215a Homework exercises 7, Fall 2019, due Dec. 2

$\star$ This week's HW are all from Tong's exercise sheet 3
http://www.damtp.cam.ac.uk/user/tong/qft/oh3.pdf

1. Tong 3.2 (i.e. exercise sheet 3, exercise 2). The Lorentz algebra is $[\mathcal{M}^{\rho\sigma}, \mathcal{M}^{\mu\nu}] = i\eta^{\sigma\mu}\mathcal{M}^{\rho\nu} \pm 3perms$ where the ± 3 perms can be inferred from the first term using the fact that $\mathcal{M}^{\mu\nu} = -\mathcal{M}^{\nu\mu}$.

2. Tong 3.3.

3. Tong 3.4.

4. Tong 3.5.

5. Tong 3.6. Please instead use my preferred notation (normalization of the creation and annihilation operators), i.e. there is no square-root in (11), and instead there are factors of $(2E_p)$ on the RHS of 12.

6. Tong 3.7. Again, please use the notation that I prefer, so equation (16) instead has our usual Lorentz-invariant integration measure over spatial momenta (multiplied by E_p, so one could cancel these factors of E_p).