struct a symbolism for a comparable purpose, I find the choices made rather unwieldly for purposes of initial study and use. Using $\dot{x}$ for the *value* of a logical variable x obscures the fact that a function is involved. Similarly, the negation of x, written $\bar{x}$ has little to recommend it.

Instead of using the symbol "Λ", which has already been introduced for logical conjunction, for the conjunction of two words of the same length, the symbol "$\cap$" is used. This change, while justifiable on grounds of rigor, is merely a nuisance here since "$\cap$" will be used for set intersection, also in the usual nonrigorous fashion. For the most part the choice of symbols does not originate with Bazilevskii of course. It is illuminating to see the inconsistencies that arise in notational usage, even in a logical presentation. Thus, $\dot{X}$ is used to indicate the value of a word X which should be a finite chain comprised of 0's and 1's; this is immediately interpreted as a integer expressed in binary form, but X is not an integer without some rather careful discussion since initial 0's then must be inserted. There is no logical reason for ignoring 0's at the beginning of a word.

Aside from these niceties, Bazilevskii makes a contribution in considering problems related to mathematical machines. His discussion of the solution of equations (section 6) sheds some light on the objectives and methods of analyzing a sequential function which describes the behavior of some discrete system and which is generally given in the form of a system of implicit equations. The relationship between periodic functions and stationary states is discussed.

In his second paper, Bazilevskii proceeds to apply some of the formalism developed in the first to the structure of memory systems. Here he introduces weight functions which may assign to a word X other numerical values than the binary number indicated above. He uses his derived Boolean expressions to obtain circuits of various types of accumulators.

The paper entitled "Some general questions on programming," by I. Ya. Akushskii, contains an important contribution to the orderly treatment of program operators. In his work during the preceding several years, Akushskii found that he could obtain general facts about programming additive machines by treating the machine operations as linear transformations in n-dimensional space. This changes these problems to

a discussion of the matrices of program operators. I found his paper most interesting.

In the fourth paper, "Programming and recursive functions," Yu. A. Shreider discusses a systematic approach to forming programs that contain cycles. His method is illustrated for a three-address system. In particular, he records a set of instructions that calculates the Gauss-Seidel solution of a linear equation system. The objectives are similar to those of Algol and Fortran, both of which appeared after this paper was written.

The remaining papers are rather routine discussions of various topics. The efficiency of computers, a Monte Carlo method for solving linear equations, the efficient number of addresses per word, and multiregisters in arithmetical operations indicate the topics treated.

With respect to the translation itself, I encountered no particular difficulties. In one place, "not" seems to have been replaced by "to"—the statement reads as follows: "The field of application of such mathematical methods need *to* be confined solely to programming" (p. 86). On page 26, in Eq. 5.1, the first two expressions, linked by an identity symbol, are, as far as I can tell, completely identical.

The lag between the original publication and the publication of the translation (some 5 years) appreciably decreased the value of this book. In contrast, the book by R. C. Richards, *Arithmetical Operations in Digital Computers* appeared in Russian translation in 1957, 2 years after its original publication. Strangely, the contributors to this volume are identified by name only. Surely a little information about their locations and positions would be useful, but this is not provided in the editor's preface or in footnotes.

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Mathematical Information

How To Find Out in Mathematics. John E. Pemberton. Pergamon, London; Macmillan, New York, 1963. x + 158 pp. Paper, $2.45.

This is volume 2 in the "Libraries and Technical Information Division" series. It is "a guide to sources of mathematical information arranged ac-

cording to the Dewey Decimal Classification." Besides being a valuable reference work, this carefully organized book affords an interesting insight into some of the extensive ramifications of mathematics in the modern world.

Chapter 1, "Careers for mathematicians," gives information of practical value on opportunities in teaching, research, statistics, operational research, and actuarial science.

The next six chapters are devoted to the organization of mathematical information, with the Dewey Decimal Classification used as a guiding principle. Specific mention is made of the most useful dictionaries, encyclopedias, periodicals, and journals devoted to abstracting or reviewing. Mathematical societies are listed and mathematical education discussed. Sources of further information are cited for mathematical tables.

Chapters 9 and 10 treat mathematical books—part 1, "Bibliographies," and part 2, "Evaluation and acquisition."

By way of specific subject matter, separate chapters are devoted to probability and statistics and to operational research. There are three appendices: (i) Sources of Russian Mathematical Information; (ii) Mathematics and the Government (United States and United Kingdom); and (iii) Actuarial Science.

The emphasis throughout is on practical applications, professional uses of mathematics, and utilization of library facilities. Much of the information is at a level appropriate to undergraduate students, and a few exercises are included.

