

about the average number of applications. There are other books on the calculus which contain many more applications than the present volume. Two problems are discussed in some detail which are omitted in most calculus books, viz., the cable with a uniform horizontal load (parabolic cable) and the cable with equal loads on equal lengths (catenary).

The authors have exercised considerable care and have met with more than ordinary success in making clear the meaning of an infinitesimal, curvature, and mean value. Duhamel's theorem is explained with unusual clearness and is used consistently in obtaining integral forms. Illustrative examples are numerous.

The preface states that a large number of drill problems have been inserted. In general we find this to be true. None of the lists are excessively long. Some are in our opinion too short. Chapters XVI and XIX end with no problems. We find other chapters ending with 1, 2, 3, and 5 problems. Answers are given to approximately fifty exercises.

The subject of integration is first brought to the student's attention on page 46 just after he has learned to differentiate the power function. Thereafter whenever he is shown how to differentiate a new function he is at once also shown how to apply the result to the integration of certain forms.

In the short sixteen-page chapter on differential equations no use is made of the initial conditions to determine the constants of integration with the exception of the discussion of a damped harmonic motion in the last article of the book. No exercises are given after this discussion. The subjects of center of gravity and moments of inertia have been treated somewhat more fully than is usual.

The book is designed for a course of four hours a week throughout the college year. But it is easy to adapt it to a three-hour course by suitable omissions. On the whole the book is a good one and has added its share to the general endeavor to obtain better texts.

W. V. LOVITT.

Die Differentialgleichungen des Ingenieurs. By Dr. W. HORT, Engineer in the Siemens-Schuckert Works. Berlin, Springer, 1914. 540 pp.

THIS volume cannot fail to be of interest to teachers of mathematics in American schools of engineering. The follow-

ing paragraphs taken from the preface indicate the controlling purpose of the author.

“Da ich möglichst alle für Aufgaben des Ingenieurwesens wichtigen Methoden bringen wollte, habe ich mich veranlasst gesehen, die Reihenentwicklungen nach Frobenius nebst der damit in Zusammenhang stehenden Ermittlung der logarithmenbehafteten Integrale linearer Differentialgleichungen zu behandeln. Bekanntlich werden diese Verfahren in der Behältertheorie gebraucht. Daneben werden einige Fragen, die mit der Technik nicht in unmittelbarem Zusammenhang stehen, wie z. B. die Integration der Differentialgleichungen der Planetenbewegung, ihres allgemeinen Interesses halber erörtert.” * * * “Im Interesse der Anwendungen sind auch die Differenzgleichungen wenigstens in einem kurzen Abriss aufgenommen worden.”

Then comes the significant statement:

“Beim Abschluss des Druckes ersehe ich aus Nr. 20 der *Zeitung des Vereines deutscher Ingenieure*, dass der deutsche Ausschuss für technisches Schulwesen in seinem fünften Bericht den gleichen Anschauungen Ausdruck gibt, die mir den Abstoß zur Abfassung dieses Buches gegeben haben.”

For the reviewer the natural query as to what the book stands for in engineering education in Germany is answered in the paragraph just quoted. One is at first inclined to conclude that the author's point of view is a personal one. In fact, the scope of the book is so comprehensive,—including in the first part (pages 1–253) a thorough course on ordinary differential equations, with applications to a great variety of engineering problems, and in the second part (pages 254–519) an exposition of the differential equations of mathematical physics, with emphasis on such problems as Helmholtz's vortex theory and Lorenz's investigations on turbines,—that the first thought is that the author takes an extremely advanced position as to the possible use a practising engineer may have to make of mathematics. But the authority of the committee on technical education referred to puts the matter in a different light. Evidently the position that engineering students should be trained in mathematics far beyond the calculus receives organized support in Germany.

The book can be used with advantage by American teachers as a storehouse of problems with which to vitalize the subject of differential equations.

PERCEY F. SMITH.