The remainder of the book consists of 24 articles illustrating the topics referred to in the first part. Two of these articles are summaries by the author on " Generalized homology and cohomology theories " and on " Complex cobordism " written specially for this book. Six others are taken from unpublished lecture notes, etc., which students may have difficulty in obtaining. These include the paper " On the construction FK " by J. W. Milnor and the notes of lectures by A. Dold and E. Dyer given at the Colloquium on Algebraic Topology, Aarhus, 1962.

I am less certain of the value of reprinting the remaining 16 articles all of which appeared in major journals and should be readily available to anyone with access to a University Library.

M. J. TOMKINSON

HINDLEY, J. R., LERCHER, B., and SELDIN, J. P., *Introduction to Combinatory Logic* (London Mathematical Society Lecture Note Series 7, Cambridge University Press, 1972), 170 pp., £2.

The authors devote an introductory chapter to lambda-conversion, presenting a modified version of Church's treatment. They then introduce the notion of a combinator and establish the basic structure used in the rest of the book. The connection between lambda-conversion and combinators is clearly indicated.

The natural numbers are then presented as sequences of combinators and Kleene's results showing the relation between combinatory and partially recursive functions are described with minor modifications. The authors then show how an analogue of Church's undecidability result can be constructed in combinatory logic.

The notion of extensional equality for combinators is then introduced and used to show the exact equivalence of lambda-conversion and the theory of combinators. Strong reduction for combinators is then defined and the Church-Rosser theorem is proved for this relation.

The next stage in the development of the subject is to show how combinators can be interpreted as set-theoretical functions. This requires the introduction of a theory of types and two ways in which this can be done are described. It is then shown how a formal logic based on combinators can be developed. The book concludes by showing how Gödel functions of finite type can be treated combinatorially.

This is a well-written text giving an up-to-date account of the present state of the art in Combinatory Logic. The only aspect of the subject which the authors have not covered is the application to programming languages but references to recent papers are given for any reader who wishes to explore the topic further.

M. T. PARTIS

KLINE, MORRIS, *Mathematical Thought from Ancient to Modern Times* (Oxford University Press, 1973), xvii + 1238 pp., £12.

In this imposing volume Professor Kline, well known for several books aimed at the general mathematical reader, ranges with easy mastery over an immense field, presenting a panoramic view of the evolution of mathematics from Babylonian, Egyptian and Greek times up to the first decades of the present century. As might be expected from the title, the emphasis is more on exposition than in many conventional histories of the subject. The arrangement is roughly chronological; in general the mathematical themes selected for treatment are not traced from their origins, but are taken at the stage or stages when they have attained sufficient maturity to influence the main stream of development; thus several topics recur at different periods. The first ten out of a total of 51 chapters are concerned with the pre-Renaissance period; the last three treat abstract algebra, topology and foundations of mathematics (set theory and logic). Between these the survey embraces such themes as calculus, calculus of variations, ordinary and partial differential equations, functions of a complex variable, the different varieties of geometry, infinite series, integral equations and group theory. Due prominence is given to the part played by applied problems in the evolution of pure mathematics. Selection of and balance between different topics is to some extent a matter of opinion; in certain fields the author does not claim to have given more than representative samples, but he has maintained a just proportion and there are no obvious omissions. In any case it has not been the author's purpose to write an encyclopaedia; what he has actually produced is something much more interesting. Where possible, results are quoted from original sources, and valuable bibliographies are given at the end of each chapter. The treatment throughout is straightforward and free from tiresome sophistication; full statements of the conditions under which various results hold are often purposely omitted in order to keep the main ideas in focus. The exposition is enlivened by occasional sidelights on the lives and times of the principal characters. The result is an eminently readable book suitable either for sustained study or for dipping into. It will be very useful to the professional mathematician seeking to enlarge his mathematical background, while for the prospective mathematician the study of a historical introduction of this kind is one of the best ways of gaining familiarity with his subject as a whole. Printing and general make-up are excellent, and there is a good index. The jacket design—a photograph of a nebula—seems a little inappropriate; there is nothing nebulous about Professor Kline's exposition. To have avoided a heavy crop of misprints in a book of this size is in itself something of an achievement; but it is odd to see P. G. Tait described as Professor of Natural *History* at Edinburgh University; and the eye of a classicist might be offended by a couple of Greek words innocent of breathings or accents, one of them wrongly transliterated.

Professor Kline's book is a notable contribution to the cause of mathematical literacy in an age of specialisation, and all sorts and conditions of mathematicians will derive lasting pleasure and instruction from its pages.

ROBERT SCHLAPP