

(used to indicate determinants) have been misplaced. In the lists of reduced forms some small errors have caught my eye;\* on p. 142 (footnote) in reference to Frobenius's paper in *Crelle*, vol. 86, we should read p. 146 for p. 20. Near the foot of p. 166,  $(S + T)^{-1} (S + T)$  should be  $(S + T)^{-1} (S - T)$ ; and in some places there are slight errors in the titles of papers quoted.

In conclusion I may say that Dr. Muth's book is of great interest and very useful in extending one's knowledge of certain branches of the subject. I hope that it may induce other readers to take up this part of invariant theory, which is important on account of its applications as well as for its intrinsic interest.

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#### SHORTER NOTICES.

*Kurzgefasste Vorlesungen über verschiedene Gebiete der höheren Mathematik, mit Berücksichtigung der Anwendungen.* Von DR. ROBERT FRICKE. Large 8vo. Pp. ix + 520. Leipzig, B. G. Teubner, 1900.

Two objects are sought in Dr. Fricke's timely book: first, to supply a defect in German mathematical literature, a handbook for students who have mastered the elements of analysis and are not yet qualified to read profitably the highly specialized treatises; second, to smooth the way for technical students who discover a taste for the more abstract branches of mathematics. The present volume is confined to analysis and theory of functions, a second is announced as in preparation, to treat of advanced portions of algebra and geometry.

The reader is presumed to have a pretty thorough acquaintance with integral calculus, though not with the calculus of imaginaries. Fourier's series are first introduced, with applications to vibrating strings and to diffusion of heat. A short chapter is given to spherical and cylindrical harmonics, with tables for the functions  $P_1(\mu)$ ,  $P_2(\mu)$ ,  $-P_6(\mu)$  according to Byerly, and of  $J_0(\varphi)$  and  $J_1(\varphi)$

\*The second form in each of the following needs correction: p. 91 (c. 3); p. 117 (5) and (8). The last of these has an  $x$  instead of a  $y$ ; in each of the other two a suffix has been misprinted.