

*Vorlesungen über Differential- und Integral-Rechnung.* By Dr. OTTO DZIOBEK. Leipzig, Teubner, 1909. x+648 pp.

IN comparison with American texts on the differential and integral calculus this volume of 648 pages bulks rather large. Being a compilation of class lectures, with such fulness of explanatory and pedagogic matter as characterizes German teaching practice, accounts for most of the bulkiness. The treatment organizes the matter into three books.

The first is an introduction to differential and integral calculus, of 164 pages; the second, of 246 pages, is on differential calculus, and the third, of 191 pages, treats integral calculus. This, with an introduction, table of contents, and an appendix of 38 pages on solutions of the more difficult problems and exercises of the text, completes the work.

Book I again falls into three parts, viz., calculus of differences, introduction to function theory, and the development of the concept of continuity.

Book II, also of three parts, treats the fundamental notions of the differential calculus, leading applications of the differential calculus, and the analytical development of functions.

Book III treats the ground formulas of integral calculus, systematic integration of standard functional forms, and a little of differential equations.

The work is illustrated with 150 excellent figures. This remark must not be omitted in commenting on a German text.

This is about the kind and scope of work in the differential and integral calculus that the German military academies require of their students. These students are studying the subject for its practical uses, and not as a principal subject. This treatment is, however, sufficiently rigorous for a first course.

The aforesaid seeming bulkiness of the work is due to the fact that it is essentially the author's customary course of lectures. Furthermore, many delicate or more difficult points are very fully explained and copiously illustrated in the interest of beginners. In the reviewer's opinion this matter has been rather overdone. Also, for the sake of somewhat greater completeness than is practicable in a lecture course, some fuller developments and more numerous glimpses into neighboring and higher fields are given in the printed book than a lecture course could always contain. Since the lecturer's audience consists of technological students, much

care is taken with the applications. These are unusually numerous and excellent for the purpose intended, and very many of them are solved in detail in the text. This makes the book easy reading and adapts it to self-study for one who wants a modern and rigorous practical grounding in this most important branch.

As was suggested above, more might well have been left for the student to do; but with large classes and meager time allowance, of course, the German professor would feel this procedure very doubtful and dangerous. Then there is a liberal number of problems that are not worked out, distributed in well-chosen places, on which the student may develop "mental muscle." The treatments of continuity, limit, integration, the indeterminate forms, convergency and divergency, if not concise, are clear, strong, and practical. On the whole, fulness is a close concomitant of clearness, and soundness. Fulness is not in this case wordiness, but conscientious didactics. It is in the interest of guaranteeing insight. Bulkiness therefore, if a fault at all here, at least leans to the side of virtue. Every teacher of calculus to collegiate sophomores would do well to have this book at hand for problem material, for pedagogic suggestion, and for inspiration.

The few trivial errors that have appeared, all of them typographical, are not worth mentioning. The publisher might well be commended for the excellence of his work, if his name were not already a sufficient guarantee of typographical excellence. The binding is however decidedly frail for so heavy a book.

G. W. MYERS.

*Wahrscheinlichkeitsrechnung.* Von Prof. Dr. FRANZ HACK. Leipzig, Teubner, 1911. 122 pp.

THIS is a worthy sample of the Sammlung Göschen, covering in six parts the fundamentals of the calculus of probabilities. The treatment is rather too condensed for the very beginner, but is well adapted to the reader who has once learned the elements and, having grown a little rusty on reasons, wishes to recover enough of the theory to make rational use of it.

The first part is on the basic theory; the second, on applications of the theory to special problems; the third, on the laws of large numbers; the fourth, on a comparison of the theory of probability with experience; the fifth, on the theory