The book, which is both thorough and as up-to-date as possible, includes a number of references to items which have appeared in the last 2 years.

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Organic Chemistry

Reactions of Organic Compounds. A textbook for the advanced student. Reynold C. Fuson. Wiley, New York, 1962. viii + 765 pp. Illus. $12.95.

The principal topic of this book is, as the title indicates, the reactions of organic compounds. Mechanisms receive frequent mention but are not of primary concern. The amount of in-

formation in the volume is overwhelming, and one of the author's achievements is the deft way in which he treats so much material in so little space. More important is the selection of material, and here again the author is to be congratulated. The specialist will quibble over the inclusion or omission of one or two reactions in his field of special interest, but the quibble will be concerned with only a percentage or so of the total material in the book.

For the purpose for which the book was written—to cover the reactions of organic chemistry for students who have had an introduction to the subject—Fuson's book is the best treatment available, and I know of nothing else that can be compared with it. If we consider the amount of information presented, the number of errors is small and most of them are so obvious that they will cause no trouble. Attention should be called to the following points however. (i) The course of the nitration of p-bromotoluene is said to be interesting, but the results of nitration are not given (p. 30). (ii) The formula for chloramine T is incorrect (p. 246). The reaction schemes on pages 176, 185, 195, and 203 should be corrected to show the gain or loss of a proton. (iii) The statements about the reaction between alkoxide ion and acetate ester on page 255 and the one on page 479 are contradictory. (iv) The mechanism of cine substitution on page 387 requires correction. (v) The description of the preparation of phenyl isothiocyanate from ammonium dithiocarbamate as an oxidation by lead nitrate is inaccurate. (vi) The statements about pinacol formation (p. 548 and p. 585) are inconsistent.

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New Books

Mathematics, Physical Sciences, and Engineering

Astronautical Guidance. Richard H. Battin. McGraw-Hill, New York, 1964. 416 pp. Illus. $15.

Azeotropy and Polyazeotropy. Wojciech Świetosławski. K. Ridgway, Ed. Pergamon, London; Macmillan, New York, 1963. 226 pp. Illus. $10.

Bibliography of African Hydrology. J. Rodier. UNESCO, Paris, 1963 (order from Columbia Univ. Press, New York). 166 pp. Paper.

Calculus of Variations. I. M. Gelfand

and S. V. Fomin. Translated from the Russian edition by Richard A. Silverman. Prentice-Hall, Englewood Cliffs, N.J., revised English ed., 1963. 240 pp. Illus. $10.60.

Chem Study Materials. *Chemistry: An Experimental Science*, George C. Pimentel, Ed. (textbook, 482 pp., $5.80); *Chemistry: An Experimental Science*, Lloyd E. Malm, Joseph E. Davis, Jr., and Margaret Nicholson, Eds. (laboratory manual, 150 pp., paper, $1.60); *Teachers Guide*, A. L. McClellan, George C. Pimentel, and Keith MacNab, Eds. (793 pp., paper, $7); *A Programmed Sequence on Exponential Notation*, Eugene Roberts (31 pp., paper); *A Programmed Sequence on the Slide Rule,* Eugene Roberts (64 pp., paper). Freeman, San Francisco, Calif., 1963. Illus.

Chemical Applications of Infrared Spectroscopy. C. N. R. Rao. Academic Press, New York, 1963. 697 pp. Illus. $19.50.

Chemical Engineering. vol. 1, *Fluid Flow, Heat Transfer, and Mass Transfer*. J. M. Coulson and J. F. Richardson. Pergamon, London; Macmillan, New York, rev. ed. 2, 1964. 504 pp. Illus. $7.50.

Chemistry. George W. Watt, Lewis F. Hatch, and J. J. Lagowski. Norton, New York, 1964. 592 pp. Illus. $6.95.

Chemistry in the Laboratory. George W. Watt, Lewis F. Hatch, and J. J. Lagowski. Norton, New York, 1964. 208 pp. Illus. Paper, $3.50.

Classical Thermodynamics of Non-Electrolyte Solutions. H. C. Van Ness. Pergamon, London; Macmillan, New York, 1964. 174 pp. Illus. $6.

College Calculus with Analytic Geometry. Murray H. Protter and Charles B. Morrey, Jr. Addison-Wesley, Reading, Mass., 1964. 911 pp. Illus. $11.50.

Complexing and Hydrothermal Ore Deposition. Harold C. Helgeson. Pergamon, London; Macmillan, New York, 1964. 142 pp. Illus. $8.50.

