extending the concept of analyticity, in particular discrete function theory, pseudoanalytic functions in the sense of Bers, and monogenic functions. Of special interest here is the very clear survey paper by Professor Habetha "On the zeros of elliptic systems of first order in the plane". The second section is concerned mainly with singular integral operators, a subject to which Muskhelishvili made many fundamental contributions. Particularly welcome here is the paper by Professor Mikhailov reviewing some of the recent results obtained by him and his co-workers. The final section contains a variety of papers connected with boundary value problems for ordinary differential equations and the solution of integral equations arising in the theory of elasticity. The reviewer found the long paper by S. Christiansen in this section on "Kupradze's functional equations for plane harmonic problems" very interesting. Overall this book should be of considerable interest to those mathematicians either working in the area of function theoretic methods in differential equations or those who are simply interested in finding out what some of the more important lines of research are in this field.

D. L. COLTON

HALL, G. and WATT, J. M. (editors), *Modern Numerical Methods for Ordinary Differential Equations* (Clarendon Press, 1976), 336 pp., £9·75.

This book comprises the proceedings of a summer school held in 1975, organized by numerical analysts from Liverpool and Manchester Universities. The list of contributors is almost a who's-who in British o.d.e. specialists, as well as including a prominent overseas contributor, so the work is certainly authoritative. The style however is generally not too abstract, which is welcome, and the book is coherent, a feature no doubt partly due to the contributors having used a common notation. The book is aimed at final year and postgraduate numerical analysts, and to both users and suppliers of numerical software. I would expect the book to be understandable by anyone with a grasp of calculus, matrices and norms, and an appreciation of the basic properties of o.d.e.'s. Eight chapters are devoted to general initial value problems, and a further six to stiff problems. This is followed by five chapters on boundary value problems and two final chapters on delay equations and Volterra integro-differential equations. Other features include a detailed list of contents, a collection of references for the whole book, and a subject index, although as one might expect there are no questions for the student. The book is well bound; and although it is photo-reproduced, the final effect is not unpleasant, although there are some differences in the style and density of the typescript.

I think the book succeeds best in its appeal to the academic community, being well suited to the preparation of a course (or courses), and to an in-depth appreciation of the subject. I am not so sure that it will appeal to the less sophisticated user, say in an Engineering Department. For instance the basic idea of attempting a finite difference solution is stated in the first twelve lines of text, with no illustration or amplification. Nothing is said, as far as I can see, of the circumstances in which such a solution should be attempted, or about how a high order differential equation might be reposed as a first-order system. Likewise the circumstances under which a stiff system might arise are not explained, except in a general mathematical sense.

There are one or two minor irritations, for instance the author's names do not appear with the chapter headings (they are indexed in a list); and the chapter number only appears on the initial page, so that it is hard to find one's way about the book, and to distinguish between the many equations each referenced by (2.1) for instance. Any savings in the use of photo-reproduction do not seem to be reflected in the price, which will put it beyond what many students can afford. However, these are minor points, and

I think it very likely that the book will succeed as a standard work of reference in the subject for some years to come.

R. FLETCHER

GIBLIN, P. J., *Graphs, Surfaces and Homology: Introduction to Algebraic Topology* (Chapman and Hall, 1977), xv+329 pp., £4·95.

The book is an introduction to algebraic topology that concentrates on the properties and applications of simplicial homology theory. The author has neatly avoided some of the problems usually associated with such an approach and which stem from the relationship between the combinatorial structure of the simplicial complex and the topological structure of its underlying space. By taking the notion of a simplicial complex as fundamental and keeping the idea of continuity in the background as a motivation he can discuss the topological invariance of simplicial homology without ever having to prove it; instead he proves the simpler result that the homology groups are invariant under stellar subdivision which is quite sufficient for his purpose. When it comes to making computations of homology groups traditional exact sequence methods are used together with the invariance of the homology groups of a simplicial complex that is collapsed onto a subcomplex and the consequent introduction of the technique of collapsing at this elementary level is a most welcome feature of the book.

The book begins with chapters on graphs and surfaces and these both help to motivate the later definitions of simplicial complex and homology group and allow some account to be given of recent results in this area such as the Ringel-Youngs theorem on embedding graphs in surfaces. These topics reappear in the final chapter where a version of Lefschetz duality is employed in order to determine the number of regions into which a surface is divided by a subcomplex, the number depending on the rank of the second relative homology group. In its emphasis on graphs and surfaces the book is complemented by the similarly titled book of A. T. White: Graphs, Groups and Surfaces (North Holland, 1973) which would be a suitable sequel for a reader interested in this area.

A second comparison can be made with White's book in terms of the actual appearance of the printed page. Both books seem to have been reproduced from a typescript by using photolithography or some similar technique and so are dependent on a typewriter keyboard for their type face. This limitation is liable to produce a monotonous appearance if it is not mitigated by judicious use of indentation and display. White's book is a good example of what can be achieved in this area and it is regrettable that the book under review could not have received a similar treatment. Unfortunately the numerous digressions and examples with their asterisks and X's are embedded in the mainstream of the text in a way that often makes it difficult for the reader to grasp the exact status of what he is studying at any particular instance. The moral seems to be that if typesetting costs are to be saved then a larger area of paper will be required and a significant amount of it must be left blank, which presumably means a larger page size than that which is customary in the series of which this book is a member. This involves difficult and complex decisions being reached by publisher, printer and author, but consideration must be given to the matter of appearance if books such as this are not to have their considerable intrinsic merit obscured by the cramped appearance of their printed pages.

Despite these objections to the appearance of the book, I believe there is much in it that will repay careful study. The digressions and examples are often of great interest, there is an ample supply of admirably executed diagrams and wherever possible the author emphasises the underlying geometry.

R. M. F. MOSS