Problems for Quantum Field Theory 2
10. Tutorial

PROBLEM 1: *Casimir operators 2*

Consider a combination of Lie algebra generators in the representation r

$$t^b t^a t^b = t^b t^b t^a + t^b [t^a, t^b].$$

Use $t^a t^a = C_2(r)$ and $f^{acd} f^{bcd} = C_2(G) \delta^{ab}$ to show

$$t^b t^a t^b = [C_2(r) - \frac{1}{2} C_2(G)] t^a.$$