9. Prove that the following two Lie algebras over the field $\mathbb{C}$ are isomorphic:

(i) the 3-dimensional Lie algebra with the basis vectors E, F, G and relations

$$[E, F] = 0\,, \qquad [E, G] = 0\,, \qquad [F, G] = E\,;$$

(ii) the Lie subalgebra of the general linear Lie algebra $\mathfrak{gl}_3\mathbb{C}$, consisting of the *strictly upper triangular* 3×3-matrices $[X_{ij}]$: here $X_{ij} = 0$ unless $j - i > 0$.

Do *not* use the classification of 3-dimensional Lie algebras.

10. For a Lie algebra $\mathfrak{g}$ over the field $\mathbb{C}$ consider the Lie algebra $\mathrm{Der}(\mathfrak{g})$ of all derivations of $\mathfrak{g}$. Prove that the set of all *inner* derivations $\operatorname{ad} X$ where X is ranging over $\mathfrak{g}$, is an ideal of $\mathrm{Der}(\mathfrak{g})$.