PROBLEM SET 11, DUE NOVEMBER 30

11. Lie Algebras representations.

Problem 11.1. *Are the Lie algebras* $\mathfrak{su}(2)$ *and* $\mathfrak{sl}(2,\mathbb{R})$ *isomorphic?*

Problem 11.2. *Is Heisenberg Lie algebra* $\mathfrak{uut}(3,\mathbb{C})$ *isomorphic to the Lie algebra* $\mathfrak{sl}(2,\mathbb{R})$*?*

Problem 11.3. *Are the Lie algebras* $\mathfrak{su}(2)$ *and* $\mathfrak{so}(3,\mathbb{R})$ *isomorphic?*

Problem 11.4. *Is the standard representation of* $\mathfrak{sl}_n(\mathbb{C})$ *in the vector space* $\mathbb{C}^n$ *irreducible ?*

Problem 11.5. *Is the standard representation of* $\mathfrak{so}_n(\mathbb{C})$ *in the vector space* $\mathbb{C}^n$ *irreducible ?*

Problem 11.6. *Is the standard representation of* $\mathfrak{sp}_n(\mathbb{C})$ *in the vector space* $\mathbb{C}^{2n}$ *irreducible ?*

Problem 11.7. *Is the standard representation of* $\mathfrak{ut}_n(\mathbb{C})$ *in the vector space* $\mathbb{C}^n$ *irreducible ?*

Problem 11.8. *Is the adjoint representation of* $\mathfrak{gl}_n(\mathbb{C})$ *in the vector space* $\mathfrak{gl}_n(\mathbb{C})$ *irreducible ?*

Problem 11.9. *Is the adjoint representation of* $\mathfrak{sl}_n(\mathbb{C})$ *in the vector space* $\mathfrak{sl}_n(\mathbb{C})$ *irreducible ?*

Problem 11.10. *Is the adjoint representation of* $\mathfrak{uut}_n(\mathbb{C})$ *in the vector space* $\mathfrak{uut}_n(\mathbb{C})$ *irreducible ?*

Date: November 26, 2024.