The Taylor Series. An Introduction to the Theory of Functions of a Complex Variable. By P. Dienes. Oxford, The Clarendon Press, 1931. xii+552 pp.

This treatise conducts the reader from the elements of real variable theory into some of the furthest reaches of complex analysis. As we feel that the book will find its chief usefulness in connection with modern function theory, we shall describe first the more advanced chapters.

Chapter VIII deals with Picard's theorem and conformal mapping. By the simple method introduced in 1925 by Bloch, the theorems of Landau and Schottky and Picard's theorem are proved in succession. The Riemann mapping theorem for simply connected regions is proved by the most modern methods.

Chapter IX presents Weierstrass' factorization theorem for integral functions, Mittag-Leffler's theorem, Borel's method for the summation of divergent Taylor series and the representations of analytic functions in star domains, due to Mittag-Leffler and Painlevé.

Chapters X and XI deal with questions inspired, directly or indirectly, by Hadamard's dissertation. One finds here Hadamard's condition for the nonexistence of essential singularities on a circle of convergence and his theorem on the multiplication of singularities. Ostrowski's hyperconvergence is also presented.

Chapter XIII deals with conditions for a power series to represent a bounded function within its circle of convergence (Nevanlinna), with majorants (Hardy, Landau, Bohr), with convergence at singular points (Riesz), and with radial limits (Fatou).

In Chapter XII there is given an extensive treatment of the summation of divergent series. Applications are made in the final chapter (XIV), to the study of the types of divergence of power series at singular points. This last chapter also presents Hadamard's theory of the order of a singular point.

It would be difficult to overestimate the value, for advanced students, of these later chapters in Dienes' book. They reduce to didactic form a large section of the recent literature on complex analysis. These seven chapters, the second volume of Bieberbach's *Funktionentheorie* and Montel's *Fonctions Entières et Méromorphes*, give together quite a complete account of the more modern contributions to complex variable theory.

The first seven chapters of Dienes' book present what is commonly considered elementary complex variable theory, with the exception that, in Chapter V, one finds such topics as Schwarz's lemma, Hadamard's three-circle theorem, and Vitali's theorem. The elementary chapters contain a great amount of excellent material. One might mention the interesting treatment of hypercomplex numbers and also the valuable collections of exercises. However, we do not think it can be claimed that these chapters furnish a sound introduction to function theory. Let us consider, for instance, the question of analysis situs. Chapter VI contains a detailed proof of the Jordan separation theorem. On the other hand, the notion of sense receives no consideration, so that, in Chapter VII, one finds oneself integrating "with the area on the left," on a purely geometric basis, just as in older, frankly intuitive accounts of the subject. The treatment of the number system in Chapter I does not seem to us to be adequate for beginners. In Chapter III, integration is used on the basis of the student's knowledge of the calculus.

It thus appears that, although we have in recent years acquired excellent treatises on higher complex function theory, one must still refer students to the works of Osgood and of Tannery for thorough presentations of the elements of the subject.

Our comments on the earlier chapters of Professor Dienes' book are not to be interpreted as adverse criticism. We have sought merely to indicate what we consider the advantages of this treatise, which is the work of a distinguished authority and which will hold an important place in every mathematical library.

J. F. RITT

Exercices de Calcul Différentiel et Intégral. By E. Lainé. Paris, Vuibert, 1931. 143 pp.

This book contains the solutions of most of the problems given in the written examinations at Paris for candidates "du certificat de Calcul différentiel et intégral" from 1920 to 1930, inclusive. The examinations were held twice each year in June or July and in October and are presented here in chronological order. The solutions are quite complete in themselves and, for the benefit of the students, references for formulas and theory are made to the author's two volume text entitled *Précis d'Analyse Mathématique.*

The ground covered by the examinations and the relative emphasis on each field is indicated by the following distribution. Frequently a problem involves more than one field so that the total number of references is almost double the number of problems. I. Theory of functions of real variables, 25 problems. II. Theory of analytic functions, 9 problems. III. Ordinary differential equations, 19 problems. IV. Differential geometry, 22 problems. V. Partial differential equations, 30 problems.

Each of the sixty-one problems is a very substantial exercise, frequently involving several parts to the question. Professors in American universities will find in this collection some excellent material for use in connection with graduate courses in the fields mentioned above.

W. R. LONGLEY

Exposé Électronique des Lois de l'Électricité. By Marcel Boll. Paris, Hermann, 1932. 72 pp.

The idea of this little book is to give an exposition of the elementary facts of electromagnetism based on the electronic theory. Mathematically there is very little difference between such an account and the older Maxwellian theory with its electric densities, displacement currents, etc., the changes being largely in the symbolism and the physical interpretation. The book is evidently intended mainly for engineers and the mathematics involved is of an elementary character. Thus the equations of Maxwell-Lorentz are not given. There is an interesting chapter of some ten pages devoted to the conduction of electricity through metals.

F. D. MURNAGHAN