Integrals of the first kind are defined by the condition that they keep a finite value at every finite or infinite point of the surface. Picard then finds several conditions that must be met in order that there may exist integrals of the first kind. Examples are given of surfaces which do meet these conditions.

Integrals of the second kind for a total differential are those whose value along a path, which is reducible to a point by continuous deformation, is zero. Such integrals exist and may be found but a lengthy discussion shows that *in general* a surface has no integrals of the second kind. Any integral of the rational total differential $Rdx+Sdy$ which does not meet the conditions of the first two kinds is called an integral of the third kind.

One can draw on a surface, with ordinary singularities, particular curves $C_1, C_2, \cdots, C_\rho$, such that there exists no integral of the third kind for the total differential having as specific logarithmic curves the totality of curves C or a part of them but such that there does exist an integral of the third kind having for specific logarithmic curves a $(\rho+1)$th arbitrary curve Γ and the totality of curves C or a part of them.

The two final chapters discuss the double integrals of rational functions $\int\int F(x, y)dx\,dy$ and $\int\int R(x, y, z)dx\,dy$, where $f(x, y, z)=0$.

The book ends with three notes which had previously appeared in mathematical journals.

F. A. Foraker

FOWLER ON STATISTICAL MECHANICS

Statistical Mechanics. By R. H. Fowler. Cambridge University Press, 1929. 570 pp.

The Adams Prize in the University of Cambridge for 1923–1924 was awarded to Mr. R. H. Fowler for an essay dealing with the properties of matter at high temperatures. The essay was subsequently developed into the extensive systematic treatise before us for review. The author, with the occasional collaboration of other scientists generously acknowledged in his preface, has prepared a detailed survey of a very large portion of the existing theoretical and experimental material concerning the behavior of matter in bulk. The mechanical principles on which the treatment is based are those of the classical and the Bohr-Sommerfeld theories; the essential modifications necessitated by the newer quantum theory are discussed in the final chapter. It should not be supposed, however, that this point of view detracts seriously from the fundamental value of the book; for, essentially the same statistical methods are effective in the new quantum theory as in the others and the results obtained upon the introduction of the Bose-Einstein and Fermi-Dirac statistical weightings are often only slightly different from those obtained in the older quantum theory. If the author should set out to revise his treatment of those instances where the principles of the present quantum theory produce essential changes, he would run today the same risk that he incurred in 1926–1929 of seeing the basic physical principles of his work supplanted almost before the last pages of the manuscript reached the printer.