Introductory Algebra — Exercise no. 8
Due Thursday, 26 January, 2017

Consider the Lie algebra associated with $\mathcal{SU}(3)$ and construct the Cartan–Weyl basis. Compute all non-vanishing elements of the Killing form and find the metric matrix g^{ij} for the inner product in root space. Evaluate the scalar products of all roots, both diagonal $\alpha \cdot \alpha$ and non-diagonal $\alpha \cdot \beta$.

Interpret the scalar products of roots in terms of the lengths and relative angles of vectors in root space and draw a two-dimensional picture of these vectors.