3. A mark for each face, and a list of the edges and vertices in their order upon the boundary of each face.

Such a notation must contain a mark of distinction for the two sides of an edge ; an easy matter if the direction of positive rotation be adopted uniformly in listing arrangements about the vertices and faces respectively.

These processes, and the proved existence of fundamental polygons, open a range of particular problems of considerable interest. But of even superior interest must be, at least until it is solved, *the problem of finding a method for constructing, a priori, upon a given surface the exceptional (Davis) special reticulations whose characteristics are given by the restrictive tables.*

NORTHWESTERN UNIVERSITY,
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SYSTEMS OF SIMPLE GROUPS DERIVED FROM THE ORTHOGONAL GROUP.

BY DR. L. E. DICKSON.

1. IN the February number of the BULLETIN I determined the order ω of the group G of orthogonal substitutions of determinant unity on m indices in the $GF[p^n]$ and proved that, for* $p^n > 5$, $p \neq 2$, the group is generated by the substitutions

$$O_{i,j}^{\alpha,\beta}: \quad \begin{array}{l} \xi_i' = \alpha\xi_i + \beta\xi_j, \\ \xi_j' = -\beta\xi_i + \alpha\xi_j, \end{array} \quad (\alpha^2 + \beta^2 = 1).$$

The structure of G was determined for the case $p = 2$. I have since proved† that for every $m > 4$ and every $p^n > 5$ of the form $8l + 3$ or $8l + 5$, the factors of composition of G

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* The fact that $p^n = 3$ is an exception was not pointed out in the BULLETIN. In fact Jordan had not proven case 2° of § 211 when $-1 =$ square, so that the case $a^2 = b^2 = c^2 = \ldots = 1$ was unsolved when $p = 3$, $m = 3k + 1$. The theorem is readily proven when $p^n = 3^n$, $n > 1$; but for $p^n = 3$ an additional generator is necessary and sufficient, viz.,

$$W = \begin{pmatrix} 1 & 2 & 2 & 2 \\ 1 & 2 & 1 & 1 \\ 1 & 1 & 2 & 1 \\ 1 & 1 & 1 & 2 \end{pmatrix}, \quad W^3 = 1.$$

† A preliminary account was presented before the Mathematical Conference at Chicago, December 30, 1897.