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allied developments. Nevertheless the fundamental principles are given here which will apply to whatever new device one prefers to use. Chapters 9 and 10 deal with power system measurements and integrating meters, respectively, which contain fascinating and even curious (though practical) ideas for a physicist. Thus, there are the corona voltmeter (for measuring high voltages), or the ionic wind voltmeter, the electrolytic ampere-hour meter, the mercury motor meter, and the clock meter, among many others which are thought provoking for the gadgeteer.

Equally useful and intriguing are the descriptions of instrument transformers, Chapter 11, and magnetic measurements in Chapter 12. In the latter I noted the Chattock magnetic potentiometer, the Illiovi permeameter, and the Fahy Simplex permeameter as examples of ingenious devices with a purpose. The last chapter, 13, which sketches electrical methods for measurement of some nonelectrical quantities, is a kind of addendum and not as satisfying as the other chapters, because it is too brief.

The detailed table of contents, a good index, the generous diagrams, and text combine to make the wide assortment of devices and their theories readily accessible to the reader.

Mathematical Analysis: A Modern Approach to Advanced Calculus. By Tom M. Apostol. 553 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass., 1957. \$8.50. *Reviewed by C. M. Ablow, Stanford Research Institute.*

As he tells us in his preface, the author has striven to provide an honest, rigorous, and up-to-date development of the subject matter of advanced calculus. That he has succeeded very well makes his work an exceptional text during school and a useful reference afterwards. Added to a detailed discussion of the usual material on limits, proper and improper integrals, partial and total differentiation, and the like, are introductions to measure theory, Fourier analysis, point set topology, summability of series, and complex variable theory.

The aim of providing a rigorous treatment has dictated a somewhat arid definition-theorem-proof sequence. This form does have the great advantage of making clear just where the argument stands at any moment, what is assumed, what has been proven previously, and what is still in doubt. Further the form provides sharp divisions between the subject matter itself and the interpolated heuristic remarks. These remarks are characteristically short and to the point, giving some historical background, the tenor of a coming sequence of theorems, or a description of the ideas underlying one of the longer proofs. Most useful are the series of examples illustrating the hypotheses of a theorem or the range of definition. However, the ratio of heuristic to formal material is quite low, making the book probably difficult for self-study.

The treatment of Green's theorem is typical. It opens with a description of the theorem as permitting

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the double integral of a function over a region to be expressed as a line integral over a closed path determined by the boundary of the region whenever the function is a sum of partial derivatives. There follow a short historical note, that the theorem was given by Lagrange (1760) though attributed to Green (1828), and a statement of the course of the succeeding section. Next is a formal statement and proof of the theorem for rectangles.

Green's theorem for more contorted regions is proven by covering the region with a rectangular network, using the established theorem for individual meshes in the interior of the region, and showing that the fractional rectangles on the boundary of the region alter the result by a negligible amount if the mesh is fine enough. The details of this proof are contained in three careful lemmas and the final theorem stated for regions bounded by rectifiable Jordan curves, a previously well-defined concept. The proofs are assisted by illustrative figures. Credit is given to the contemporary originator of the proof.

It is clear after these ten careful pages just where Green's theorem surely holds. In more general regions it may or may not be valid, the difficulties in the present proof showing how contradictions arise. Exercises at the end of the chapter ask for derivations of several of Green's identities and of the Cauchy integral theorem, that the integral of an analytic function around a contour in the complex plane vanishes. The application of Green's theorem to the proofs of those of Stokes and Gauss is made in a later chapter on vector analysis.

The book is handsome, cleanly printed, and apparently free of typographical errors. An incorrect example of an integrable function with singularities on page 471 is the only flaw of any sort the reviewer found. The text is a useful addition to the library of a user of mathematics, providing, as it does, a firm foundation for accurate statements in a wide range of topics.

Mathematics and Wave Mechanics. By R. H. Atkin. 348 pp. John Wiley & Sons, Inc., New York, 1957. \$6.00. Reviewed by H. Mendlowitz, National Bureau of Standards.

In less than three-hundred and fifty pages the author covers over two-hundred topics of which a little more than one third are mathematical and the remainder physical in nature. The author has attempted to present what he considers to be the necessary background for a student taking a course in quantum mechanics. In addition to this, the author covers what he considers to be an introductory course in quantum mechanics. Because so much material was condensed to fit the space limitations, many important items are treated in a hurried manner and so suffer in clarity. Except for its use in a survey course, the severe condensation makes the book unsuited as a text for a graduate course in quantum mechanics. However, it is very useful in