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book reviews

Table of Integrals, Series, and Products by I. S. Gradshteyn and I. M. Ryzhik, Academic Press, 1966, 1086 pages, $12.50.

REVIEWED BY D. F. HAYS[1]

The analyst, whether an engineer, physist, or mathematician, who is involved in the interdisciplinary field of Tribology will at some time probably require the use of tables of series, integrals or products. For such persons this latest edition of Integrals, Series, and Products will be a welcomed addition to the bookshelf. This is an English translation of the fourth Russian edition and has been much expanded over previous editions. It is a most comprehensive and impressive compilation of integrals and, according to the publisher, contains more than twice as many formulas as found in previous editions. Many special functions of mathematical physics have been included in this edition and extensive tables of both definite and indefinite integrals are presented.

The ever present problem facing the user of a table of integrals such as this, is the difficulty of finding the particular integral that is needed. It is usually time and experience that makes one familiar with a text and produces the comfortable feeling of knowing where to look. Whether or not this new edition will be more efficient than other texts in its order of presentation will only be born out by time. However, the authors have recognized the difficulty of locating items in other comprehensive tables and have attempted to simplify the listings. They have also presented a rational behind their ordering of formulas. It would be well for the user to read the early chapter dealing with the ordering of formulas and also the chapter on the use of tables. This latter chapter was prepared especially for the English language edition. Another problem which quickly arises with the use of the tables such as these (or when referencing between tables) is that of abbreviated notations. The current text includes an Index of Special Functions and Notations as well as a page on general Notations that will be helpful to the reader.

The introductory chapter of this book covers such areas as finite sums, numerical series and infinite products, functional series, and certain formulas from differential calculus. The remaining chapters then present an array of integrals covering both elementary and special functions. Perhaps the most efficient way to show the comprehensiveness of the tables is to list in order the functions that are covered. Of the elementary functions this includes rational functions, the logarithmic function, the inverse hyperbolic functions, and the inverse trigonometric functions. Then there are the special functions which include elliptic integrals; elliptic functions; the logarithm integral, the exponential integral, the sine integral, and the cosine integral functions; probability integrals and Fresnel's integrals, the Gamma function and related functions; Bessel functions; Mathieu functions; Legendre functions; orthogonal polynomials, hypergeometric functions; degenerate hypergeometric functions; functions of a parabolic cylinder; Meijer's and MacRobert's functions; and Riemann's Zeta function. As can be seen, the breadth of coverage is remarkable and it is this characteristic that adds immensely to the usefulness of this work as a valued reference volume.

This volume includes 1086 pages of formulas. I have found the paper to be of excellent quality and the type is clear and easy to read. The page format is excellent and the formulas are not overly crowded on the page. Clarity and good contrast between page and type is especially important in a text such as this where subscript and superscript notation must be easily discernable and understandable.

Bibliographic references to sources used in the preparation of the text are given and the integrals are keyed to this list. In addition, there is a very useful classified supplementary reference list that was prepared by Alan Jeffrey for this English language edition.

This text will be a welcomed addition to the library of analysts and others whose work requires frequent reference to integral tables.

[1] GM Research Laboratories, Warren, Mich.

Films on Solid Surfaces, by J. G. Dash, Academic Press, New York, 1975, 260 pages + 7 author index + 6 subject index, $26.00.

REVIEWED BY ALAN BEERBOWER[1]

The author indicates in his Preface that he wrote for "physical and biological scientists," and the reviewer must begin by saying that very few engineers are qualified to make full use of this book. The stage is well set in the three page first chapter on "Motivation," which emphasizes the focus on the fundamentals of adsorption. This is quickly narrowed to physisorption, with almost complete exclusion of chemisorption. Just a few years ago it would have been impossible to write even 100 pages on these weak interactions, but there has been a burst of new experimental techniques and theoretical models in that time.

The scope of the book is well indicated by this chapter; though it ends on a cheerful note about applications, there is no further detailing of them. Further insight is gained by scanning the index. There is a broad range of substrates shown, including metals, metal halides, a few other compounds, glass and even solidified noble gases. However, only 16 adsorbates are shown and the largest of these is ethanol. This and most of the other molecules receive only a single reference, and the noble gases get at least 90 percent of the attention.

Chapter 2 treats interatomic forces, beginning with a routine discourse on van der Waals (London) attractions. This is followed by an exceptionally brave examination of interactions of metals with van der Waals molecules, in which an attempt is made to separate the effects of conduction electrons from those of metallic ions. The results are promising, rather than directly useful. Chapter 3 deals with experimental techniques, and is appropriately loaded with warnings about the difficult problems of preparing and verifying clean surfaces. The data support the reviewer's idea that most solid surfaces can be characterized in two words: DIRTY and WET.

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