

Homework exercise HW4 = 29, revised form

Let (δ_1, V_1) , (δ_2, V_2) be two irreducible finite dimensional representations of the Lie group G . Show that

- (a) If $T : V_1 \rightarrow V_2$ is intertwining, then both $\ker T$ and $\text{im } T$ are G -invariant.
- (b) If $T : V_1 \rightarrow V_2$ is an intertwining operator, then either $T = 0$ or T is invertible.
- (c) $\dim \text{Hom}_G(V_1, V_2) = 1 \iff \delta_1 \sim \delta_2$.
- (d) $\dim \text{Hom}_G(V_1, V_2) = 0 \iff \delta_1 \not\sim \delta_2$.