Contact Angle, Wettability, and Adhesion. Kendall Award Symposium, American Chemical Society (Los Angeles, Calif.), April 1963. Frederick M. Fowkes, Ed. American Chemical Soc., Washington, D.C., 1964. 399 pp. Illus. $8.

Continued Fractions. A. Y. Khinchin. Translated from the third Russian edition (Moscow, 1961) by Scripta Technica. Univ. of Chicago Press, Chicago, 1964. 107 pp. Illus. Paper, $1.95; cloth, $5.

Contributions to Differential Equations. A serial issued under the auspices of the Research Institute for Advanced Study and the University of Maryland. vol. 2. J. P. LaSalle and J. B. Diaz, Eds. Interscience (Wiley), New York, 1964. 495 pp. Illus. $16.50.

Controlled-Delay Devices. S. A. Doganovskii and V. A. Ivanov. Translated from the Russian edition (Moscow, 1960) by O. M. Blunn. D. K. Ghosh, Ed. Pergamon, London; Macmillan, New York, 1963. 77 pp. Illus. $4.50.

Cosmic Rays, Solar Particles, and Space Research. Proceedings, Course 19, International School of Physics "Enrico Fermi." B. Peters, Ed. Academic Press, New York, 1963. 432 pp. Illus. $16.

Twenty-eight papers presented at the 1961 session of the school.

A Course of Mathematical Analysis. pt. 1. A. F. Bermant. Translated from the Russian seventh edition (Moscow, 1959) by D. E. Brown. Ian N. Sneddon, Translation Ed. Pergamon, London; Macmillan, New York, 1963. 507 pp. Illus. $10.

Current Topics in Organic Chemistry. vol. 1. Louis F. Fieser and Mary Fieser. Reinhold, New York; Chapman and Hall, London, 1964. 127 pp. Illus. Paper, $2.75.

Ergodic Theory. Proceedings of an international symposium (New Orleans, La.), October 1961. Fred B. Wright, Ed. Academic Press, New York, 1963. 328 pp. Illus. $8.

Experiments in Nuclear Science. Grafton D. Chase, Stephen Rituper, and John W. Sulcoski. Burgess, Minneapolis, Minn., 1964. 181 pp. Illus. Paper, $3.50. A teachers guide (75 pp., paper, $2.45) is also available.

Flight Test Instrumentation. vol. 2. Proceedings of the Second International Symposium (Cranfield, England), 1962. M. A. Perry, Ed. Pergamon, London; Macmillan, New York, 1963. 270 pp. Illus. $11.50.

Geology. William C. Putnam. Oxford Univ. Press, New York, 1964. 494 pp. Illus. $10.95.

Geometric Dissections. Harry Lindgren. Van Nostrand, Princeton, N.J., 1964. 175 pp. Illus. $4.95.

A Guide-Book to Mathematics for Technologists and Engineers. I. N. Bronshtein and K. A. Semendyayev. Translated from the Russian edition by Jan Jaworowski and Michael N. Bleicher. Pergamon, London; Macmillan, New York, 1964. 783 pp. Illus. $20.

The Relation Between the Structure and Mechanical Properties of Metals. vols. 1 and 2. Her Majesty's Stationery Office, London, 1963 (order from British Information Services, New York). vol. 1, 466 pp.; vol. 2, 344 pp. Illus. Set, $12. National Physical Laboratory, Symposium, No. 15; proceedings of a conference held at the laboratory in January 1963. The papers presented at the conference, the verbal discussion, and some written discussion received afterwards are included.

Relativistic Fluid Mechanics and Magnetohydrodynamics, Fundamental Topics. Proceedings of a symposium (Michigan State Univ.), October 1962. Robert Wasserman and Charles P. Wells, Eds. Academic Press, New York, 1963. 251 pp. Illus. $8.50.

Treatise on Analytical Chemistry. I. M. Kolthoff and Philip J. Elving, Eds. pt. 1, *Theory and Practice*; vol. 5, sec. D-3, *Optical Methods of Analysis*. Fred W. Billmeyer, Jr. et al. Interscience (Wiley), New York, 1964. 660 pp. Illus. $16.

X-Ray Optics and X-Ray Microanalysis. A symposium (Stanford, Calif.), August 1962. H. H. Pattee, V. E. Cosslett, and Arne Engstrom, Eds. Academic Press, New York, 1963. 640 pp. Illus. $22.

Yearbook of Astronomy, 1964. J. G. Porter and Patrick Moore, Eds. Eyre and Spottiswoode, London, 1963; Norton, New York, 1964. 223 pp. Illus. Paper, $3.95.