ous and ever-increasing supplement. Descriptions of extant tables had been given in the past, for example, by De Morgan in his articles written for various encyclopædias and by the numerous reports of the British Association Tables Committee, beginning with Glaisher's extensive report of 1873, of 175 pages; but latterly the need of a comprehensive index of tables had begun to be felt. The authors of the present book set to work in 1939 to supply this need. In the United States the same need was independently experienced, the result being the publication in 1943, by a Committee of Mathematical Tables and Aids to Computation, of the quarterly journal, *Mathematical Tables and Aids to Computation*, which has very quickly justified its existence.

The "Index of Mathematical Tables", which we here review, is of outstanding value. Its price is not at all excessive, when the wealth of its contents and the beauty of its printing are considered. It is not a complete index, the compilation of which would be a task of prohibitive difficulty, but with its aid, and particularly through the bibliography, one should be able to trace and appraise all mathematical tables of genuine importance over an extraordinarily wide range of tabulated functions. Of special value is the running commentary on the subjects treated and on the accuracy of the tables.

The book falls into two parts, Part 1 being an index of tables, of 372 pages, in twenty-four sections according to the functions tabulated, Part 2 being a bibliography of seventy-two pages. In addition, there is a long introduction of great interest and instructiveness, describing in detail the arrangement of the work, the general principles and the abbreviations used.

As to the functions tabulated, we may exemplify by choosing two sections: Section 5, Mathematical Constants; Multiples and Powers; Roots of Algebraic and Transcendental Equations; Miscellaneous Constants; Conversion Tables: Section 14, Factorial or Gamma Function, Psi Function, Polygamma Functions, Beta Function, Incomplete Gamma and Beta Functions. Should one want, to thirty or more digits, the authoritative values of all the familiar constants, and a host of unfamiliar ones, their powers, their logarithms, here they all are, in elegant black type. Or if one is interested in the binary quadratic forms of integers and in the remarkable numbers $\exp(\pi\sqrt{D})$ of Hermite, here are the values for $D = 22, 37, 43, 58, 67, 163$, as calculated by Peter Gray, Ramanujan and D. H. Lehmer. The last is worth record here, its value to 39 digits being **262 537 412 640 768 743·999 999 999 999 250 072 597.**

As to the thoroughness with which the authors have checked the tables, a single partial quotation, one of hundreds of the same kind, will serve. It concerns the value x_0 giving the main minimum of $\Gamma(1 + x)$.

"It has been stated in Legendre 1814 (71) and 1826 (436), and quoted by various authors, that the main minimum occurs at $x_0 = 0{\cdot}46163\ 21451\ 105$, and that $\log_{10}(x_0)! = \bar{1}{\cdot}94723\ 91743\ 9340$. Davis 1933 (278), however, gives $x_0 = 0{\cdot}46163\ 21450$. Calculations to about 25 decimals by J. C. P. Miller give (retaining 15 decimals)

$$x_0 = 0{\cdot}46163\ 21449\ 68362, \ldots$$
$$(x_0)! = 0{\cdot}88560\ 31944\ 10889$$

The natural value of $(x_0)!$ is wrongly given as $0{\cdot}88560\ 24$ in Gauss 1813 (at any rate as reproduced in *Werke*, **3**, 147, 1866). The correct 7-decimal value is given in Bertrand 1870 (284), Carr 1886 (364) and Hayashi 1926 (273), 1930b (53, 155)."

Such information in regard to errors in extant tables is visible on almost every page and is of the greatest value.

Enough has been said to show that this "Index" will henceforth be indispensable to all self-respecting centres of computation. The highest praise must be given not only to the industry, but even more to the resolution, of the authors, for completing their project during the most difficult years of the War, and amid a heavy pressure of war duties and anxieties. The book is published by the Scientific Computing Service under Dr. L. J. Comrie, and in the clearness of arrangement and the beauty of typography is in all respects up to the standard associated with this name.

A. C. Aitken

6/-

PHILOSOPHY AND ÆSTHETIC CRITICISM

The Basis of Criticism in the Arts

By Prof. Stephen C. Pepper. Pp. xi+177. (Cambridge, Mass.: Harvard University Press; London: Oxford University Press, 1945.) 14*s*. net.

THIS book is of the nature of a philosophical experiment; an instructive one, well worked out, but like many experiments less simple than appears at first sight. Prof. Pepper selects (for reasons discussed in another book—"World Hypotheses", 1942) four types of philosophy as "relatively adequate world hypotheses", and uses them for the purpose of æsthetic criticism, arguing in terms of concrete examples.

The critical examination of a work of art and the interpretation of the judgments made about it bring one up against what is ultimately and irreducibly given in experience in such a way that issues cannot be dodged by selecting a few more manageable elements and ignoring the rest. The method should be valuable. The author's conclusion appears to be that each kind of world hypothesis brings out some special significant aspects and that from all of them together something like a synthetic view may emerge. The reviewer's conclusion is more one-sided. One theory comes out of the test badly: the one that, starting from the truism that beauty causes pleasure, refuses, ostensibly, to say more and is found borrowing its standards of judgment surreptitiously from other theories. What the author calls the formistic theory, the assertion of external, 'objective' standards, looks like several theories, not one. Two theories come out much better, as providing out of their own resources æsthetic criteria which are relevant and significant. But these are closely related philosophies, the fundamental distinctions of which are æsthetic, not moral, scientific or anything else. They are the type loosely called Hegelian idealism and the philosophy derived from Prof. Dewey, which the author calls contextualist. The conclusion would appear to be that the fourfold classification needs revising.

There are a number of excellent points in this stimulating discussion which cannot be dealt with in a short review, but it would be unfair not to mention the really admirable treatment of the subject of definition, a useful corrective to the distortions of some recent logicians.

A. D. Ritchie