axioms and rules which give only true statements and, in certain cases, all true statements (the completeness theorems).

New techniques emerged including the ideas of recursive functions and the development of computer programs. (These together with the precision of language led to an unexpected answer to e.g. Hilbert's tenth problem: there is no general formal technique which will decide diophantine problems.) Recursive function theory comes from the ideas of formal languages; the other aspect, truth, leads to model theory: the semantic aspect of the languages. Most present general interest here centres on nonstandard analysis. Abraham Robinson's brilliantly simple observation was to apply a reasonably well-known theorem (compactness) in what appeared an entirely unpromising situation.

**2.** Corresponding to the three aspects of logic noted above (though not in one-one correspondence) are three theorems.

Propositional calculus deals only with logical connectives (e.g. and, or, not) applied to unanalyzed statements and is very useful as a pedagogical prelude. The first theorem (completeness of propositional calculus) shows that a finite