

MTHSC 412 SECTION 4.2 – CAYLEY'S THEOREM

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THEOREM

Every group is isomorphic to a group of permutations. In particular, any group G is isomorphic to a subgroup of $S(G)$, that is there is a monomorphism $\phi : G \rightarrow S(G)$.

EXAMPLE

Let $G = \mathbb{Z}_5$.

Then,

$$f_0 = e$$

$$f_1 = (0, 1, 2, 3, 4)$$

$$f_2 = (0, 2, 4, 1, 3)$$

$$f_3 = (0, 3, 1, 4, 2)$$

$$f_4 = (0, 4, 3, 2, 1)$$

So, $G' =$

$$\{e, (0, 1, 2, 3, 4), (0, 2, 4, 1, 3), (0, 3, 1, 4, 2), (0, 4, 3, 2, 1)\} \leq S(\mathbb{Z}_5).$$