

## SHORTER NOTICES

*Elementary Differential Equations.* By Thornton C. Fry. New York, D. Van Nostrand Company, 1929. x+255 pp.

This book presents a specialized type of course in differential equations, which has been developed in the Out-of-Hour Courses of the Bell Telephone Laboratories, and is intended primarily for students of engineering. Quite naturally technical applications and illustrations play a prominent part in the work. The author has a style of presentation which is so plausible that, to the scientific student, formal proofs are likely to appear superfluous. But he has been careful to point out that physical intuition is not a substitute for abstract logic and that understanding of principles is more important than proficiency in operating mathematical machinery. In order to emphasize this view, the mathematical ideas and the illustrative material are presented in separate chapters.

To illustrate the range of subject matter in the applications we find in Chapter III under the development of differential equations from physical laws the following illustrations: the law of mass action in chemistry, the catenary, the flow of current in an electrical network, the conduction of heat, irrotational motion in a perfect fluid, and the equation of the potential distribution in a vacuum tube. The author remarks that some of the examples require the use of physical laws with which the student may not be familiar, but it is not expected that every student will digest every illustration. To quote from the preface: "The freedom of choice provided by this excess of material may perhaps be of little value to the instructor, who will probably draw his illustrations largely from the subject in which he is at the moment most interested, whether it be in the text or not; but the Out-of-Hour courses have shown it to have another sort of merit, in that the better students develop a spontaneous interest in these illustrations, even when they are not assigned, and follow them up on their own initiative. The educational value of such voluntary effort needs no special emphasis."

In Chapter IV on methods of solution of first order equations we find prominence given to approximate methods, including numerical and graphical integration and the use of series. The applications (Chapters VI) include dissipation of heat in a wire, flow of heat in a sphere, curve of constant curvature, trajectories, freely falling body under the newtonian law, bending of a beam, deflection of structural columns, vibrating string, vibrating drum head, surface of revolution having minimum area, the brachistochrone, geodesics on a curved surface, the problem of Dido, and a problem in probability.

The latter part of the book is devoted to the discussion of linear equations and applications to various electrical phenomena. The method of treatment is original and should prove very valuable to the workers in this particular branch of engineering.

In a book of this type it is not to be expected that the treatment would be always rigorous. The author has maintained a nice balance between mathe-

mathematical rigor and intuitive justification and it is obvious that he knew precisely what he wished to do in this respect.

The book will certainly prove to be of great value as a text for teaching the subject of differential equations to technical students. For those interested primarily in mathematics it contains much illuminating material. There is a large collection of instructive problems to which answers are given.

Among the few misprints noted there is only one which might lead to misunderstanding. On page 31, tenth line from the bottom, the third word should be "order" instead of "degree."

W. R. LONGLEY

*Platons Verhältnis zur Geschichte der Mathematik.* By Seth Demel. Leipzig, Felix Meiner, 1929. v+146 pp. Price 6 RM.

This interesting and valuable contribution to the history of Greek mathematics and philosophy appears as the first part of the fourth volume of the *Forschungen zur Geschichte der Philosophie und der Pädagogik*, edited by Artur Schneider and Wilhelm Kahl. The series is setting a high standard of scholarship, and we may venture to hope that a similar set of monographs, showing evidence of the same ideals, may in due time be founded in one of the schools of education in this country.

What Dr. Demel has undertaken is a new study of the relation of mathematics to philosophy in the writings of Plato. The theme is by no means a new one, as he himself is at pains to show. Blass (1861), Rothlauf (1878), Cohen (1878), and various historians of mathematics have already considered it. But Dr. Demel has approached the problem from an angle which differs from those of his predecessors. He has considered the evidences of Plato's knowledge of and dependence upon mathematics in successive periods, as evidenced by his writings. In this he has been aided by the studies of Wilamowitz who, in 1918, considered with great care the chronology of Plato's works as determined largely by his choice of words and his style. The first conclusion set forth is that, in his early period, Plato showed no evidence of any real knowledge of mathematics. Socrates, upon whom he was so dependent, was not interested in the subject, and Plato's knowledge of any writings on the science by such scholars as Theodorus of Cyrene and Hippias of Elis seems to have been slight. In his *Protagoras* he mentions the subject, but sees in it little beyond a few remote analogies, elementary computation, and simple measurement. The first evidence of his conception of any noteworthy connection of mathematics with philosophy is found in the *Charmides*, where he argues that the former is something which transcends the mere utilitarian and has a genuine philosophic value. The same spirit is observed in the *Gorgias*. It is in the *Menon*, however, that Plato seems to have awakened to the real value of mathematics as a subject worthy the attention of the philosopher, and this value is emphasized in his later writings; notably in the *Politicus*, *Theaetetus*, *Parmenides*, *Timaeus*, and *Philebus*.

Throughout the work Dr. Demel has set forth his textual evidence in the original Greek, followed, except in minor cases, by a translation into German.

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