1. (a) Compute the conserved current $j^\mu$ associated to the scaling symmetry of the massless $\phi^4$ theory in 4 dimensions.

(b) Compute $\partial_\mu j^\mu$ and show that it vanishes classically if $\phi$ satisfies the equations of motion.

2. (a) Show that for any $b^\mu$ the special conformal transformation

$$x'^\mu = \frac{x^\mu - b^\mu x^2}{1 - 2b \cdot x + b^2 x^2}$$

is conformal, so that $g'(x') = \Omega(x)g(x)$ for some positive scale factor $\Omega(x)$. Compute $\Omega(x)$.

(b) Compute the generators $K_\mu$ of these special conformal transformations.

3. Di Francesco et al, Exercise 3.2 (P 91), one-dimensional Ising model.

4. Check the details of the assertion that in flat space of signature $(p, q)$, the conformal algebra is isomorphic to the Poincaré algebra in signature $(p + 1, q + 1)$. 