

Problem 07 ¹ (A special case of Schur's lemma)

Consider the linear action of $SU(2)$ on \mathbb{C}^2 . Show that any linear equivariant map $T : \mathbb{C}^2 \rightarrow \mathbb{C}^2$ is of the form $T(\vec{z}) = \alpha\vec{z}$ for some $\alpha \in \mathbb{C}$.

Problem 08 (D_3 and Cayley's theorem)

What is the smallest symmetric group S_n that the dihedral group D_3 can be embedded? Construct the embedding and conclude that $D_3 \cong S_3$.

Problem 09 (Getting familiar with cycles)

A permutation ϕ reverses the order of $\{1, 2, \dots, n\}$ to $\{n, n-1, \dots, 1\}$.

- (1) Write down its cycle decomposition.
- (2) Is it an even or odd permutation?
- (3) Generate it using the generators $\sigma_i = (i \ i+1)$, where $1 \leq i < n$.

¹pp. 36 of [GM]