If $C$ be the contact transformation whose defining functions are the above $X_i$, $P_i$, $Z$; $Q$ an arbitrary point transformation; and $L$ the transformation of Legendre as generalized by Lie it may be shown analytically and geometrically that

$$C = LQL.$$

In case the contact transformations degenerate into point transformations, $Q$ must be projective. Among the results of the note are complete generalizations of those of a memoir of G. Vivanti, *Rend. del circ. mat. di Palermo*, vol. 5 (1891).

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# CONCERNING A LINEAR HOMOGENEOUS GROUP IN $C_{m,q}$ VARIABLES ISOMORPHIC TO THE GENERAL LINEAR HOMOGENEOUS GROUP IN $m$ VARIABLES.

BY DR. L. E. DICKSON.

(Read before the American Mathematical Society at its Fifth Summer Meeting, Boston, Mass., August 20, 1898.)

1. While the present paper is concerned chiefly with continuous groups, its results may be readily utilized for discontinuous groups.* Indeed, the finite form of the general transformation of the group is known *ab initio*. Further, the method is applicable to the construction of a linear $C_{m,q}$-ary group isomorphic to an arbitrary $m$-ary linear group.

2. The formula of composition of $m$-ary linear homogeneous substitutions

$$(a_{ij}): \qquad \xi_i' = \sum_{j=1}^{m} a_{ij}\xi_j \qquad (j = 1, \cdots, m)$$

is as follows, where the matrix $(a_{ij}')$ operates first:

$$(a_{ij}'') = (a_{ij})(a_{ij}'),$$

where
$$a_{ij}'' = \sum_{k=1}^{m} a_{ik}a_{kj}' \qquad (i, j = 1, \cdots, m).$$

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* An analogous isomorphism between certain linear groups in the Galois field of order $p^n$ has heen discussed by the writer in an article presented to the London Mathematical Society.