Math 6393: Lie Groups and Lie Algebras II

Spring 2008, University of Oklahoma

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— 6th Assignment —

due April 10, 2008

19. Let $\mathfrak{g} = \mathfrak{sp}(2, \mathbb{C})$ (4×4 matrices) with compact real form $\mathfrak{k} = \mathfrak{sp}(2) = \mathfrak{g} \cap \mathfrak{u}(4)$. Find a maximal abelian subalgebra $\mathfrak{t}$ of $\mathfrak{k}$. Determine all the roots and root spaces of $\mathfrak{g}$ with respect to the Cartan subalgebra $\mathfrak{h} = \mathfrak{t} + i\mathfrak{t}$.

20. Same as problem 19 with $\mathfrak{g} = \mathfrak{so}(4, \mathbb{C})$ and compact real form $\mathfrak{k} = \mathfrak{so}(4)$.

21. Same as problem 19 with $\mathfrak{g} = \mathfrak{so}(5, \mathbb{C})$ and compact real form $\mathfrak{k} = \mathfrak{so}(5)$.