Math 210C Homework 1

- Humphreys Section I.4 (pages 5-6) # 3,8,10 ($\mathtt{B}_2 \cong \mathtt{C}_2$ only).

Note: Problem 10 may be difficult at this stage in the book. As an alternative, you can substitute any other problem from Chapter 1.

3. Let $x = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$, $h = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$, $y = \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix}$ be an ordered basis for $\mathfrak{sl}(2, F)$. Compute the matrices of $\mathrm{ad}(h)$, $\mathrm{ad}(x)$ and $\mathrm{ad}(y)$ relative to this basis.

8. Verify the stated dimension $2\ell^2 - \ell$ of $\mathtt{D}_\ell$.

10. For small values of ℓ, isomorphisms occur among certain of the classical algebras. Show that $\mathtt{B}_2 \cong \mathtt{C}_2$.