better presented alsewhere or, like the paragraphs on parabolic and hyperbolic problems, could be omitted entirely. Later chapters include a careful formulation of the group diffusion equations of reactor physics, detailed descriptions of known iterative and semi-iterative methods and a valuable discussion of the results of careful numerical experiments. The book concludes with a chapter on the author's new non-linear iterative procedure whose effectiveness, as the author admits in the preface, has yet to be evaluated. This could prove to be a significant advance in this field; in any event the book will be valuable as a sourcebook and reference for the iterative methods it describes.

James L. Howland, University of Ottawa

Polish logic, 1920-1939, edited by Storrs McCall. Oxford University Press, 1967. viii + 406 pages. $15.00.

These are English translations of 18 papers by the following Polish logicians who flourished between the two wars: Ajdukiewicz, Chwistek, Jaskowski, Jordan, Leśniewski, Łukasiewicz, Slupecki, Sobociński and Waisberg. The notable exception is Tarski, whose papers have already appeared in "Logic, Semantics, Metamathematics", reviewed in this Bulletin some years ago.

This is undoubtedly a very interesting collection, and the editor deserves great credit for having brought it together. The reviewer was particularly interested in seeing the article "Syntactic connection" by Ajdukiewicz, the first attempt to produce a type-theoretic analysis of the grammars of natural languages.

The papers are remarkably uniform in style: the bracketless "Polish" notation prevails. On the whole, however, it would seem to the reviewer that they are not in the mainstream of logical development and that there is a preoccupation with side-issues.

J. Lambek, McGill University

From Frege to Gödel, edited by Jean van Heijenoort. (A source book in mathematical logic, 1879-1931). Cambridge, Mass., Saunders of Toronto, 1967. x + 660 pages. $18.50.

This is an invaluable collection of 45 contributions to mathematical logic in its classical period, written in or translated into English, each preceded by an explanatory preface. The editor has been assisted by Dreben, Quine, and Hao Wang.

In this reviewer's opinion, the contributions have been wisely chosen to illuminate the birth of the most important ideas in modern logic and the controversies surrounding them. This volume should be on the shelf of every one interested in logic or the history of mathematics.

The first and longest contribution is Frege's "Begriffsschrift" with 82 pages. It treats the predicate calculus and goes as far as giving a logical definition of "sequence". Unfortunately, it is not easily read today, as its two-dimensional notation has not survived, except for the symbol "$\vdash$".

The last and second longest single contribution is a 57-page extract from Herbrand's doctoral dissertation. A gap in his famous theorem is corrected by Dreben and Denton.

However, the second most prolific author is Skolem, represented by four papers totalling 72 pages. They deal with Löwenheim's theorem, axiomatic set theory, foundations of arithmetic, and mathematical logic.

Hilbert has three contributions, amounting to 52 pages, his lectures on foundations of 1904 and 1927, and an attempted proof of the continuum hypothesis.

Russell is represented by two articles, totalling 41 pages, on the theory of types and on descriptions, the latter in collaboration with Whitehead.

Gödel has only 36 pages, but these contain his two famous articles on the completeness of the functional calculus and on the incompleteness of arithmetic.

Zermelo also has 36 pages. These range over three papers and include two proofs of the theorem that every set can be well-ordered.

Brouwer is given 33 pages. His three papers deal with intuitionistic matters.

Löwenheim has a 24-page article containing his famous theorem that every consistent formula has a countable model.

Post has 20 pages devoted to the propositional calculus and its many valued generalization.

A 15 page article by Ackermann is largely concerned with recursive functions.

Peano's "Principles of arithmetic", translated from the Latin and abridged, also comes to 15 pages. While Peano worked in ignorance of Frege, his notation has survived, and his work is still easily read.

Schönfinkel has 12 pages devoted to what is now called "combinatory logic". This topic should be of renewed interest in the light of recent developments in the theory of categories.

There are shorter items by Burali-Forte, Padoa, Richard, König, Wiener, Fraenkel, Finsler, Weyl and Bernays. We also find letters by Dedekind and Cantor, and the famous correspondence between Russell and Frege. The volume is generously endowed with references and index.

J. Lambek, McGill University

The basic laws of arithmetic, by Gottlob Frege. Translated and edited by Montgomery Furth. University of California Press, 1967. lxiii + 144 pages. Paperback $1.95.

This is a translation of approximately one-fifth of Frege's "Grundgesetze der Arithmetik". Its main portion is the "Exposition of the Begriffsschrift", and there is an appendix devoted to Russell's paradox. Frege's two-dimensional symbolism has not been tampered with. There is a long introduction by the editor.

J. Lambek, McGill University

On the syllogism, by Augustus de Morgan. Edited by Peter Heath. Yale University Press, 1966. Distributed by McGill University Press. xxxi + 355 pages. $10.00.

De Morgan was born in India. He was a man of strong anti-establishment principles, on account of which he was barred from a fellowship and resigned his positions twice. He was engaged in a protracted controversy with the Scottish logician William Hamilton.

In the book under review he is mainly concerned with bringing the syllogism up-to-date, and there are the rudiments of a theory of relations. I could not find "De Morgan's Law", but it seems that this was already known to the scholastics.

J. Lambek, McGill University

The problem of the minimum of a quadratic functional, by S.G. Mikhlin, translated by A. Feinstein. Holden-Day, 1965. ix + 151 pages. $9.50. (Original published in 1952 as Problema Minimuma Kvadratichnogo Funktsionala, State Publishing House, Moscow-Leningrad.)

In elementary calculus of variations we find extremals by solving the Euler-Lagrange equations. In other words, we reduce the problem of minimizing a functional to the integration of a differential equation or system of differential equations. This book is concerned with the reverse process. In particular, it is concerned with boundary-value problems of mathematical physics (of elliptic type) which can be reduced to the problem of finding the minimum of some functional.