

Physics 5456 – Problem set 7

1. Schwabl I exercise 20.2(b).
2. Schwabl I exercise 20.4.
3. Use only the Dirac algebra to prove the following identities:

(a) $\gamma^\alpha \gamma^\mu \gamma_\alpha = -2\gamma^\mu$

(b) $\gamma^\alpha \gamma^\mu \gamma^\nu \gamma_\alpha = +4g^{\mu\nu} I$

4. For $S^{\mu\nu} = (+i/4)[\gamma^\mu, \gamma^\nu]$, use the Dirac algebra $\{\gamma^\mu, \gamma^\nu\} = +2g^{\mu\nu} I$ to show that

$$[S^{\mu\nu}, S^{\rho\sigma}] = i(g^{\nu\rho} S^{\mu\sigma} - g^{\mu\rho} S^{\nu\sigma} - g^{\nu\sigma} S^{\mu\rho} + g^{\mu\sigma} S^{\nu\rho})$$