of the second order admitting of a three-parameter group is effected by possible operations involving no more than quadratures in the most unfavorable cases. In most cases the introduction of the canonical variables can be avoided and the integration performed by operations purely algebraic, if the integration problem be referred to that of the equivalent linear partial differential equation which admits of necessity of the extended group $U_1'f$, $U_2'f$, $U_3'f$; here again the most unfavorable case exacts no more than a quadrature.

The concluding chapter shows how the application of the methods of the book may be made to differential equations of the third order in two variables having known infinitesimal transformations and to partial differential equations of the first order in four variables admitting of three-parameter groups. If the first derived group of the latter has fewer than three parameters the integration is affected by three quadratures, the first two or last two of which are independent; if the first derived group has three parameters the integration of a Riccati equation is demanded.

A paragraph relative to the meaning and importance of the theories in exposition here for the general theory of differential equations, calling attention among other points to analogies with Galois' theory of algebraic equations, concludes this, the introductory volume of Lie's published works.

EDGAR ODELL LOVETT.

PRINCETON, N. J.,
5 *November*, 1897.

SHORTER NOTICE.

Famous Problems of Elementary Geometry. An authorized translation of F. KLEIN'S *Vorträge über ausgewählte Fragen der Elementargeometrie*, by WOOSTER WOODRUFF BEMAN and DAVID EUGENE SMITH. Boston and London, Ginn and Company, 1897. 12mo, pp. ix+80.

Whatever opinion one may hold privately as to the desirability of translations in general, the appearance of a readable English version of Professor Klein's pamphlet* can excite no feeling other than that of satisfaction. This lucid exposition of the historical and actual significance of the three great problems of Greek geometry is addressed to all interested in the teaching of elementary mathematics,

*Leipzig, B. G. Teubner, 1895.