those explaining the irregularities in physiology and nutrition of animals and man.

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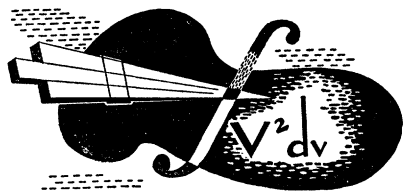

Rings and ideals. Neal H. McCoy. (Carus Mathematical Monographs of The Mathematical Association of America.) LaSalle, Ill.: Open Court Publ., 1948. Pp. xii + 216. $2.00.

This attractive little volume, well written and neatly printed, offers an excellent and almost entirely self-contained introduction to some of the most interesting topics in elementary modern algebra. Chapter I discusses the idea of a ring, with the help of some carefully thought out examples; chapter II further illustrates the same concept by a more detailed discussion of polynomial rings. Chapter III introduces the all-important notions of the ideal, of homomorphism, and of the residue class ring. After some auxiliary results in chapter IV, chapters V and VI offer an excellent, thoroughly modern, and lucid treatment, by means of Zorn's principle (without any finiteness assumptions), of the basic properties of the radical and of the Jacobson radical, and their application to the representation of rings as direct or subdirect sums. This is illustrated, in chapter VII, by a discussion of Boolean rings and of p-rings. The last two chapters (somewhat loosely connected with the rest of the book) give a concise exposition of matrices and determinants over arbitrary commutative rings (knowledge of the theory of determinants over a field being assumed), and of the basic facts concerning primary ideals and Noetherian rings.

Utmost simplicity has been reached in nearly all proofs; this, together with an easy and readable style, and a skillful use of examples, should put the book well within reach of beginners in the field, without rigor being sacrificed in any way to this object. Both the simplicity of the exposition and the generality of the results are further enhanced by the fact that the author carefully avoids bringing in any assumption before it really becomes necessary; when he does so, he takes into account the results of the latest research, including some of his own. Thus, chain-conditions are not even mentioned before the last chapter. Similarly, commutativity is introduced only when it is needed, even though the emphasis is mostly on commutative problems and methods. All this is in full agreement with the lastest developments in algebraic theory and practice, and should prove most helpful to readers who wish to acquaint themselves with such developments; further help and guidance is provided by means of a good bibliography and a brief discussion of the main source material at the end of each chapter.

The author deserves to be congratulated for this valuable addition to the literature; and the book may be warmly commended, both to newcomers to the subject and to those who have lost contact with it and may wish to bring their knowledge of its basic principles up to date.

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Introduction to applied mathematics. Francis D. Murnaghan. New York: John Wiley; London: Chapman & Hall, 1948. Pp. ix + 389. $5.00.

This is a time when applied mathematics is being cultivated very vigorously. Problems of gas dynamics, elasticity, atomic physics, and nonlinear mechanics, to name but a few fields, require the most powerful and advanced tools available to the mathematician, physicist, or engineer. Coincidentally, there is a need for books which will present in a clear, connected, and reasonably complete fashion the known facts about eigenvalue problems, partial differential equations, integral equations, calculus of variations, etc. Prof. Murnaghan, who has done outstanding work in applied mathematics, has drawn on his twenty years' experience in presenting such material to graduate students and has written a good and helpful introduction to the field.

The first two chapters are devoted to vectors and matrices. The treatment is vigorous and proceeds from the special to the general, a plan followed wherever possible throughout the book. Included are n-dimensional complex space and an introduction to the eigenvalue problem. Chapter 3, one of the most important, carries the discussion into function space; here the student will find orthonormal sets of functions, generalized Fourier expansions, and linear integral operators. Chapters 4 and 5 discuss curvilinear coordinates and Laplace's equation. Considerable attention is paid in the latter chapter to the useful "method of images." Chapter 6 discusses separation of variables for partial differential equations, power-series methods for ordinary differential equations, and special functions. In Chapter 7, the student will find self-adjoint linear differential operators, boundary conditions of various types, and a very complete discussion of Green's functions—including the central theorem concerning the equivalence of linear second-order boundary-value problems and Fredholm integral equations. Chapter 8 gives the theory of Fredholm integral equations and concludes with a careful discussion of Rayleigh's principle. Chapter 9 discusses the calculus of variations, with applications to dynamics. The last chapter is devoted to operational calculus, based on the unilateral Laplace transformation. The discussion is restricted to ordinary differential equations of general order and systems of such, but these are treated completely.

Altogether, the reviewer considers this a good though demanding introduction to applied mathematics. The word *introduction* is to be emphasized; in its 389 pages, the author has been forced to omit mention of several important topics, notably initial value problems. However, there are good discussions elsewhere of most of the omitted questions—while of the topics included, there are