This is heavy going—a formidable exercise in analytic number theory! The result is due to Walfisz.

Chapter 9: $\int_0^X P_k^2(y)dy$ (Jarnik).

Chapter 10: Development of $P_k(t)$ in Bessel function series.

The author remarks that the study of ellipsoids: $\alpha_1 y_1^2 + \alpha_2 y_2^2 + \cdots + \alpha_k y_k^2 \leqq X$ (with positive irrational coefficients α_j) would require a separate monograph. The reviewer would also like to mention in this connection the striking recent work of Davenport, Heilbronn, G. L. Watson on irrational indefinite quadratic forms and that of Birch and D. J. Lewis (Mathematika, December, 1957) on the nontrivial representation of 0 by "mixed" cubic forms (with coefficients in any algebraic number field) with a sufficient number of variables.

S. CHOWLA

Lectures on ordinary differential equations. By Witold Hurewicz. The Technology Press of the Massachusetts Institute of Technology, and John Wiley, New York, 1958. 17+122 pp. $5.00.

We quote from the Preface. "This book is a reprinting, with minor revisions and one correction, of notes originally prepared by John P. Brown from the lectures given in 1943 by the late Professor Witold Hurewicz at Brown University. They were first published in mimeographed form by Brown University in 1943, and were reissued by the Mathematics Department of the Massachusetts Institute of Technology in 1956. . . . An appreciation of Witold Hurewicz by Professor Solomon Lefschetz, which first appeared in the *Bulletin of the American Mathematical Society*, is included in this book, together with a bibliography of his published works."

The book consists of five short chapters. The first presents the existence and uniqueness results for the equation $y' = f(x, y)$ with f continuous and satisfying a Lipschitz condition. The existence result under the assumption of continuity alone is proved using the Weierstrass approximation theorem and equicontinuous sequences. The dependence of solutions on initial conditions and parameters, and the continuation of solutions, are also treated here. In Chapter 2 it is indicated how all these results carry over to systems. Chapter 3 is concerned with elementary properties of linear systems, and in particular linear systems with constant coefficients. The last two chapters deal with the more geometric aspects of the subject. In Chapter 4 is discussed the behavior of solutions in the vicinity of an isolated singularity of a system $x' = P(x, y)$, $y' = Q(x, y)$ by considering it as a perturbation of a linear system. Chapter 5 is devoted to a proof of the Poincaré-Bendixson Theorem, and a short discussion of orbital stability.

As can be seen from the above outline this book does not pretend to be a comprehensive treatment of the subject. However it gives a particularly lucid account of the topics it does treat. Until these lecture notes first appeared the geometric results in the last two chapters were only accessible to students in foreign texts, notably German.

EARL A. CODDINGTON

Commutative algebra, Vol. 1. By Oscar Zariski and Pierre Samuel. Van Nostrand, Princeton, 1958. 11+329 pp. $6.95.

In the last few decades the subject of commutative algebra has become increasingly important, both as a tool, especially in algebraic geometry, and as an area of research in its own right. Yet, surprisingly, until the appearance of the volume under review there has been no recent, adequate exposition of this far-reaching field. While van der Waerden's book has been of great significance in the training of many of the present day mathematicians, and while it does deal, in parts, with portions of commutative algebra, it is really designed for the very beginner and it does little more than scratch the surface. There are books dealing with ideal theory, for instance Krull's monograph or the volume by Northcott; however, one can fairly say that there was no single, up-to-date source to which the graduate student (or mature mathematician) could turn to learn commutative algebra. This situation is now changed, for this book by Zariski and Samuel more than adequately fills this vacuum. While it is difficult to predict its influence on the mathematical education of future mathematicians, this reviewer feels that it might very well play the role, in the time ahead, which van der Waerden did in the past.

Since there has been, and will be, great interest in this book, especially as a possible text for a graduate course we shall give a rather complete and detailed run-down of the contents, chapter by chapter.

Chapter 1 begins slowly with an introduction of the notions of group, ring and field and a development of some elementary, basic properties of these. It is interesting to note how the authors fret and worry about the question of embedding one ring in another. There follows a discussion of unique factorization domains. Polynomial rings are then introduced with very great care (in the beginning of the appropriate sections, informally as combinations of power products but in the body of the text, formally in terms of mappings) and the usual things about them are exhibited. Next to appear is the formation of quotient rings relative to a multiplicative system, and