EXERCISE III
(DEC 19 2012, TO BE HANDED IN JAN 16 2013)

INTRODUCTION TO THE RENORMALIZATION GROUP EQUATION (KREIMER, WS 12/13)

- 1.
  Let $S_R^\phi := -R(m_V(S_R^\phi \otimes \phi P)\Delta)$, with $\phi \in G_V^H$, $R : V \to V$ Rota–Baxter $(R(vw) + R(v)R(w) = R(vR(w)) + R(R(v)w))$. Show: $S_R^\phi \in G_V^H$.

- 2.
  Consider $f(z) \in \mathbb{C}[z^{-1}, z]]$, $f(z) := \sum_{j:=-k}^{\infty} c_j z^j$. Show: $R[f](z) := \sum_{j:=-k}^{-1} c_j z^j$ is Rota–Baxter.

- 3.
  Read *An Etude in non-linear Dyson-Schwinger Equations* (Kreimer, Yeats), Nucl.Phys.Proc.Suppl. 160 (2006) 116-121, hep-th/0605096.