

very comprehensive result of Zariski's is quoted, but without proof); the difficulty lies perhaps in the fact that, instead of the powerful theorem about the extension of a specialization to a place, the authors proved only that any integrally closed domain is an intersection of valuation rings.

In the last chapter (Chapter XVIII) valuation theory is applied to geometric problems. Corresponding subvarieties in a birational correspondence are defined in a geometric way, and characterized by means of valuation theory. Transforms and total transforms of subvarieties are discussed, and a weak form of Zariski's "main theorem" is proved. The authors derive from a more general result the fact that, if P is a normal point and if the total transform of P under a rational mapping F consists of a finite number of points, then F is regular at P . After an introduction devoted to monoidal transformations, comes the climax of this book, i.e. the proof of the local uniformization theorem. This proof follows, broadly speaking, Zariski's method, but a valiant effort has been made toward greater intelligibility. The existence of finite resolving systems for a function-field F is then proved without topologizing the Riemann surface of F . And, as in Zariski's "simplified proof," the method of replacing, in a resolving system, two varieties by a single one, leads to the reduction of singularities for surfaces.

A one-page bibliographical note tells more about the history of the subject than could many pages in the usual historical style, and the authors should not apologize about that in their introduction. Here as in the remainder of their books, the authors should be commended for having given the facts, many useful facts, in a straightforward way. They should also be commended for having successfully steered a course which is equally remote from bashfulness about using algebra and from oversophistication in its use. In writing their books they have rendered an invaluable service to the mathematical community.

P. SAMUEL

The printing of mathematics. Aids for authors and editors and rules for compositors and readers at the University Press, Oxford. By T. W. Chaundy, P. R. Barrett, and Charles Batey. Oxford University Press, 1954. 10+105 pp. \$2.40.

Mathematics in type. Richmond, Va., The William Byrd Press. 12+58 pp. \$3.00; \$1.50 to staff members of educational institutions.

Printing is a necessary evil: there is substantial agreement among mathematicians that an alleged piece of mathematics has no standing until it has appeared in print for all interested people to read. There

is also a general impression that editors make arbitrary and unreasonable rules about the form of manuscripts; and that printers impose absurd restrictions on the symbolism which may be used. These two books are intended to dispel these impressions and give helpful advice to authors. Both of them give detailed explanations of how mathematics actually gets into type; understanding this, the mathematical author can understand why one of two equivalent notations is more economical than another, and generally what he should do (or not do) in order to help the printer. One book or the other should be required reading for anyone who is going to write a mathematical paper. The Oxford one is considerably more detailed about the mechanics of monotype composition and proof correction; in some other respects it may be misleading to an American reader, since of course it represents Oxford practice, which is not entirely typical even of British practice. The Byrd guide is somewhat safer for an American reader to follow, but part of its discussion is based on methods used at the Byrd Press, and not in general use, which make it possible to set on a machine many common combinations which ordinarily require hand work. A minor point, frequently overlooked, is clarified by understanding the mechanics of printing: manuscripts should not be marked in the same way as proofs, since they are handled by the printer in a different way.

Some of the differences between British and American printing customs are interesting. The Americans insist on typewritten copy; the British are quite happy with legible handwriting, and even prefer it under some circumstances. In Oxford practice displayed formulas are numbered on the right; "A very few distinguished mathematicians have numbered their equations on the left: this is exceptional"—but of course is the American standard. Here the British practice is more economical of space if one is willing to agree that a numbered formula need not be displayed, or conversely that ordinary words are admissible in a display. Oxford prefers $\binom{n}{r}$ to ${}_nC_r$ for reasons of style, but hopefully suggests $(n!r)$ as a distinctive replacement for either. The British prefer $\frac{1}{2}$ for looks; the Americans prefer $1/2$ for legibility. The Oxford book suggests several other notational innovations, for instance $\sqrt{a+b}\backslash$ for $\sqrt{(a+b)}$ (making the radical sign serve as its own bracket, as $|$ does in an absolute value); $\exp_a x$ for a^x in the case of a complicated x ; $y_{\#}$ and y_{\flat} for $\max y$ and $\min y$ (here there would be trouble if the y 's had subscripts: perhaps $\#y$ and $\flat y$ would be preferable, but in any case \flat is hard to *write* distinctively. One may well object to any notation that is not convenient both to write and

to print clearly). I add one suggestion of my own: write $|x+y|$ for $\Gamma(x+y+1)$. Anyone who is repelled by such innovations may recall that the solidus (/) was an innovation less than a century ago.

