there is to be any condition whatever (such as continuity, etc.) connecting values in
the interior with values on the boundary. The solutions are formal; for example, on
page 39 we find the assertion that a function \( v \) defined by an infinite series
\( v = \sum A_n v_n \)
(the \( A_n \)'s being undetermined arbitrary constants and the \( v_n \)'s being functions of \( r \)
and \( t \)) satisfies a differential equation and the condition
\[ \lim_{t \to \infty} v(r, t) = 0 \]
"since this is true of every term."

Chapter III (16 pages) discusses briefly Bessel functions of order 0 when the
argument is pure imaginary, and gives applications to problems in alternating cur­
rents. Chapters IV and V (30 pages) give definite integrals and asymptotic expan­
sions involving Bessel functions of order 0. Chapter VI (35 pages) gives fundamental
properties of Bessel functions of real orders, and finally Chapter VII (13 pages) gives
applications of them.

The book contains about 150 exercises and problems, many of which consist of
several parts and most of which require proofs of identities involving series or
integrals. The emphasis in the book is on formulas and identities rather than on
rigorous methods of obtaining them. The reviewer feels that the book would be
made more useful if numbers of displayed formulas were placed before rather than
after the formulas, and the space after the formulas were used to specify the ranges
of the parameters for which the formulas hold. The choice of notations and printing
is good except for an annoying similarity of two microscopically different \( Y \)'s which
denote different Bessel functions. Finally, the reviewer must report (for the attention
of authors and publishers) that the binding of his copy of the book cracked badly in
spite of a careful attempt to open the book without tearing it apart.

R. P. Agnew

*Advanced Analytic Geometry.* By A. D. Campbell. New York, Wiley; London, Chap­
man and Hall, 1938. 10+310 pp.

Professor Campbell envisages a student who had a rudimentary course in plane
analytic geometry in which oblique axes have not been mentioned. The algebraic
equipment of the student may exceed somewhat the usual course in College Algebra
of our American schools, say, in the matter of determinants, but he cannot be relied
upon to be familiar with Sylvester's method of elimination (p. 93). His knowledge
of derivatives hardly goes beyond the definition of the term.

This student Professor Campbell undertakes to "introduce to the analytic side
of projective geometry." The author realizes that he will have to confront his student
with a vast number of new ideas, both analytical and geometrical, and that the
student may have difficulties in assimilating new concepts coming in such rapid suc­
cession. To meet the situation the author deliberately sets out to remove from the
path of the learner every obstacle that can possibly be removed. He begins by picking
out a considerable number of topics which are usually dealt with, or made use of, in
analytic projective geometry, but which can be treated independently of that subject.
He puts this material in the front part of the book, to form preliminaries, or an intro­
duction, to the subject proper. Thus he discusses affine geometry, linear transforma­
tions, groups, anharmonic ratio, families of conics, etc. Then he develops each topic
gradually, with plenty of examples, without sudden jumps, and with constant regard
to the mathematical equipment of the learner. By the time this part of the task is
done, the author has not only completed about half of his book, but has produced
something that constitutes a rounded whole in itself, and well worth the while of any­
one who would drop the subject right there.
The second part of the book takes up the subject of projective analytic geometry, by discussing the usual topics, such as the triangle of reference, homogeneous coordinates, duality, the line at infinity, etc. Some of the topics already considered in the first part are developed further. All this is written with the same preoccupation for clarity and simplicity as the first part. The student will find many judicious remarks, many striking "asides" which cannot but interest him. Constant appeal is made to the student's geometric intuition. Synthetic methods are often made use of, and even synthetic proofs are given, when this procedure seems to simplify and expedite matters. Exercises are numerous throughout the book and often used to supply details of proofs and to clarify the text generally.

It is possible to raise the question whether the author, by making the presentation too easy, has not deprived the student of his birthright to come to grip with difficulties. This reviewer, for one, shares the author's view that such fears are futile. The difficulties inherent in the subject matter discussed, and in Mathematics, in general, are a sufficient guaranty that the learner will have to put forward his best efforts, if he is to get anywhere, and it is not necessary to pile up difficulties of presentation, just for the pleasure of having them there. It is more reasonable to smoothen the learner's path when possible and thus enable him to reach more quickly a higher level in his studies.

However, the reviewer does not share the author's view that it is always advisable to assume as meager a preparation on the part of the student as possible. The author followed a custom which has attained the dignity and the rigidity of a dogma. This "starting from scratch" is a burdensome procedure that impedes progress, and is often unnecessary.

The book as a whole is well thought out, well planned, and well written.

N. A. Court


The prerequisites for a study of this book are "the elements of calculus and of ordinary differential equations, and a recognition of the failure of classical mechanics in the domain of atomic physics." The book is for those who are willing to devote the necessary time for getting a sound working knowledge of the subject. The emphasis is on ideas and fundamentals. Thus the problems are selected for mathematical simplicity and for their appropriateness in illustrating the theory. The free particle and the harmonic oscillator are most often used.

Mathematical and physical difficulties receive separate treatment. The mathematics of operators, eigenfunctions and eigenvalues, and matrices is treated fully enough for the comfortable reading of the physical part. The book closes with chapters on the states of the normal hydrogen atom, electron spin, and Dirac's theory of the electron.

It seems to the reviewer that the author has succeeded in his aim to introduce the reader to Quantum Mechanics, and that most readers would save time and get better results by working through this book before going to a more "comprehensive and critical survey of the theory, or a study of its applications" for which it is an introduction. The coherence of the book is to be praised. The author has made the subject his own and has not written a compilation.

K. W. Lamson