Hence $\mathfrak{G}$ can be thought of as imbedded isomorphically in its associated algebraic group $M(\mathfrak{G})$. The representations of $\mathfrak{R}$ to which these special ω's correspond are precisely those which preserve the passage to conjugate imaginaries (that is $\zeta(\overline{P})=\overline{\zeta(P)}$). This subgroup of the representations of $\mathfrak{R}$ is therefore in one-one correspondence with $\mathfrak{G}$. This is the duality theorem of Tannaka by which we regain $\mathfrak{G}$ from $\mathfrak{R}$. The usual theorems about reducibility, orthogonality and the approximation of continuous functions on $\mathfrak{G}$ are needed in the foregoing development; they are established with characteristic efficiency.

The book is dedicated, appropriately, to Elie Cartan and Hermann Weyl.

P. A. SMITH

Lectures on differential equations. By Solomon Lefschetz. (Annals of Mathematics Studies, no. 14.) Princeton University Press; London, Humphrey Milford, Oxford University Press, 1946. 8+210 pp. $3.00.

This book is a welcome addition to the literature of differential equations in the real domain, for in it one finds certain basic parts of the theory treated in a refreshingly modern manner. The principal topics considered include the fundamental existence and continuity theorems, critical points, periodic solutions, and the stability of solutions. Poincaré's geometrical theory of the qualitative properties of the general solution of an equation of the first order is developed at considerable length. One chapter is devoted particularly to systems of linear differential equations. It is the author's intention to furnish the necessary background for the modern work on the theory of nonlinear dynamical systems, and I believe that the judicious selection of the material, together with the thoroughness of the treatment, will cause the book to serve this purpose admirably. Some of the simpler physical applications are discussed briefly in the final chapter.

The consistent use of the terminology and properties of vector spaces, matrices, and matrix differential equations enables the author to handle quite general situations without any unduly complicated symbolism. The relevant parts of matrix theory are carefully explained in the first chapter; and the subsequent use of these notions results, for the most part, in a very perspicuous treatment of the subject matter. In a few places, mostly in the fourth and fifth chapters, the highly condensed notation, combined perhaps with some typographical errors, makes for rather difficult reading. (The book is lithoprinted from a typewritten manuscript and, as is usual in such cases, there are a goodly number of typographical errors. Most of these, however, are quite trivial, and will cause no difficulty.)

In order to secure a high degree of precision in the statments of the theorems and in the proofs, the author makes much use of concepts and theorems belonging to general topology. Although some brief explanations of these concepts and theorems are included in the first chapter, I believe that most readers will find this explanatory material insufficient, and will be forced to make frequent reference to other books. This task would have been lightened considerably if a greater number of precise references had been given to places where the necessary topological theory is to be found.

Aside from these matters of exposition, my chief criticism concerns the discussion of linear differential equations with periodic coefficients. The treatment, which contains no illustrative material, seems to be too brief, condensed, and general to give an adequate idea of the difficult problems which are presented by these important equations. Thus, although the entire discussion centers around the characteristic exponents, nothing whatever is said about the problem of calculating these numbers effectively. At the very least, one would have expected to see the general theory illustrated by some discussion of the familiar Mathieu equation.

Although some parts of the contents might have been dealt with advantageously in a more ample and leisurely fashion, the book remains an interesting and valuable exposition of a part of differential equation theory which has been too much neglected in American and British works. It will be exceedingly useful to people working on the theory of nonlinear dynamical systems; and it should do much toward attracting mathematicians to a fascinating field, where many further advances are urgently needed.

L. A. MacColl

Sur les bases du group symétrique et les couples de substitutions qui engendrent un groupe régulier. By Sophie Piccard. (Mémoires de l'Université de Neuchâtel, vol. 19.) Paris, Vuibert, 1946. 223 pp.

This book is divided into two main parts. The first is a collection of the author's previously published results on pairs of substitutions generating the symmetric and alternating groups. It has appeared in the Polish, French, and German journals during the years 1938–1942 (see Mathematical Reviews vol. 1 (1940) p. 161, vol. 4 (1943) p. 1, vol. 7 (1946) p. 410 and also Zentralblatt für Mathematik und ihre Grenzgebiete vols. 19, 21, 22). Besides the paper of Hoyer (Math. Ann. (1895)) referred to in her bibliography, the only other work having any close bearing on that of the author, which the reviewer was able to find, is a paper by Hadwiger (Tôhoku Math. J. vol. 49