Particle Physics HW8

1. Verify the orthonormality condition for spinors stated in lecture for one example of each case, i.e. $s = s'$ and $s \neq s'$. Note: The explicit expressions for the spinors are given in the notes.

2. Verify the completeness relationship for at least one case of spinors. Note: You will need the form of $\gamma^0$ which I provided in the online lecture notes.

3. Verify that the propagator for a spinor is indeed $i$ times the inverse of the Dirac operator as discussed in class.

4. Consider the process $e \rightarrow e + \mu + \mu^+$. Compute the expression for $\langle |M|^2 \rangle$ to lowest order leaving it in terms of traces. This should be very analogous to what we did and where we got to by the end of lecture on Thursday!

5. Consider the process $e + e^+ \rightarrow \mu + \mu^+ + \tau + \tau^+$. For this process evaluate $M$ for any one of the lowest order diagrams. You can leave this in terms of spinor sandwhiches. You will have at least one virtual matter particle and so I will leave it to you to determine where you should put its propagator in the order of things.