

8. Exercise sheet

This sheet will be discussed on 14.12.2018

Exercise 1

Show that the lower central series and the derived series of a Lie algebra are non-increasing sequences of subalgebras.

Exercise 2

Complete the proof of Proposition 1 in chapter 5 of the lecture.

Exercise 3

Let \mathfrak{h} be the 3-dimensional Heisenberg algebra

$$\mathfrak{h} := \left\{ \begin{pmatrix} 0 & u & w \\ 0 & 0 & v \\ 0 & 0 & 0 \end{pmatrix} \mid u, v, w \in \mathbb{R} \right\}.$$

Construct a basis of \mathfrak{h} with respect to which $ad(\mathfrak{h})$ consists of upper triangular matrices.