Lezioni sulla Teoria dei Numeri Algebrici. By Luigi Bianchi, Bologna, Nicola Zanichelli, 1923, 640 pp.

After an examination of the contents of this book the reviewer feels that it serves a double purpose. On account of the very comprehensive treatment of the subject the book is an excellent work for reference. Moreover, on account of the manner in which the author coordinates the various notions used in the development, it will undoubtedly prove an excellent work for any one who wishes to gain a clear insight into the theory of algebraic numbers.

A brief résumé of the contents of the various chapters will serve to show the ground covered and also to give an idea of how the various topics are correlated in the development.

Chapter one deals with the elements of the theory of matrices and their applications to systems of linear equations and systems of linear forms. It also contains a brief study of forms relative to a modular system $(f_1, f_2, \ldots, f_n)$ where the f_i are linear forms. This leads to the proof of Minkowski's well known theorem regarding linear forms. Some space is devoted to the geometric interpretation.

In the second chapter the author develops the elements of the theory of numbers for the Gaussian field $k(i)$, $(i^2 = -1)$. This development contains the proofs of the fundamental theorems whose generalizations are contained in the succeeding chapters. The chapter concludes with the consideration of further examples of quadratic number fields, showing how the law of unique factorization, which was seen to hold for $k(i)$, breaks down.

The third chapter contains the development of the algebraic side of the general theory of algebraic number fields.

Chapter four is devoted to the theory of units in an algebraic number field. The author shows the existence of units, and of fundamental systems of units.

The fifth chapter contains the development of the theory of ideals and chapter six is devoted to congruences with respect to an ideal modulus with special consideration of prime ideal moduli. In this connection the author treats the subject of quadratic residues which he has already treated, in Chapter 2, for the field $k(i)$. Quadratic residues in a quadratic field are given special consideration.

Chapter seven contains the theory of equivalence of ideals and the separation of ideals into classes. The group of classes and its invariants are studied and a proof of the finiteness of the number of classes is given. This chapter also contains a consideration of the correspondence between ideals and decomposable forms and the relations between classes of ideals and classes of forms, and the multiplication of ideals and composition of forms.

Chapter eight contains the proofs of the general theorems regarding the factorization of the rational primes in an algebraic number field and its relation to the decomposition of $f(x)$ with respect to the modulus p, where $f(x) = 0$ is an equation one of whose roots generates the field. The last part of the chapter considers the prime factors of the field discriminant and also the factorization of the rational primes in cyclotomic fields.

The first part of chapter nine contains the theory of orders (Dedekind, Ordnung; Hilbert, Ring) in a field, and the ideals of any order. The second part of the chapter is devoted to Galois domains and their sub-domains.

Chapter ten deals with the analytic theory of algebraic numbers and develops the transcendental expression for the number of classes of ideals in a field.

Chapter eleven contains the development of the expression for the number of classes of the quadratic and cyclotomic fields and the proof of Dirichlet's theorem regarding arithmetic progressions.

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Report on Radiation and the Quantum-Theory. By J. H. Jeans. London, Fleetway Press, Ltd., 1924. 86 pp.

The first edition of this report was written in 1914 and was published by the Physical Society of London. In preparing the new edition the writer has omitted some of the parts in which he says there is an *apologia* for the defects and inconsistencies of the theory and has made numerous additions which add to the charm and lucidity of the presentation. The author's remark "that the quantum theory need no longer be considered on the defensive" aptly describes the present situation; in fact some writers have a feeling that the apologia must now be made for the classical electrodynamics.

In the first chapter Jeans points out that the smallness of the total density of radiant energy in temperature-equilibrium with matter compared with that of the heat-energy in the matter cannot be explained on the basis of Newtonian mechanics or by a supposed analogy with a vibrating elastic system immersed in a fluid such as air or water, for it is known by experience that the energy of the elastic system is finally transformed into heat energy of the fluid. The relative smallness of the density of the radiation at 0° C is quite startling in the case cited, being 4×10^{-5} ergs per cubic centimeter as compared with 8×10^{9} ergs per cubic centimeter in the matter.

In the next chapter it is shown how the classical electrodynamics in combination with the kinetic theory of gases leads to the radiation formula which is associated with the names of Rayleigh and Jeans.

This formula is correct in the region of long wave-lengths or at very high temperatures when the density of radiation is very large