n_1 + 1, ..., then the group generated by \( i_x \) and \( H \) contains operators of order \( p^2 \) and the remarks in regard to additional groups apply only to the remaining numbers and to the invariant operators of \( H \) which are not commutators. As \( i_x \) and its conjugates cannot give rise to any group of order \( p^m \) when \( p \) is less than some one of the numbers \( n_1 + 1, n_x + 1, \ldots \), all the groups of this order which contain \( H \) can be readily obtained by the above considerations. It may be observed that this includes all the groups of order \( p^m \) in which every operator is of order \( p \) whenever \( m < 5 \), since every group of order \( p^4 \) contains an abelian subgroup of order \( p^3 \).

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A CLASS OF SIMPLY TRANSITIVE LINEAR GROUPS.

BY PROFESSOR L. E. DICKSON.

1. In the study of the group defined for any given field by the multiplication table of any given finite group,* it is necessary to discuss the types of simply transitive linear homogeneous groups \( G \) whose transformations can be given the form

\[
\begin{align*}
\xi_1' &= \gamma_1 \xi_1, \\
\xi_2' &= \gamma_2 \xi_2 + \gamma_1 \xi_3, \\
\xi_3' &= \gamma_3 \xi_2 + \gamma_2 \xi_3 + \gamma_1 \xi_4, \\
\xi_4' &= \gamma_4 \xi_2 + \lambda \xi_3 + \mu \xi_4 + \nu \xi_5 + \gamma_1 \xi_6, \\
&\quad \ldots.
\end{align*}
\]

Here \( \gamma_1, \gamma_2, \gamma_3, \gamma_4, \ldots \) are the independent parameters, while \( a, \beta, \gamma, \lambda, \ldots \) are linear homogeneous functions of the \( \gamma_i \).

Burnside† was led to the erroneous conclusion that every such group \( G \) is an abelian group. He first concludes that the expression for \( \xi_1' \) contains only the parameters \( \gamma_1, \ldots, \gamma_4 \) and contains \( \gamma_1 \) only in the first term \( \gamma_1 \xi_1 \). That this result need not be true is shown by a consideration of the simply transitive group of quaternary transformations

\[
\begin{align*}
\xi_1' &= \gamma_1 \xi_1, \\
\xi_2' &= \gamma_2 \xi_1 + \gamma_1 \xi_2, \\
\xi_3' &= \gamma_3 \xi_1 + a \xi_2 + \gamma_1 \xi_3, \\
\xi_4' &= \gamma_4 \xi_1 - \frac{a_3}{a_4} a \xi_2 + \gamma_1 \xi_4, \\
&\quad \ldots
\end{align*}
\]
