Problem 9

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

Problem 10

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 11

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

(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 $1 \leq i < n$.