

Physics 495

Homework No. 7

due Monday, 9 November, 2009

1. Please determine the 2×2 matrix representations $D(1/2, 0)$ and $D(0, 1/2)$ for the 4-dimensional version of the six generators, $\mathcal{J}^{\alpha\beta}$, preferably in terms of the three 2×2 Pauli matrices, σ_x , σ_y , and σ_z .
2. Please determine the invariants of the Lie algebra for the Lorentz group, beginning directly with the 4-dimensional version of the six generators, $\mathcal{J}^{\alpha\beta}$. Note that the analogy with the electromagnetic Faraday tensor should be helpful. Then apply that knowledge to determine their numerical values, as multiples of the identity matrix, for the two 2×2 representations discussed above in problem (1).