

culus involves a differential equation, the students remain unable to treat even the equation of harmonic motion and completely ignorant of the necessity and significance of "determining the arbitrary constants." Thirdly the author introduces Fourier's series long before he reaches the chapter on "more difficult exercises and theorems" in which he first states the rule for differentiating a product. Curious as this arrangement may seem, we wish to use it to call attention to the value and the possibility of early introducing the expansion of a function into a Fourier's series. Mathematicians as a rule are so pre-occupied with contemplating the difficulties encountered in proving the expansibility of an arbitrary function into a Fourier's series that their students study calculus three hours a week for two full years, one hundred and eighty lessons, without hearing of any such series. Yet so valuable are these series in physics and astronomy that they might well be introduced, even crudely, as Professor Perry introduces them, early in the study of calculus. The actual determination of the coefficients in a case of the simpler functions is not difficult and furnishes a practical problem in integration.

Such are some of the advantages and disadvantages of Professor Perry's *Calculus for Engineers*. We can heartily recommend to any teacher the perusal of this book. In many places he will find his eyes opening to ways in which the treatment of difficulties, unsuspected and unappreciated by the student, may be replaced by questions of practical use and interest without endangering the career of any possible future pure mathematician. It will be only by a rational compromise on both sides that the inconvenience of the present tendency to different courses and different books for each class of specialists can be avoided without harm to any.

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*Leçons sur les Fonctions Méromorphes.* Par ÉMILE BOREL.  
Recueillies et rédigées par LUDOVIC ZORETTI. Paris, Gauthier-Villars, 1903. 8vo., vi + 122 pp.

THE *Leçons sur les Fonctions Méromorphes* is a natural sequel to the author's *Leçons sur les Fonctions Entières* which appeared about three years ago. The results are in great part mere generalizations, to the case of functions possessing poles, of the results earlier obtained for functions possessing no singularities in the finite region of the complex plane. Considerable

attention is paid to numerical equalities and inequalities. The work draws its inspiration from Weierstrass, Du Bois-Reymond, and especially from Cauchy. It is distinctly of the modern French School, however, for with the exceptions of Mittag-Leffler and Lindelöf, who draw from the same source, the names that one meets are Picard, Poincaré, Hadamard, Borel and other less-known French mathematicians.

The chief topics treated are Mittag-Leffler's theorem that a meromorphic function is the sum of an integral (transcendental) function and a series of rational fractions; Weierstrass's theorem that a meromorphic function is the quotient of two integral functions; Hadamard's investigation on Taylor's series with applications to meromorphic functions and to the zeros of integral functions; the generalization of Picard's theorem to the statement that any meromorphic function must take on every value, except possibly two, an infinite number of times; and series of rational fractions, with ordinary and extraordinary distributions of poles, as applied to the study of meromorphic functions. Four notes, two of which Mr. Zoretti contributed, bring the subject so far up to date as to include some memoirs not published when the book went to press.

This little book, like the others, is of great value in putting us abreast of the present state of a particular branch of mathematics. So carefully has the matter been chosen and so clearly has Mr. Zoretti written that only a very limited knowledge of the theory of functions is presupposed. This pedagogical method is peculiarly French. It quickly places the student in absolute command of an advanced field so that he may commence his investigations at once without that vast auxiliary knowledge which some consider necessary. By such a work as these *Leçons* the whole mathematical world is given the same advantage.

E. B. WILSON.

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#### NOTES.

THE April number (volume 25, number 2) of the *American Journal of Mathematics* contains the following papers: "The double-six configuration connected with the cubic surface, and a related group of Cremona transformations," by EDWARD KAS-