uniformities corresponding to a given proximity is studied. It always contains a minimum element, which is totally bounded, though in general not a maximum. However the existence of the latter has been satisfied by introducing a generalized uniform structure with a weaker intersection axiom. Two uniformities of the same height and in the same proximity equivalence class induce equivalent uniformities in the hyperspace.

The final chapter considers proximal convergence and makes brief mention of symtopogeneous structures, sequential proximity, and four generalizations of proximity structures.

A very comprehensive bibliography containing 138 papers up to 1969 and the notes and references at the end of each chapter contribute to the book's value as a survey for the intending research worker. However it will also be enjoyed by those merely wishing to add proximity spaces to their store of knowledge.

J. R. MCCARTNEY

ROOM, T. G. and KIRKPATRICK, P. B., *Miniquaternion Geometry* (Cambridge Tracts in Mathematics and Mathematical Physics, No. 60, Cambridge University Press, 1971), viii + 176 pp., £4.

The system of miniquaternions is the 9-element near-field in which multiplication is right-distributive but not left-distributive over addition, and miniquaternion geometry is the study of three non-desarguesian projective planes of order 9 (i.e. with 10 points on each line) that can be constructed and coordinatized by means of this near-field. Lest such a bald definition of the meaning of the book's title should give the false impression that it is devoted exclusively to very specialized topics, it must at once be added that the sub-title, " An Introduction to the Study of Projective Planes ", summarizes much more revealingly the book's aims and contents.

The 41-page second chapter is the most fundamental. It starts with the definition of a projective plane and surveys important generalities such as the well-definedness of the order of a finite plane, properties of central and axial collineations, and the Desargues configuration. It then turns attention to planes over fields and discusses matrix representation of projectivities, correlations, polarities, and conics when the field has characteristic different from 2. This chapter stands apart from the rest of the book in that other chapters aim to acquaint the reader with projective planes through the medium of detailed analysis of particular cases, attention being focussed almost exclusively on planes of order 9: thus Chapter 3 is devoted mainly to the plane over $GF(9)$, and Chapters 4 and 5 to miniquaternion geometry proper. The so far unmentioned first chapter is a short account of the miniquaternion system itself and, like the rest of the book, demands no sophisticated algebraic knowledge on the part of the reader.

Apart from a few curious lapses, the authors have presented their material in a well-organized form, and they are good at providing sign-posts for readers who are strangers to this area of mathematics. Chapter 2 deserves repeated mention as a welcome and very readable addition to the few available introductory accounts of projective planes. On the other hand, some readers who are largely familiar with the contents of Chapter 2 may regret that the emphasis throughout the rest of the book is so strongly on the particular as opposed to the general. In defence of the authors' approach, one can point out that their discussions of planes of order 9 provide an attractive and uncluttered setting for the communication of many ideas of more general importance, that in any case finite geometry is a subject where much of the interest and the charm resides in the particular, and that it would be impossible to rewrite their work with greater development of the general without stepping up significantly the algebraic prerequisites.

T. A. WHITELAW

CHAUNDY, T. W., *Elementary Differential Equations* (Oxford, at the Clarendon Press, 1969), xii+414 pp., £3·75; paperback £2·00.

This book appears after the death of Dr. Chaundy who left it in manuscript form, the editing for publication having been carried out by Dr. J. B. McLeod. The first six chapters are concerned with standard methods of integration of ordinary differential equations—use of operator D, separation of variables and so on. In the succeeding chapters great use is made of the operator $\delta \equiv xd/dx$; the methods of solution by series expansions and definite integral are also described, leading onto consideration of hypergeometric functions. There is a final chapter on singular solutions.

The book has a rather old fashioned appearance in that there is great emphasis on manipulation and use of formulae. The style, too, is rather ponderous and over wordy; it is hard to imagine modern students finding the general presentation attractive.

It is also a little difficult to decide what sort of student would benefit from this book. Those reading engineering or science would find the almost total lack of reference to physical problems a great drawback. On the other hand mathematicians might find it useful in parts but not as a single course.

There is a fairly detailed list of contents at the beginning of the book but no index at the end; one is certainly needed. At the end of each chapter many examples are given but solutions are provided for only the first nine chapters.

R. JORDINSON