Homework #4
Due Feb 16

Read Griffiths chapters 6 and 7

1. Griffiths 7.8

2. Griffiths 7.9

3. Griffiths 7.22

4. The parity operator may be given by γ^0, see Griffiths Eqn 7.61 and references.

   (a) What is the parity eigenvalue of the particle state $u^{(1)}(p=0)$?

   (b) What is the parity eigenvalue of the anti-particle state $v^{(1)}(p=0)$?

   (c) We could equally as well used $-\gamma^0$ as the parity operator, what would you have found for parts a) and b) in that case?

   (d) Find the behavior under Parity of the five bilinear combinations $\bar{\psi}\psi$, $\bar{\psi}\gamma^5\psi$, $\bar{\psi}\gamma^\mu\psi$, $\bar{\psi}\gamma^\mu\gamma^5\psi$ and $\bar{\psi}\sigma^{\mu\nu}\psi$. Hint: the pseudoscalar case is done for you in Griffiths.

5. Find the angular cross-section $\frac{d\sigma}{d\Omega}$ for $e^+e^- \to \mu^+\mu^-$ in the limit that the outgoing μ are non-relativistic.