which $K = l$, the total variation is $J_{\bar{C}} - J_{\bar{C}_0}$. It is the object of Dr. Crathorne's paper to express this total variation in a form somewhat analogous to the Weierstrassian E-function representation for the simple calculus of variations problem.

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CONCERNING TWO RECENT THEOREMS ON IMPLICIT FUNCTIONS.

BY DR. LLOYD L. DINES.

(Read before the American Mathematical Society, October 26, 1912.)

THE theorems here considered are two recent generalizations of the Weierstrassian implicit function theorem,* by Professor G. A. Bliss† and Mr. G. R. Clements.‡ They will be referred to respectively as Theorem B, and Theorem C.

The two theorems are similar in that they both give information concerning the number and character of the solutions of a system of equations

$$(1) \qquad f_i(x_1, \cdots, x_n; y_1, \cdots, y_p) = 0 \quad (i = 1, 2, \cdots, p)$$

in the neighborhood of a point at which the functional determinant vanishes. They are different in that the assumptions concerning the functions f_i are different. As is so often the case with similarly related theorems, the ranges of applicability overlap, but neither is wholly contained in the other.§ The purpose of this note is to characterize explicitly the four classes of cases: (I) in which neither theorem is applicable; (II) in which both theorems are applicable; (III) and (IV) in which one theorem is applicable while the other is not.

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* Weierstrass, Abhandlungen aus der Funktionenlehre, p. 107.

† Bliss, "A generalization of Weierstrass' preparation theorem for a power series in several variables," *Transactions*, vol. 13, pp. 133–45 (April, 1912).

‡ Clements, "Implicit functions defined by equations with vanishing Jacobian" (Theorem IV), BULLETIN, vol. 18, p. 453 (June, 1912).

§ In presenting this note to the Society, I made the statement that Mr. Clements's theorem was a corollary of Professor Bliss's. That this statement was incorrect was pointed out to me by Mr. Clements, who exhibited a numerical example in which the hypothesis of his theorem was satisfied while that of Professor Bliss was not. The example comes under Case IV as treated in this paper.