PHY 5669 : Quantum Field Theory B, Spring 2015

January 15^{th}, 2015

Assignment # 1

(due Thursday January 29^{th}, 2015)

1. Show by explicit computation that the objects of the $\left(\frac{1}{2}, \frac{1}{2}\right)$ representation of the Lorentz group are indeed Lorentz vectors.

2. Problem 36.1 of Srednicki's book.

3. Problem 36.3 of Srednicki's book.

4. Problem 36.4 of Srednicki's book.

5. Suggested (not graded). Work out how the six objects contained in the $(1, 0)$ and $(0, 1)$ representations of the Lorentz group transform under the Lorentz group. Recall from your course on electromagnetism how the electric and magnetic fields $\vec{E}$ and $\vec{B}$ transform. Conclude that the electromagnetic field in fact transforms as $(1, 0) \oplus (0, 1)$.