trative examples. The developments treated are clearly written and fairly easy to follow, although absorbing new concepts is always a fairly slow process; knowledge of at least a number of the basic ideas in abstract algebra is advisable for anyone wishing to go through the whole book.

The translation into English is better than that of most translated mathematical works which I have encountered. The typographical errors noted were obviously such and could easily be corrected by the reader.

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Mathematics

Elements of General Topology. D. Bushaw. Wiley, New York, 1963. viii + 166 pp. Illus. $6.95.

It is refreshing to discover a book which, in some 150 pages, transmits and unifies so many aspects of a basic branch of mathematics as does Bushaw's *Elements of General Topology*. The book is suitable for use in a one-semester course and the author's stated prerequisites of some knowledge of set theory and 3 years of sound undergraduate mathematics are realistic. After a leisurely, instructive, historical account, a well-motivated approach to a topology via axioms for open sets is followed by equivalent axiomatizations via neighborhoods, closed sets, closure, and later, subbases, bases, and neighborhood bases. Chapter 3, a brief treatment of continuity and homeomorphism, is followed by a discussion of subspace, product, quotient, and metric topologies (and later, uniformities), nicely unified by the observation that all are induced in a natural way by a function and a given topology (uniformity). T_4-separation and connectedness are discussed in chapter 5, along with equivalence in metric spaces and implications in general of Frechet, sequential, and covering compactness. A very clear proof of Tychonoff's product theorem is given. Bourbaki's influence, mentioned by the author, is evident. The concept of filters, rarely found in English texts, is clearly expounded and used in the chapters on uniform spaces and their completion (the last two chapters).

Bushaw has succeeded well in adhering to basic concepts with minimum distraction. His knack for choosing useful forms of effective results makes for easy reading and neat proofs. Involved proofs occur only in the last 20 pages, and many well-chosen examples and more than 200 graded exercises are spaced strategically throughout. Appendices include basic set theory, a bibliography, and hints or answers for some exercises. A minimum of errors—perhaps a dozen typographical, a couple of wrong formulas, and but one glaring error in an example (the latter on page 30) —and clear but informally stated definitions contribute to the readability of this text.

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Intermediate Textbook

Thermal Physics. Philip M. Morse. Benjamin, New York, revised edition, 1964. xiv + 455 pp. Illus. $10.50.

This book comprises the text materials used by Philip M. Morse in the course in thermodynamics and statistical mechanics which is required of senior physics majors at Massachusetts Institute of Technology. Those who are familiar with the preliminary edition published in 1962 will find this regular edition somewhat enlarged by the addition of a few topics, rewritten and improved in clarity, but essentially unchanged in choice of subject matter and order of presentation.

In *Thermal Physics* Morse undertakes to present, in three separate sections, ordered discussions of thermodynamics, kinetic theory, and statistical mechanics. No one can deal with all of these subjects in 400 pages, and the success of a text like this will depend on the degree of agreement between the author's preferences and those of the instructor and students who use the book.

Morse's preferences are clearly theoretical, and he places emphasis, in both text and problems, on ideas and algebraic development. There is virtually no discussion of experiments or experimental procedures bearing on the ideas, and actual data appear irregularly and in many cases approximately. Those who enjoy (or require) careful attention to the hard facts of experiment will find Morse's treatments disappointing; those who prefer horseback estimates in getting a feel for theory will be pleased.

The first third of the book is given to a conventional treatment of classical thermodynamics along historical lines. The discussion is concise, but Morse manages to include reasonable reference to the third law and a long section on helium II. It is pleasant to see attention paid to systems having more than two independent variables. But for a book oriented toward theory, some of the discussion is weak. There are, for example, no sharp definitions of such basic ideas as heat and internal energy. The treatment of the second law is based on Clausius and Kelvin, with no hint that modern alternatives exist for good reasons. Even within the Clausius-Kelvin limits, there is only casual discussion of the problem of approximating an arbitrary cycle by a set of Carnot cycles. The algebraic manipulations are done by the common elementary procedures (all too frequently opaque to students), without the simplicity and gain in conciseness available through the use of Jacobians. These are common characteristics of texts in thermodynamics; but they are not necessary in even a short treatment, and they mar a book newly written in the 1960's.

The second section, about 90 pages, discusses kinetic theory, chiefly of gases, but with some discussion of magnetic materials. It provides a very useful opportunity to introduce ideas of probability, phase space, distribution functions, and the like in the context of the rather specific kinetic theory model.

After a bow to classical statistical mechanics (Liouville's theorem), Morse develops a modern treatment of statistical mechanics by postulating the connection between entropy and the distribution function. This is then illustrated in a short chapter on the microcanonical ensemble and in extended discussions of the canonical ensemble, with applications to the theories of specific heat (including the Debye theory), the properties of gases, and paramagnetic materials. The grand canonical ensemble is introduced and is used to treat Einstein-Bose and Fermi-Dirac as well as Maxwell-Boltzmann systems. Tastes in statistical mechanics are individual, but Morse's choice of basic approach is defensible, and his treatment of it is excellent. Only the optional last chapter disturbs me; the student who has studied quantum mechanics will find little that is new, while the student who has not will find the discussion too concise to be instructive.