Both books pay a deserved amount of attention to matters of style, although here again the Oxford book is fuller. There are two aspects of mathematical style, only one of which has to do with the mechanics of printing. This is the fact that some symbols don't combine happily. For instance, consider a_R , where the subscript is almost as big as the main letter; or j_k , which, especially when the whole thing is a subscript, is much harder for the eye to take in than is k_j . Appearance and ease of reading are improved if some care is taken to adjust the symbolism to the demands of printing.

The other aspect of style is essentially literary, and applies even if the paper is not to be printed from type. Both books stress such frequently overlooked points as that a formula is a phrase or sentence of the same language as the rest of the paper, and should be arranged and punctuated as such. They explain the rules governing spacing of symbols, breaking formulas, etc. The Oxford book discusses in detail the preferred usage of punctuation marks, of "I" versus "we," of "assume," "arbitrary," "only," and so on, and compares the relative merits of alternative ways of saying the same thing. These rules are not arbitrary rules, but a summary of the current usage of writers who write clearly and considerately. One can usually recognize good writing, even if one is not aware of the characteristics which make it so; the authors have isolated some of these characteristics. Some of the spirit of this discussion can be felt from the following quotations.

"A good mathematical presentation is one in which the essential information admits of being 'immediately apprehended'; it should not be sufficient merely to say that it is 'all there' for anyone who has the patience and skill to disengage it."

"Some mathematicians (including the writers) will maintain that symbolism can be overdone; that a remorselessly symbolic mathematics need not be the more intelligible. The passage from mind to mind must be made through the reader's eye, and a microscopic notation, all 'jots and tittles,' indices and subscripts, may be as illegible as a macroscopic exposition relying largely on words and phrases. The ideal lies between these, in which an occasional word punctuates the symbolism and a formula or a little knot of symbols breaks the flow of words."

"Mathematicians who are writing in English are asked not to forget the dignity and traditions of the language. What they write purports to be English prose, even though symbols have replaced many

of its words; it should be both readable and speakable as well as printable. Thus symbols such as \therefore , \because , or end-tags like 'q.e.d.', 'q.e.f.' are best left behind in the schoolroom. What they say can be as well said in plain English. When 'with respect to' grows tedious by repetition, it need not be cut to 'w.r.t.', which is not current English. The preposition 'in' will generally serve."

I recommend this part of the Oxford book especially to all of us who feel that doing research is so much more fun (and claim that it is so much more important) than writing it down carefully for others to comprehend.

Both books contain long lists of available characters; there is a wealth of choice available for anyone who is imaginative enough to do something besides varying a few letters by covering them with hats of various shapes. The Oxford University Press is, however, not an entirely safe guide for authors, since, for example, it is willing to allow, and indeed has allowed, a Chinese character as a mathematical symbol. Other, less well-equipped, presses would disagree; and in general it seems that notations should, if possible, be chosen so that they can be reproduced by all reasonable printers.

R. P. BOAS, JR.

BRIEF MENTION

Higher algebra. By H. Hasse. Vols. 1 and 2 in one volume. Trans. from the 3d rev. German edition by T. J. Benac. New York, Ungar, 1954.

Exercises to higher algebra. By H. Hasse and W. Klobe. Trans. from the 2d rev. and enlarged German edition by T. J. Benac. New York, Ungar, 1954. 212 pp. \$4.00.

For reviews of earlier editions (in German) see this Bulletin vol. 33, p. 251; vol. 34, p. 672; vol. 40, p. 370; vol. 41, p. 476; vol. 44, p. 178.

Contributions to the theory of partial differential equations. Ed. by L. Bers, S. Bochner, and F. John. (Annals of Mathematics Studies, no. 33.) Princeton University Press, 1954. 8+257 pp. \$4.00.

This volume contains 15 papers read at a conference held in October, 1952.

Opere. By U. Dini. Vol. 2. Ed. by the Unione Matematica Italiana with the assistance of the Consiglio Nazionale delle Ricerche. Rome, Cremonese, 1954. 6+509 pp. 4500 lire.

For vol. 1 cf. this Bulletin vol. 60, p. 288. Vol. 2 contains papers on