

ties are developed in a natural way and some connections with other parts of number theory are pointed out.

Various types of density are defined and compared, and an extensive theory is developed. In the course of this study, other concepts and methods are introduced, and thus the contacts with other parts of number theory are increased.

One chapter, concerned with the partition function, is practically independent of the rest. It is essentially a survey of this subject. A few theorems are proved and a large number of results are stated without proof but with adequate references.

Throughout the volume, proofs are given with a minimum of details and, in some cases, are omitted.

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*Algebraic threefolds.* By L. Roth. (Ergebnisse der Mathematik und ihrer Grenzgebiete, New series, no. 6.) Berlin, Springer, 1956. 8+142 pp. 19.80 DM.

The contents of this book can be divided into three parts and an appendix (plus a good bibliography); the first part, consisting of the first three chapters, contains a very compressed outline of such topics as the genera of algebraic varieties, Severi's systems of (rational) equivalence, results of the Riemann-Roch type for 3-dimensional varieties, and the theory of the base. All this is given without proofs, or with sketches of proofs of the classical type (that is, over the field of complex numbers, and without refraining from the use of imperfectly defined concepts).

The second part, consisting of Chapters 4 and 5, is devoted to the main topic of the book, namely several criteria of rationality or unirationality for surfaces and 3-dimensional varieties; proofs are usually supplied here. The third part (Chapter 6) contains a classification of varieties, especially of dimension three, which admit continuous groups of transformations; the sections dealing with pseudo-abelian and para-abelian varieties, as well as some portions of the second part of the book, had previously appeared only in original papers by the same author. A 15-page appendix gives a condensed list of results on surfaces, with which the reader is assumed to be more or less familiar.

Actually, it seems to the reviewer that the reader should be quite familiar with the whole body of algebraic geometry, before he can attempt reading this work with understanding and profit; for a reader of this type, Chapters 1 to 3 could then have been omitted, or relegated to the appendix, thus making room for a more detailed

and more critical exposition of the content of the remaining chapters, and in particular of the criteria of rationality; these will undoubtedly be the main attraction of the book, both for the "classical" and for the "abstract" algebraic geometer. The former will find here the only systematic collection of criteria of rationality, and a large number of special examples; the latter will, on the other hand, find a vast and challenging field which, by modern standards of rigour and generality, is virtually unexplored (it is enough to mention the fact that such a basic result as Castelnuovo's theorem on the rationality of plane involutions still awaits a convincing proof).

The abstract algebraic geometer has learned by experience that the results of classical algebraic geometry, although often based on debatable proofs, are nonetheless correct, and have been tested, by persons endowed with a keen geometric intuition, on a large number of concrete cases; thus, a readily accessible collection of theorems is an invaluable help for anybody desirous to test the power of the abstract methods against problems of rationality.

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