

Introductory Algebra — Exercise no. 7

Due Thursday, 19 January, 2017

1. The set of elements of a Lie algebra whose Lie product with every element of the algebra vanishes is called the *centre* of the algebra. Show that the centre is an Abelian ideal of the Lie algebra.

2. Consider the matrix group $SU(2, 1)$ — the set of unimodular, complex, 3×3 matrices which preserve the quadratic form $|z_1|^2 + |z_2|^2 - |z_3|^2$. Find the infinitesimal generators of the group and compute their commutators.

Select a set of mutually commuting generators and find their simultaneous eigengenerators and eigenvalues.

Compare with the corresponding results for $SU(3)$. (The commutators of the infinitesimal generators of $SU(3)$ can be copied from the lecture notes, at the end of chapter 8.)