

Series 3

I. Representations of the conformal group

1. Verify the commutation relations given in eq. (2.16) of the notes.
2. Derive (2.17) in the notes using (2.11) and the Hausdorff formula.
3. Write down from there the full transformation rules of the fields under D and K_μ (2.18).

II. The energy-momentum tensor

1. Verify that $\partial_\mu \partial_\lambda \partial_\rho X^{\lambda\rho\mu\nu} = 0$ for $X^{\lambda\rho\mu\nu}$ defined as in (2.25) of the notes.
2. Show that the term $\frac{1}{2} \partial_\lambda \partial_\rho X^{\lambda\rho\mu\nu}$ is symmetric under $\mu \leftrightarrow \nu$.
3. Show that $T^{\mu\nu}$ as given in (2.26) if the notes is indeed traceless.